

Appendix H – Stakeholder Comments on Updated PSP



United States Department of the Interior



FISH AND WILDLIFE SERVICE

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In Reply Refer To:

July 15, 2013

FirstLight Hydro Generating Company
Turners Falls Hydroelectric Project, FERC No. 1889
Northfield Mountain Pumped Storage Project, FERC No. 2485

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Dear Secretary Bose:

This responds to the updated Proposed Study Plan (PSP) submitted by FirstLight Hydro Generating Company (FirstLight) on June 28, 2013 as part of the relicensing of the Turners Falls and Northfield Mountain Pumped Storage (NMPS) projects, located on the Connecticut River in Franklin County, Massachusetts.

Background

FirstLight filed its initial draft PSP on April 15, 2013. Subsequent to that filing, FirstLight scheduled and conducted eight full day meetings between May 14, 2013 and June 12, 2013. For most of the proposed studies, substantial technical comments and recommendations were provided by the U.S. Fish and Wildlife Service (Service) and other parties at the meetings. Based on those comments and recommendations, FirstLight proposed to make changes to the PSP and acknowledged the need to expand on, clarify, or modify the proposed individual study plans.

By letter dated June 13, 2013, the Service requested a 15-day extension of time (EOT) of the July 15 2013 deadline for filing comments on the PSP. By letter dated June 28, 2013, the Federal Energy Regulatory Commission (Commission) denied the Service's EOT request.

Simultaneous to the PSP development and review, FirstLight has been developing a final detailed Instream Flow Study Plan (IFSP), which will be conducted this summer/fall. FirstLight is also requesting comments on their revised IFSP and has coordinated with the interested parties to schedule the initial field work for the study in early July 2013. Based on the Commission's denial of our EOT request, the Service has requested, and FirstLight has agreed, that the initial

field work should be rescheduled to a later date in order to afford more time to review and provide comments on the updated PSP.

The Service is providing the following remarks for your consideration. These comments were prepared following our review of both the initial and updated PSP, and include information obtained from multiple study plan meetings. We note that the late filing of the updated PSP, coupled with the Commission's denial of our request for an EOT, has regrettably affected our ability to thoroughly review and prepare within a reasonable time frame, essential comments and recommendations on the updated PSP. We believe this denial will also affect other interested parties' ability to adequately review recently submitted materials, prepare and coordinate their comments with other involved parties, and restrict their input during this process. This will unfortunately result in less thorough and comprehensive comments and recommendations being developed and has the likelihood of adversely impacting the interest of all parties, including the Applicant who has expended an enormous amount of time and effort to assure that adequate studies are being considered, developed, and performed. We also note that, as a result of the reduced time frame, our hydraulic engineer will not be available to review some study plans by the July 15, 2013 submittal deadline. Therefore, additional comments on those plans may be provided at a later date, or in response to the Final Study Plan.

3.2.1 Water Quality Monitoring Study

In general, FirstLight's updated PSP is consistent with the methodology outlined in our March 1, 2013 study request. FirstLight has updated the study plan to address comments provided by the Service at the May 14, 2013 study plan meeting; therefore, the Service has no further comments on this study plan.

3.2.2 Hydraulic Study

On page 3-51, it states that water surface elevation (WSEL) monitors record hourly data, while the additional WSEL monitors to be placed upstream of Turners Falls Dam will record WSEL every 15 minutes. The shorter time interval would provide a more precise depiction of project operations, therefore it is unclear why existing monitors are set at a one-hour time interval. If changes are not made to the existing monitors to correspond to the new ones, the reason for the discrepancy should be explained in the final study plan.

3.3.1 Instream Flow Habitat Assessment

On page 3-70, the updated PSP states that a site visit has been scheduled for July 2013 to select transect locations and review 2-D options in the study area. As noted above, due to the Commission's denial of the Service's EOT request, this site visit has been postponed to later in the summer or early fall of 2013.

Habitat Suitability Index Criteria

FirstLight states that it is consulting with agencies and other stakeholders on development of appropriate habitat suitability index (HSI) curves to be used in the flow model. While agreement has been reached on some of the HSI species/life stage curves, a number have yet to be finalized. In addition, the use of guilds as a surrogate for a suite of species with similar habitat requirements has been discussed, but to date, no consensus has been reached whether to use guild curves, the species represented by those guilds, or the appropriate guild curves that could be used. The Service will continue to coordinate with other parties and consult with FirstLight on recommended HSI curves for target species and life stages. Additional modifications of species or guild curves are likely to occur during this consultation, including modifications to the sea lamprey spawning and incubation depth and substrate HSI criteria based on data from the Deerfield River (Yergeau 1983). These changes will be discussed during ongoing consultations on all species.

Freshwater Mussels

FirstLight states that host fish species associated with eastern elliptio and eastern floater mussels are habitat generalists and therefore are poor indicators of fluvial habitat suitability. In reviewing the information provided in Table 3.1.1-2, it appears that at least some of the identified host species are not considered habitat generalists. For example, the white sucker is listed as a host species for both the eastern elliptio and eastern floater, but is considered to be a fluvial-dependent species. In addition, we note that a paper documenting new host fish species for eastern elliptio has been published, indicating a much smaller number of suitable host fishes for elliptio within the Chesapeake Bay watershed (Lellis *et al.* 2013). Of the 38 fish species tested, five were found to be suitable hosts for the elliptio: American eel, lake trout, brook trout, mottled sculpin and slimy sculpin.

While white sucker was not found to be a suitable host species for elliptio in the Lellis study (Lellis *et al.* 2013), it was found to be suitable in an earlier study by Kneeland and Rhymer (2008) and, therefore, it would seem reasonable to utilize the white sucker HSI curves as surrogates if no species-specific habitat suitability indices exist for either the eastern elliptio or eastern floater (similar to the approach that FirstLight has proposed for the yellow lampmussel and triangle floater).

Data Collection

The updated PSP includes a table identifying what the proposed calibration flows/flow ranges will be for each reach and model type. At the last flow study meeting, the Service had noted that for Reach 3, the calibration flow range of 2,500-9,000 cfs appeared to be too high to capture existing conditions, given the approximate extrapolation flow range of 1,430 to 22,500 cfs. Reach 3 begins at the Rock Dam and extends downstream past the Cabot tailrace. Therefore, the upper part of the reach may only receive flows released at the dam (which could be as low as 140 cfs) during periods when Station 1 is not generating, while downstream of Cabot Station would always have flows of at least 1,430 cfs (currently required minimum flow below the project). This concern does not appear to have been addressed in the updated PSP.

Dual Flow Analysis

During a June 20, 2013 conference call regarding the Instream Flow Study conducted by First Light, the Service and other parties requested spatial maps depicting suitable habitat across cells for the 1 D modeled reach. This mapping can be generated from the PHABSIM data. FirstLight expressed concern over the amount of analysis it would take to assess and develop maps for all species/life stages at various flow pairs. It was agreed on that call that, after initial flow study results are reviewed, a subset of species/life stages would be identified to narrow the number of maps to be developed. The updated PSP makes no mention of this issue or the agreement made between FirstLight and other parties. The final plan should include a commitment by FirstLight to the recommended and agreed-to mapping and a description of the proposed post-study consultation process for map development.

Study Report

FirstLight states that raw field data and model output data will be made available upon request. We recommend that both the field data and model output be provided in digital format.

Study Schedule

The study schedule likely needs to be revised due to the postponement of the field visit.

3.3.2 Evaluate Upstream and Downstream Passage of Adult American Shad

Methodology

FirstLight does not provide details on aspects of the study design, such as the number of fish that will be tagged. The rationale FirstLight gives is that these elements will be informed by reviewing existing research and analyzing data from the whole river shad telemetry study conducted by the Service and USGS, which FirstLight proposes to do in Task 1 of the updated PSP.

While the Service agrees that the results of Task 1 would help inform the study design, FirstLight has been given no assurance that USGS will be able to provide the data to FirstLight in a timeframe that fits within the proposed study schedule. Although it would be helpful to have additional site-specific information, it is possible to develop minimum design parameters that can then be refined once Task 1 results become available. Below we provide guidance on those parameters.

Task 2: Develop Study Design

As noted above, the Service recommends that the updated PSP contain a certain level of detail with respect to sample sizes, telemetry equipment specifications, and receiver configurations/locations. While some refinement to these parameters may occur based on results of Task 1, it provides a starting point for those discussions (where none is contained in the updated PSP).

Equipment specifications - The initial PSP filed by TransCanada contained a shad telemetry study plan with a much higher level of detail on the type of equipment that will be used:

Radio receivers will be Lotek SRX_400 and SRX_600 datalogging units. Radio transmitters will be coded VHF transmitters supplied by Lotek Wireless Inc. (Lotek), Newmarket, Ontario, Canada. The radio tags (model number MCFT-3EM) are digitally encoded and will transmit signals on two frequencies (channels), yet to be determined, within the 150- to 151-megahertz band. Each radio tag will contain a unique pulse train to allow for individual fish identification (codes). Each cylindrical radio tag measures 11 mm in diameter, 49 mm in length, weighs 4.3 g in water, and has a 455-mm-long whip antenna. The radio tags will propagate a signal every 2.5 seconds and will have a minimum battery life of approximately 206 days.

PIT readers to be used will be half-duplex units identical to those used for the 2012 USGS study. PIT tags will be 32 mm half-duplex Model RI-TRP-WR2B-30 read/write, Texas Instruments, Austin, TX.

The Service recommends that FirstLight's updated PSP provide a similar level of detail for all equipment (tags, receivers, etc.) that will be used in the study.

Test/Flow Configurations - FirstLight states that a plan and schedule for dam flow releases will be developed and possibly refined based on results of the instream flow study of the bypass reach. The Service agrees with these general parameters, but believes that it is possible (and preferable) to include in the plan a ballpark number of test flows, given that the number of tests has bearing on the number of shad that will need to be tagged to ensure adequate sample sizes for purposes of data analysis. We recommend that two flows below 2,500 cfs be evaluated, in addition to three tests flows between 2,500 and 6,300 cfs. Test flows should be replicated to examine consistency of observations, and to examine confounding variable affects (i.e., timing of run, water temperatures, turbidity). A minimum of three replicate flow conditions for each treatment is recommended.

As a placeholder (pending further consultation and discussion among stakeholders), we provide the following recommended test flows along with their justifications:

Time Period	Test Flow*	Justification
Late April through early June	2,500 cfs	During this period, flows will be driven by needs of SNS. Three test flows spaced apart equally.
	4,400 cfs	
	6,300 cfs	
Early June through early July	1,000 cfs	After the SNS spawning period, bypass flows will likely be driven by instream flow study results for shad with respect to HSI spawning criteria as well as zone of passage.
	1,500 cfs	

* Each test flow should be run for a minimum of three days, with a minimum of three replicates per treatment.

Sample Size - Preliminary data from the USFWS/USGS whole river shad telemetry study results indicate general trends of increasing dropback, especially the farther upriver fish are tagged and the later fish are tagged. Based on this information, the test flow configuration proposed above, and the likely location and number of release sites, the Service recommends that no fewer than 390 shad be double tagged (radio and PIT) for the study, with an equal number of PIT-only tagged fish released. Paired releases of PIT-only tagged fish are a cost effective way to improve potential sample size issues and address many study objectives and/or aid in interpretation of radio-tagged fish data. Proposed capture, handling, tagging, and transport methods may require increasing sample sizes to obtain meaningful and unequivocal results to address defined study objectives. Below is a suggested protocol. The proposed numbers per release will take into account factors that reduce the effective sample size, such as an average dropback rate of 40 percent, and the expectation that not all fish will migrate to the project area, and passage efficiency of existing fishways.

Capture Site	Release Site	Release Date *	# Double Tagged/# PIT Only	Justification
Holyoke Dam	Holyoke Dam	late April (staggered over days)	80/80	Rate of early migrant movement from Holyoke to Turners Falls (TF) and route selection through TF
Holyoke Dam	Holyoke Dam	Early-mid-May (staggered over days)	80/80	Rate of mid-migrant movement from Holyoke to TF and route selection through TF
Holyoke Dam	Holyoke Dam	Late May (staggered over days)	80/80	Rate of mid-migrant movement from Holyoke to TF and route selection through TF
Cabot Ladder	Cabot Forebay	Mid-May (staggered over weeks)	50/50	Rate of movement through TF canal & passage through Gatehouse
Cabot Ladder	Upstream of Gatehouse exit	Mid-May (staggered over weeks)	50/50	Rate of movement through TF headpond and NMPS intake area
Holyoke Dam	Upstream of Gatehouse exit	Mid-May (staggered over weeks)	50/50	Buffer to ensure sufficient # of post-spawned adults for downstream passage assessment

* Release date will depend on the timing of the Connecticut River run in a given study year. If the run is late, these dates would be adjusted accordingly.

Receiver Locations - At the May 21, 2013 study plan meeting, a number of stakeholders identified specific receiver locations. Comparing those comments to the locations identified in

Table 3.3.2-1, it appears that a number of identified sites are not included. Below, we specify those additional sites, as well as provide comments on ones proposed by FirstLight.

- The Cabot Station tailrace receiver is described as a single unit, scanning to the island. This fish ladder entrance and all other ladder entrances should have both a near field and a far field receiver set up. The near field unit will have a restricted detection field (likely three element yagi antenna) and reduced likelihood of issues with noise interference, and will distinguish timing, duration, conditions relative to double-tagged fish movements and the ladder entrance attraction jet. The far field unit will be at a higher sensitivity (likely six element yagi antenna) to cover a large distance and will pick up noise, but also additional data not gathered by the near field unit. The two units complement each other and are part of a sound design to meet study objectives.
- The Station 1 tailrace receiver area shown on Figure 3.3.2-3 is too wide (extending across the entire river channel). The receiver should be sited and configured to pick up shad that are attracted to the Station 1 discharge as well as across the river.
- The “Below Turners Falls Dam” receiver also extends across the river. The equipment should be set up so that it allows determination of which side of the river the fish are coming up (which can then be related to project information such as spill through various gates). As noted above, a second near field receiver will determine whether fish are attracted and approach the entrance jet. Table 3.3.2-1 does not specify exact PIT reader locations. At all of the identified ladders (Cabot, Gatehouse and Spillway), antennas should be located at the fishway exits and entrances.
- A stakeholder had suggested that a receiver be installed at the NMPS upper reservoir. This would help confirm whether shad that are picked up by the NMPS intake receiver are actually entrained by the project or not.
- A stakeholder recommended installing a receiver downstream of Stebbins Island. The most upstream station proposed by FirstLight is the Northfield Mount Herman boathouse. Currently, the upstream extent of the influence of NMPS and Turners Falls project operations is unknown, but could extend as far upstream as the Vernon tailrace. Locating a receiver closer to this upstream extent is reasonable, as fluctuating headpond levels and/or changing hydraulics associated with project operations could alter shad movement and behavior.
- For downstream passage movement of post-spawned shad, as currently configured (Figure 3.3.2-2), it would not be possible to determine whether shad picked up by the Cabot Station Forebay and then the Cabot Tailrace receivers had passed through the units or through the downstream bypass. A PIT antenna on the entrance and exit of the bypass, and a telemetry receiver at the Cabot intake would rectify this problem.

Telemetry stations:

- Red Cliffe Canoe Club – full river width
- Sunderland Route 116 Bridge – full river width (or the Sunderland Waste Water Treatment Plant immediately downstream of the bridge)
- Montague Wastewater – full river width
- Deerfield River Confluence – full river width

- Cabot Station Tailrace – full river width (two receivers for both near field and far field coverage)
- Cabot Station Forebay
 - Radio telemetry antenna at Conte fish passage building
 - Radio telemetry antenna at Cabot forebay – general area
 - PIT antenna and radio telemetry dropper at bypass entrance
- Cabot Fish Ladder
 - PIT antenna and radio telemetry dropper at entrance
 - PIT antenna and radio telemetry dropper at exit
- Radio telemetry antenna to detect fish within the tailrace
- Rawson Island
- North and south channel
- Station #1 Forebay
- Station #1 Tailrace
 - Radio telemetry to identify fish in close proximity to the tailrace
 - Radio telemetry upriver of Station 1 to identify when fish pass the station
- Spillway Ladder
 - PIT antenna and radio telemetry dropper at entrance
 - PIT antenna halfway between entrance and first turn pool
 - PIT antennas at turn pool exits
 - PIT antenna halfway up straight section below counting window
 - PIT antenna and radio telemetry dropper at exit
- Below Turners Falls Dam – full river width to detect fish approaching dam
- Gatehouse Fishway
 - PIT antenna and radio telemetry dropper at new entrance
 - PIT antenna at first vertical slot
 - PIT antenna at last vertical slot
 - PIT antenna and radio telemetry dropper at viewing window
- Upstream end of canal – antenna for fish entering the canal from upstream
- Turners Falls Impoundment
 - NMPS Gill Bank – full river width
 - NMPS Intake
 - Area antenna
 - Dropper antennas at entrance to ensure full depth coverage
 - NMPS Upper reservoir
 - Shearer Farm – full river width
 - Northfield Mount Herman boathouse – full river width
 - Downstream of Stebbins Island – full river width

Video camera locations

- Entrance to the spillway ladder
- Entrance to the Cabot ladder

Task 4: Evaluation of Mortality

The Service has no objection to the use of motion sensor telemetry tags; however, the plan should specify that the tag time interval that will denote a dead shad should be developed in consultation with the Service and other stakeholders. The plan notes that mortality tags will be assessed in the vicinity of areas of entrainment or spill. Fish may be injured and passed downstream of these project structure areas, only becoming readily notable in downstream areas of lower water velocity. Surveys for mortality tags should cover downstream to the Hatfield S-Turn and deep pool areas, which were noted as containing stationary shad tags in the 2011 and 2012 study.

Task 5: Reporting

FirstLight does not provide any details on the types of analyses that will be conducted on the data collected. At a minimum, the Service recommends that the following information be provided in any interim or final reports:

- individual graphical portrayals of movements, identifying passage route selection (upstream and downstream);
- individual tabular depiction of rate of movement from release location up to and through any fish passage facilities;
- analysis of telemetry data in relationship to environmental (water temperature) and operational conditions (as noted in Table 3.3.2-1); and
- summary of mortality data by passage route in tabular format.

All data used to develop the report should be made available to stakeholders (upon request) in digital format, including all telemetry and PIT tag data.

Study Schedule

FirstLight proposes to first review and summarize information from existing shad telemetry reports, and then obtain, compile and analyze the USGS/FWS telemetry data in order to develop a detailed study plan by November of 2013 for stakeholder review and comment. A final study plan would be filed with the Commission by December 2013.

As noted above, the Service recommends that FirstLight develop a more detailed study plan now, which could later be refined based on the results of reviewing and analyzing existing data. The Service has provided guidance on a number of study plan elements herein.

The updated PSP indicates that the telemetry study will occur in 2014, but that a second year of field work may be conducted (depending on 2014 results). It is unclear to the Service what results would necessitate a second year of study. For a telemetry study such as this, evaluation of a single year is not sufficient to understand fish movement and behavior in a complex river environment. Therefore, the Service recommends that the study occur in both 2014 and 2015.

Lastly, at the May 21, 2013 study plan meeting, the Commission had commented that the plan should identify the possible need for a directed mortality study (e.g., balloon tags) if results of the 2014 telemetry study are insufficient to analyze (i.e., motion sensor tags do not function as planned, sample sizes are too small, etc.).

3.3.3 Evaluate Downstream Passage of Juvenile American Shad

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

In response to Service comments provided at the June 4, 2013 study plan meeting, FirstLight has modified the study design to expand the use of hydroacoustics to include the Gatehouse and NMPS intake area in addition to the Cabot forebay. The Service fully supports this modification.

FirstLight proposes to only evaluate the hydroacoustic data during pumping operations. The Service recommends that evaluations start one hour prior to initiation of pumping operations, to assess fish within the zone of pumping influence. Releases of radio-tagged fish should be planned to occur in a range of river discharge conditions (i.e., lower flow conditions would represent least favorable conditions for juveniles, as opposed to higher river discharge flows). Having releases under varied river discharge and a range of pump operations will increase the likelihood of obtaining the most useful information on the extent of any potential project-related impacts to juveniles. FirstLight may wish to increase tagged fish sample sizes to permit examination of operation effects under a reduced pumpback level (1 to 2 units). The Service is most interested in accurately determining operation effects (as currently utilized) in the least favorable scenario, which is 3 to 4 units utilized on pumpback.

Task 2: Evaluate Route of Passage Chose, Delay and Spill Survival

In response to concerns raised by the Service at the June 4, 2013 study plan meeting that it would be difficult to collect wild juvenile shad from the Connecticut River of a size sufficient to implant with telemetry tags, FirstLight now proposes to work with the Service to raise shad in a hatchery environment. We support this proposal and look forward to working with FirstLight on this effort.

The Service recommends providing more details with respect to the tagging, holding and release protocol. For example, will the fish be transported from the hatchery to the release location prior to tagging, or post-tagging? How long will the test fish be held prior to release? We suggest that FirstLight look to the recently conducted study at the Muddy Run Project for guidance on methodology (Normandeau Associates Inc. January 2012. pp. 8-9).

FirstLight proposes to release test fish at least one mile upstream of the Turners Falls Dam. At the June 4, 2013 study plan meeting, the Service recommended having at least two release sites: one upstream of NMPS and one between NMPS and Gatehouse. Below is a suggested release protocol, along with sample sizes:

Location	Release Protocol	Sample Size
Approximately 2 miles upstream of NMPS intake	Release test fish on six days during migration period. On each date, release test fish hourly for six hours. Start time will be based on NMPS operations data.	Minimum four test fish per release date per hour. Total of 144 test fish.
1 mile upstream of Gatehouse entrance (Rod & Gun Club)	Release test fish on four days during migration period. Release all fish together at dusk.	Minimum 20 test fish per release date. Total of 80 test fish (supplemented with unentrained NMPS test fish).

The Muddy Run Project used a total of 145 test fish in its entrainment study (Normandean Associates Inc. 2012). Additional test fish are needed in order to ensure sufficient sample sizes for each possible passage route and different spill conditions at Turners Falls Dam.

The updated PSP should specify whether FirstLight intends to use the same receiver locations as the adult shad telemetry study or not. We recommend that in addition to the locations identified for the adult shad study (as modified by Service comments above), an additional receiver should be installed at the Gatehouse entrance. The adult shad study proposes to use a PIT reader at Gatehouse, but because the juvenile shad will not be PIT tagged, a telemetry receiver should be placed at the entrance to Gatehouse.

Task 3: Turbine Survival

In response to stakeholder comments conveyed at the June 4, 2013 study plan meeting, FirstLight has revised the study plan to confirm that a balloon tag survival study will be conducted to assess turbine mortality at Station 1 and Cabot Station. The Service supports this proposal, but continues to advocate for the need to assess spill mortality. Depending on which gates are being used, spill can discharge at various locations along the dam's apron, including areas of ledge that could result in mortality to outmigrating juvenile shad. While FirstLight indicates that spill mortality can be assessed via Task 2, it is not clear how that would be done, as the juvenile shad telemetry tags would not contain a motion sensor similar to the adult tags.

The Service recommends that at a minimum, spill mortality be evaluated through the four bascule gates and a tainter gate (unless FirstLight can provide certainty that these gates will not be used during the downstream juvenile shad migration period). A minimum of 25 test fish per gate should be tagged and released immediately upstream of each gate to determine spill survival.

At Station 1, FirstLight proposes to evaluate one of the four double runner Francis units, as well as the smaller, faster exciter unit. The Service has no objection to this proposal. In total, three turbines will be evaluated (two at Station 1 and one at Cabot Station). The overall number of test fish proposed for the Turners Falls Project is 150, which would allow 50 test fish per turbine if distributed equally. Fish would be injected into the turbines while at or near full hydraulic

capacity. The Service reiterates concerns it expressed at the June 4, 2013 study plan meeting that if the units typically operate at less than full hydraulic capacity, that condition needs to be evaluated. Likewise, if the units are always operated at peak efficiency, that is the condition that should be evaluated. If the units are operated at varying efficiencies, all three conditions should be evaluated (maximum gate, peak efficiency, and minimum gate).

Task 4: Reporting

This section of the updated PSP lacks sufficient detail regarding the analyses that will be used on each related task (hydroacoustic, radio telemetry and balloon tag). For the telemetry task, the Service recommends that FirstLight provide graphical portrayals of each individual fish's movements and timing through the project area, identifying passage route selection. These movements should be analyzed relative to environmental and operational variables.

For the turbine entrainment task, survival through each turbine/gate setting tested should be calculated based on the number of tagged fish injected into a given turbine or bascule gate that are alive immediately and 48 hours after turbine passage. Final results would be adjusted for survival of control fish. Any injuries of recaptured fish should be reported. Total through-project survival should be calculated based on results of this study, other related studies (i.e., hydroacoustics and telemetry data), as well as historical operations data.

All data used to develop the report should be made available to stakeholders (upon request) in digital format, including all hydroacoustic, telemetry and balloon tag data.

3.3.4 Evaluate Upstream Passage of American Eel

Task 1: Systematic Surveys

In the initial study plan, the Cabot Station log sluice was identified as a survey site, but has been removed in the updated PSP. The reason for this change is unclear. The log sluice outfall passes 200 cfs from June 1 to November 15 and this flow could attract juvenile eels moving upstream. The rip rap along the banks in the vicinity of the log sluice should be surveyed.

Task 4: Reporting

The updated PSP states that a report will be submitted as part of the Initial Study Report in accordance with the Commission's Integrated Licensing Process schedule. However, according to the process schedule, the Initial Study Report is due September 12, 2014 and updated study reports are due September 12, 2015. Given that the eel survey and trap collections may extend into October each year, it is unlikely that FirstLight will be able to file the results in time to make either deadline. In Study Plan 3.3.3, a similar situation exists. For that study plan, FirstLight has acknowledged the disjunct in timing, and proposes to provide stakeholders with a study report supplement to transmit the results of that study (by February of 2015). We recommend that FirstLight include a similar proposal for this study: provide stakeholders with a report

supplement by December 1, 2014 for the eel survey and by December 1, 2015 for the trap collection study.¹

3.3.5 Evaluate Downstream Passage of American Eel

The updated PSP incorporates the use of HI-Z Turb’N tags to assist in quantifying entrainment mortality at the Turners Falls Project. The Service supports this modification to the study design.

Task 1: Evaluate Timing of Downstream Migratory Movements

A general overview of the proposed methodology is given. FirstLight states that the scope and details will be designed and executed in consultation with agencies, if needed. It is unclear to the Service why the scope and details cannot be determined at this time.

FirstLight proposes to evaluate the hydroacoustic data at NMPS only during pumping operations. The Service recommends that evaluation start one hour prior to initiation of pumping operations, to assess fish presence within the zone of pumping influence.

Task 2a: Northfield Mountain Route Selection Study

FirstLight will tag eels with motion sensing radio telemetry tags and monitor their movements during downstream migration, with receivers placed in the immediate vicinity of the NMPS intake. Few details on study methodology are provided. The Service recommends that FirstLight generally follow the protocol outlined in the report “Movement and Behavior of Telemetered Emigrating American Eel in the Vicinity of the Muddy Run Project” (Normandeau Associates Inc. February 2012) with respect to methods and data analysis for the radio telemetry study.

The Service recommends that some of the receiver locations identified in the adult shad telemetry study also be used for the eel movement study (i.e., the Shearer Farm and NMPS Gill Bank sites), in addition to the NMPS intake. In addition, receivers should be placed at the Turners Falls Gatehouse entrance and outlet to the upper reservoir (unless FirstLight is assuming that every eel picked up by an intake receiver constitutes an entrained eel). The receivers at the NMPS intake should be placed in a manner that provides full depth coverage.

FirstLight states that it is still evaluating sample sizes. Dr. Alex Haro at the U.S.G.S. Conte Anadromous Fish Branch of the Leetown Science Center has provided FirstLight with recommendations for minimum sample sizes. At NMPS, Dr. Haro recommends at least 50 eels be tagged. This number is similar to the number of eels radio tagged for the Muddy Run study.² The Service agrees that a minimum of 50 eels should be tagged; the final number may be higher, depending on how many releases will be needed to test all relevant operating conditions. For example, FirstLight has stated that the project rarely pumps with more than three units. However,

¹ Because both the eel survey and trap collection require little analysis, FirstLight should be able to develop a report within 45 days from the date the data collection ends.

² At the Muddy Run Project, additional eels were acoustically tagged—we assume to ensure full-depth coverage over the 60-foot-deep intake. In order to ensure full-depth coverage over the 45-foot-deep NMPS intake, it will be necessary to use dropper antennas.

if FirstLight requests, and is granted by the Commission, an increase in the storage capacity of the upper reservoir, then it is possible that the percentage of time when all four turbines are pumping may increase in the future. Therefore, eel movement and entrainment should be evaluated under both of those conditions.

At Muddy Run, eels were initially released just after dusk. Later in that study, this protocol was amended due to the fact that many eels were passing the project prior to the project entering a pumping mode. A similar adaptive strategy should be used at NMPS. Likewise, the hydroacoustic data that will be collected concurrently should be used to inform release times; if weekly review of the hydroacoustic data indicates eel targets at a certain time (e.g., from 10 p.m. to 1 a.m.), the release protocol should be adjusted accordingly.

Our recommended release protocol is to run tests on eight nights (four nights at three units pumping and four nights at four units pumping) with three releases per night (at dusk, two hours later, and two hours after that) and three test fish per release. This equates to a total of 72 eels.

Task 2b: Turners Falls Dam Route Selection Study

FirstLight proposes to release tagged fish 3 km upstream of the Turners Falls Dam to monitor movements of eels through the lower headpond and power canal. In order to ensure that a sufficient number of eels are exposed to all potential passage routes, the Service recommends that eels also be released immediately downstream of Gatehouse as well as at the proposed location in the headpond.

As noted above, we recommend that FirstLight generally follow the fish collection, holding, tagging and release protocol used at the Muddy Run Project.

With respect to sample size, we offer the following preliminary release protocol:

Location	Release Date/Time	# Eels/release
3 km upstream of Turners Falls Dam	Between Sept 15 and Nov 15, release eels at dusk on day prior to expecting the following flow conditions: <ul style="list-style-type: none">• no spill at dam; and• various spill conditions (discharge gate and flow volume) based on consultation with parties on the instream flow study results and normal range of spill conditions during downstream eel migration periods.	10 per condition, for a total of 30 or more fish (depending on the number of agreed-to spill scenarios)
Immediately downstream of Gatehouse	Between Sept 15 and Nov 15, release eels at dusk on day prior to expecting the following operational conditions: <ul style="list-style-type: none">• only Station 1 operating;• only Cabot operating; and• both stations operating (if this ever occurs).	10 per condition, for a total of 30 fish (supplemented with fish from headpond releases)

As noted to above, we recommend additional radio-telemetry receiver locations to assure that all migration and passage routes are covered. Our recommended locations are similar to those we have identified in our comments on the adult shad telemetry study, Study 3.3.2.:

Telemetry stations:

- Shearer Farm – full river width
- NMPS Intake
 - Area antenna
 - Dropper antennas at entrance to ensure full depth coverage
- NMPS Upper reservoir
- NMPS Gill Bank – full river width
- Turners Falls Impoundment – full river width at boat buoys
- Gatehouse
 - Upstream
 - Downstream/canal
- Turners Falls Dam
 - Across and above bascule gates
 - Across and above tainter gates
- Below the dam – full river width
- Bypass reach at Station #1 – full river width
- Canal
 - Station #1 forebay
 - Cabot station forebay
 - Cabot bypass – multiple droppers, one receiver
- Cabot station tailrace
- Montague Waste Water Treatment Plant – full river width

We also note that Dr. Haro had indicated that it could be difficult to detect tagged fish using the Cabot log sluice. Dr. Haro had suggested that some assurance be provided that the radio method will have a high degree of detection/reliability in this location; otherwise, use of a PIT system to supplement telemetry data and increase confidence was recommended. Likewise, the plan should confirm that receivers will be configured to provide full-depth coverage at all intakes and other deep (>30 feet) locations.

Task 2c: Mobile Tracking

FirstLight plans to manually track tagged eels via boat, vehicle or by foot between release sites to several kilometers downstream of Cabot Station. We recommend including the following additional details in this section of the plan:

- manual tracking will be performed up to 5 km downstream of Cabot Station; and
- manual tracking will occur on a weekly basis, beginning after the first release date and ending in mid-December (or when all viable tagged eels have been detected at the Route 116 Bridge, whichever occurs first).

Task 3: Data Management and Analysis

The report should include a graphical illustration of the movement of each fish. All data used to develop the report should be made available to stakeholders in digital format, upon request.

Task 4: Turbine Survival

In response to stakeholder comments conveyed at the June 4, 2013 study plan meeting, FirstLight has revised the study plan to confirm that a balloon tag survival study will be conducted to assess turbine mortality at Station 1 and Cabot Station. The Service supports this proposal, but continues to advocate for the need to assess spill mortality. Depending on which gates are being used, spill can discharge at various locations along the dam's apron, including areas of ledge that could result in mortality to outmigrating adult eels. While it is possible that spill survival may be able to be inferred with data collected from motion sensor radio telemetered eels, there is no guarantee that radio-tagged eels will use the gates during a spill condition. Evaluation of spill survival is critical to both assess potential impacts of various spill release amounts and locations on eel survival, compare spill survival to turbine survival, and to assess whether spill may be one alternative to addressing downstream eel passage at the project.

The Service recommends that at a minimum, spill mortality be evaluated through the four bascule gates (unless FirstLight can provide certainty that these gates will not be used during the downstream adult eel migration period). A minimum of 25 test fish per gate should be tagged and released immediately upstream of each bascule gate to determine spill survival.

At Station 1, FirstLight proposes to evaluate one of the four double runner Francis units as well as the smaller, faster exciter unit. The Service has no objection to this proposal. In total, three turbines will be evaluated (two at Station 1 and one at Cabot Station). The overall number of test fish proposed for the Turners Falls Project is 150, which would allow 50 test fish per turbine if distributed equally.

According to the updated PSP, eels would be injected into the turbines while at or near full hydraulic capacity. The Service reiterates concerns it expressed at the June 4, 2013 study plan meeting that if the units typically operate at less than full hydraulic capacity, that condition also needs to be evaluated. For example, if the units are always operated at peak efficiency, that is the condition that should be evaluated. If the units are operated at varying efficiencies, each of those conditions must be evaluated (e.g., maximum gate, peak efficiency, and minimum gate), as turbine survival is known to vary depending on turbine unit operations.

FirstLight provides no description of data analysis for this task. Survival through each turbine/gate setting tested should be calculated based on the number of tagged fish injected into a given turbine or bascule gate that are alive immediately following turbine passage and after 48 hours, adjusting for survival of control fish. Any injuries of recaptured fish should be documented and reported. Total through-project survival should be calculated based on results of this study, other related studies (i.e., hydroacoustics and telemetry data), as well as historical operations data.

Study Schedule

The proposed schedule envisions that all tasks will be completed in 2014. Given the number of locations and various operating scenarios to be evaluated, completion of this study in one year appears overly optimistic. Therefore, we believe that this section should specify that an additional study year may be necessary due to circumstances such as: (1) unfavorable environmental conditions; (2) equipment malfunction; (3) inability to secure sufficient test fish; and (4) inadequate replicates of various locations and/or operating scenarios.

Reporting

The updated PSP does not contain a section on reporting. The Service recommends that reporting for this study plan include:

- release numbers, locations and dates;
- fish vitals (length, weight, and morphometric criteria);
- river temperature at NMPS, canal, bypass and below Cabot Station;
- route selection;
- all detections of fish;
- behavior of fish that do not pass the project;
- delay of fish: location and time;
- survival of fish passing each project facility;
- overall project passage effectiveness; and
- graphic description of the movement of each fish.

3.3.6 Impact of Project Operations on Shad Spawning

Study Goals and Objectives

The Route 116 Bridge is in Sunderland, not Holyoke.

In the first version of the study plan, the last bullet in this section proposed that FirstLight would “quantify” spawning activity, while in the updated PSP, the word has been changed to “verify.” The objective is to both verify and quantify spawning activity. Project operation could affect the amount or success of shad spawning while not eliminating spawning entirely, therefore verification of the presence of spawning alone would be insufficient to assess project impacts.

Project Nexus

This section identifies the potential impacts of project operations on shad spawning activity, behavior and success. These include poor fertilization, flushing of eggs to unsuitable habitat due to flow increase, and eggs dropping out into unsuitable habitat due to flow decrease. Since proposed egg collection and monitoring is limited, it is unclear how these impacts will be addressed, given the proposed study methods.

Methodology

It is unclear why FirstLight deleted the paragraph that began with “The field studies will examine...” The Service recommends retaining that paragraph and deleting the new language.

The method section identifies the plan to review existing information and the results of hydraulic modeling to help determine field study locations. We note that the results of the Instream Flow Study will also inform this decision.

Task 1: Development of a Detailed Study Schedule

This section identifies FirstLight’s plan to investigate project discharge changes and natural hydrograph flows to understand the relationship between the magnitude of normal seasonal flows and flow fluctuations due to project operations. While this is a reasonable analysis, we note that impacts to shad spawning would not be affected by magnitude of flow alone, but could be affected by the frequency of changes and rate of flow changes.

Task 2: Examination of Known Spawning Areas Downstream of Turners Falls Dam

FirstLight’s plan states that surveys will concentrate on the five known spawning locations downstream of the Deerfield River confluence. In fact, Kuzmeskus (1977) identifies nine historical spawning sites between the Route 116 Bridge and the Turners Falls Dam. All of these sites should be surveyed, in addition to any sites identified through mobile tracking of adult shad as part of the radio telemetry study (Study Plan 3.3.2). In addition, as survey crews are moving among historical sites, they should monitor for additional (previously undocumented) spawning sites.

In Phase 2 of the updated PSP, FirstLight states that the impacts of flow fluctuation on spawning shad will be investigated at locations identified in Phase 1 “that may become dewatered when water elevations decrease due to operational changes at Cabot Station...” While the Service agrees that those sites should be assessed, the investigation should not be limited to only those sites; there likely are spawning sites that would not become dewatered, but still would be susceptible to large flow/elevation fluctuations and associated changes in depth and velocity which could impact spawning behavior or success. Therefore, the proposed observational and physical habitat data should be collected at all identified spawning sites between Cabot Station and the Route 116 Bridge in Sunderland, and collected under various operational scenarios.

In order to determine if project operation impacts spawning behavior, FirstLight would test several discharge manipulations and compare behavior during the manipulations to “baseline” spawning behavior. It is unclear to the Service when observations would be made relative to the discharge manipulations. For example, if one scenario is to evaluate full discharge and then a minimum flow release, when would observations be made? We recommend that field crews observe and count spawning splashes before the flow changes, during the change, and after the change has occurred, as spawning behavior could be altered during both increases and decreases in flow. In addition, at times of test manipulation, a dedicated field crew should be tasked with

tracking any radio-tagged fish that may be on spawning sites so that their behavior can be evaluated relative to fluctuations in flow.

Task 3: Identification of Spawning Areas Upstream of Turners Falls Dam

The protocol for identifying spawning sites within the Turners Falls impoundment (to the base of Vernon Dam) requires more detail. For instance, surveys for shad downstream of the Turners Falls Dam will occur once 10,000 fish have passed the Holyoke Dam. A similar trigger for initiating surveys upstream of the Turners Falls Dam should be specified. Given that fish pass the Turners Falls Dam later (i.e., under generally warmer water temperatures), and that far fewer fish pass the Turners Dam than the Holyoke Dam, it may be reasonable to set a combination trigger (e.g., after 2,500 shad pass Gatehouse and river temperatures reach 18°C).

FirstLight states that upstream surveys will target areas of suitable habitat, including those containing flowing waters over coarse substrates. These terms are somewhat vague and undefined and may be overly restrictive. For example, at least one previous study documented shad gathering in sections of the Connecticut River characterized by a sandy bottom (Katz 1972), which would not be considered coarse substrate. Given how little we know about shad spawning in the Turners Falls Pool, the Service recommends that surveys occur in all waters of suitable depth (as identified in HSI curves).

Study Schedule

The first bullet in this section likely should read “October 2013 through December 2013” (rather than “December 2014.”

As the Service commented at the June 4, 2013 study plan meeting, given how variable temperature and water flows can be, the timeframe for conducting the field studies should be expanded to include all of May and June (and refined based on passage numbers).

3.3.7 Fish Entrainment and Turbine Passage Mortality Study

Task 2: Quantification of Shad and Eel Entrainment

FirstLight proposes to perform a quantitative assessment of shad entrainment at NMPS based on the tagging and hydroacoustic monitoring that will occur under studies 3.3.2 and 3.3.3. The Service has no objection to using data from those studies to estimate entrainment for adult shad and outmigrating juvenile shad. However, this would leave a data gap with respect to entrainment of younger life stages of shad (i.e., larvae and pre-migrants) that reside in the Turners Falls Pool, potentially within areas of the river susceptible to multiple pump-back events at NMPS.

These concerns were related to FirstLight at the June 4, 2013 study plan meeting. The Service stated that quantification of entrainment of early life stages of shad was needed in order to inform overall impact of NMPS on the shad restoration effort, as well as potential mitigation measures to reduce or offset entrainment mortality at NMPS.

The Service reiterates that entrainment of young-of-year shad at NMPS needs to be quantified. As noted in our March 1, 2013 study request, previous entrainment studies focusing on early life stages of shad (egg, yolk-sac larvae, post yolk-sac larvae, and juveniles) have been conducted at NMPS. Since those early 1990s studies, operations at NMPS have changed (and may change further as a result of this relicensing). Likewise, ongoing passage improvements at the Turners Falls Dam will lead to more adult shad moving through and spawning in the Turners Falls Pool. Therefore, more early life stages will be prone to entrainment. The impact this may have on the shad population and achievement of restoration goals needs to be addressed.

We recommend that a similar methodology to that used in the 1992 NUSCO study (Lawler, Matusky and Skelly Engineers 1993) be used by FirstLight to quantify entrainment of early life stages of shad at the NMPS Project. The sampling should begin July 1 and should continue through October 31.

Task 3: Estimation of Turbine Mortality

FirstLight proposes to use existing literature along with the site-specific design characteristics of the Turners Falls Project turbines to estimate mortality of resident fish entrained at Station 1 and Cabot Station. During the June 4, 2013 study plan meeting, the Service voiced concern over using this methodology, for the following reasons:

- While there is a database of turbine passage survival studies, the actual number of sites with similar design characteristics (e.g., turbine size, type, runner diameter, head, etc.) where similar target species were evaluated is quite small. Using Station 1 as an example, the table below shows the number of similar sites available for comparison in the Electric Power Research Institute database. Once the evaluated species are compared with potential species of interest at Turners Falls, it becomes apparent that any mortality estimates derived from the literature would be based on a very limited data set.
- As mentioned at the June 4, 2013 study plan meeting, a recent report by Kleinschmidt (2007) [that used a methodology at the Holtwood Project (FERC No. 1881) similar to the one that is being proposed in the current updated PSP] found that the average predicted survival values derived from the Advanced Hydro Turbine Model (Franke *et al.* 1997) were higher than actual empirical studies conducted at the Holtwood Project for juvenile Alosids. Where empirical data were taken from other projects, results showed a higher survival for some species/life stages evaluated than from the modeled results (for adult river herring and adult eels). Where empirical studies showed lower survival than modeled results, Kleinschmidt appears to attribute the discrepancies to flaws in the field studies, while results showing higher survival in the field studies are attributed to differences in turbine specifications (rather than to any inherent flaws in the Franke *et al.* model). The Service acknowledges that field studies rarely are conducted under perfect conditions, however it is equally plausible that the Franke *et al.* model requires further refinement that additional empirical studies may help inform.

While the Service does not object to using a desktop methodology to estimate turbine mortality at Station 1 and Cabot Station for resident fishes, we are recommending that the results of the empirical mortality studies that will be conducted on adult and juvenile shad and adult eels be compared to estimates derived using the Franke *et al.* model. This comparison should allow further insight into the appropriateness of using a model versus empirical study to calculate turbine mortality at a project.

Task 4: Reporting

The Service recommends that FirstLight include a table similar to Tables 2.3-1 and 2.3-2 in the Exelon Muddy Run Revised Study Plan 3.3 for eels or shad (FERC # 2355) that summarizes the long-term history of pumping (number of units per hour) at NMPS by month for April through November.

Table summarizing pertinent turbine specifications for projects where survival studies have been conducted, along with information from Turners Falls.

	Designed	Number	Runner		
	Turbine	of	Speed	Head	Runner
Station	Flow (cfs)	Buckets	(rpm)	(ft)	Diameter (in)
Turners Falls Station 1, Unit 3	500	??	200	43.7	42
Turners Falls Station 1, Unit 2	140		257	43.7	33
Alcona, MI	615	16	90	43	100
Alcona, MI	1155 -1660	16	90		100
Bond Falls, MI	450		300	210	
Caldron Falls, WI (Unit 1)			226	80	72
Centralia, WI (Unit 1)	510				
Centralia, WI (Unit 2)	510		90	20	28
Centralia, WI	variable			15.5	
Colton, NY	497	19	360	265	59
Cushman Plant 2, WA	800	17	300	450	83
Cushman Plant 2, WA (1960)	800	17	300		83
E. J. West, NY	2,700	15	113	63	131
Finch Pruyn, NY (Unit 4)				9-16	41
Finch Pruyn, NY (Unit 5)				9-16	41
Five Channels, MI	675	16	150	36	55
Five Channels, MI	1034 -1167	16	150		55
Grand Rapids, WI (U 1,2,4 comb)	645		90		
Grand Rapids, WI (Unit 2)	645		150	28	58
Grand Rapids, WI (Unit 4)	926		180	28	72
Hardy, MI (Unit 2)	510	16	163.6	100.2	83.75

Highley, NY	675	13	257	46	48
Hoist, MI	300		360	142	
Holtwood, PA(U10/single runner)	3,500	16	94.7	62	149.5
Holtwood, PA (U3/double runner)	3,500	17	102.8	62	112
Holtwood, PA	3,500	16	95	55	164
Luray, VA	369	12	164	18	62.75
La central de Beauharnois	7,000	13	75	79	212
Minetto, NY	1,500	16	72	17	139
Peshtigo, WI (Unit 4)	460		100	13	80
Potato Rapids, WI (Unit 1)	500		123	17	84
Potato Rapids, WI (Unit 2)	440		135	17	80
Pricket, MI	326		257	54	53.5
Rogers, MI (units 1 & 2)	383	15	150	39	60
Ruskin, BC	4,000		120	130	149
Sandstone Rapids, WI			150	42	87
Seton Creek, BC	4,500		120	150	114
Shasta, WA	3,200	15	138.5	380	184
Shasta, WA	3,200	15	138.5		184
Stevens Creek, SC	1,000	14	75	28	135
Vernon, VT/NH	1,834	15	74	34	156
White Rapids, WI	1,540	14	100	29	134
White Rapids, WI	900				
Youghiogheny, PA	750			120	

Study Schedule

The meeting for this study plan took place on June 4, 2013, not May 14, 2013.

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

Study Goals and Objectives

Objective number 5 states that the computational fluid dynamics (CFD) modeling will be coupled with the telemetry study and passage counts to understand conditions preferable for guiding fish to entrances. We note that fish movements are also influenced by other variables, therefore FirstLight should also record and evaluate influences of river temperatures and flows on movements and passage information.

Project Nexus

FirstLight states that existing information indicates that substantial numbers of outmigrating fish use the log sluice/bypass. Given the research that has been done by the Conte Fish Branch at this site, this statement is not accurate with respect to eels and should be clarified accordingly.

Methodology

Task 3 is to construct a three-dimensional model of each target location. The description of the model does not identify grid size to be used in the model. Without some idea of the size of the grid to be used, it is impossible to know if the CFD modeling will be meaningful. For example, a 2-foot grid cell will not provide fine enough resolution to provide data about sweeping velocities at the intake rack or the capture velocities in front of the downstream bypass. The final study plan should define the grid size and provide justification for the proposed grid size.

Task 4 is to execute model runs. Since tailwater conditions greatly affect the functionality of both ladder entrances, FirstLight should run the model for different tailwater conditions based on the normal range of tailwater levels.

3.3.9 Two-Dimensional Modeling of the Northfield Mountain Pumped Storage Project

Study Goals and Objectives

This section states that one goal is to “Assess velocities and flow fields at, and in proximity to, the Project intake/discharge structure...” We note that River2D cannot model vertical walls. River2D is designed to model river beds and cannot model vertical walls based on the experience of our hydraulic engineers and their conversations with Terry Waddle (USGS retired) who was on the River2D development team. Approximating vertical as slightly sloped walls can lead to numerical instabilities within the model. In light of these limitations, we can only speculate that River2D can be used to accurately model flow field in the proximity of the intake/discharge structure; however, if it cannot, is River2D the right software to use? There are other two-dimensional codes like SMS that may be applicable, and should be considered.

Methodology

FirstLight proposes to develop a 2-D model of the NMPS intake/discharge area in order to evaluate potential impacts to fish and bank erosion. In the initial study plan, this assessment was to occur from the NMPS project to 1 km upstream and downstream of the intake/discharge area. At the May 21, 2013 study plan meeting, stakeholders commented that the distance should be expanded from 1 km to 5 km; however, the updated PSP does not incorporate this change.

The proposed River2D model is a steady-state model. Based on some estimates of hydrograph speed and wave celerity, it may take 30 minutes before changes in intake/discharge conditions at the pumps are propagated throughout the extent of the 2-km-long proposed model (or longer with a more extended model we recommended). Given the diurnal nature of both shad movement and pumped storage operations, a transient River2D model seems warranted to assess

NMPS effects on fish and to inform agency management decisions. The existing steady-state Woodlot model (2007) should be able to be adapted to transient set-up and we recommend this be incorporated too.

Regarding Task 3, FirstLight indicates that in the proposed model, the “initial uniform gridded base mesh will be generated on an approximately 50-75 foot spacing” and refined where necessary. This initial grid size may have been appropriate for the original Woodlot model, but this proposed model is focusing in part on the intake/discharge structure which is approximately 75 feet across. That means the entire intake is only one grid cell. The baseline for grid size should be based on getting ten or more cells laterally across the intake/discharge structure and refined moving out. Without this level of resolution, the FirstLight model will not be very accurate or helpful in the proximity of the structure.

At the May 21, 2013 study plan meeting, there were at least two comments made by stakeholders relative to velocities. The first (made by the Service’s Connecticut River Coordinator) concerned velocity measurements at the NMPS intake. Because only mean column velocity will be used in the model, the Service had requested, if it would be possible, to develop separate velocity profiles for the intake. FirstLight’s consultant indicated that it would be possible to provide those data, as an acoustic doppler current profiler (ADCP) unit will be used to collect velocity measurements at the intake while gathering calibration data. This effort should be included in the study plan. These data are important because differential velocities across the intake area relate directly to potential for entrainment based on, among other variables, where a fish tends to reside in the water column (e.g., Alosids tend to be surface oriented, whereas eels tend to be bottom oriented).

The second comment related to deliverables. While the updated PSP states that model run results will include 2-D water depths and velocities, the Commission’s consultant had requested that the study plan include more details regarding how the results would be presented (e.g., vector plots, pseudocolor maps, etc.). It does not appear that FirstLight has addressed this issue.

3.3.10 Assess Operational Impacts on State-listed Odonates

We defer comment on this study to the Massachusetts Division of Fisheries and Wildlife’s Non-Game and Natural Heritage Program.

3.3.11 Fish Assemblage Assessment

Methodology

FirstLight proposes to sample, using three gear types, in the early summer and fall time period. During the June 5, 2013 study plan meeting, the Service had recommended adding in a third time period in the spring. We reiterate this recommendation, as it will provide more comprehensive temporal coverage and increase the probability of detecting those fish species that are more active or fulfilling specific life history requirements under cooler water temperatures (e.g., walleye, white sucker). In order to avoid conflicts with the shortnose sturgeon, the spring sample could focus on the impoundment and bypass reach.

Sampling will be based upon habitat strata, but no definitions for the strata are provided. Using the upstream boundary of Vernon Dam to the Turners Falls Dam, there is the potential to designate many strata on a variety of important criteria. The Service recommends that an overriding criterion should be whether the area is subject to less of an impoundment effect (Stebbins Island to Ashuelot River confluence), is in impounded riverine (much of the main stem), off-channel areas (Bartons Cove, Miller Rod and Gun Club area), and lower reaches of tributaries (e.g., Ashuelot River, Dry Brook, Millers River, Four Mile Brook). These areas will provide different habitat conditions for different species and/or life stages. Large areas, such as “main stem” habitat from possibly the Ashuelot River to the Turners Falls Dam, should be defined by depth zones, reflecting nearshore/shallow, mid-channel shallow, deep water, substrate type (fines/sand/gravel/rock), and submerged aquatic vegetation beds, as these similarly affect species and life stage use.

FirstLight states that at least 18 stations will be sampled. The number of stations should be reflective of the stratification designations and should be based on the diversity of habitat types/criteria noted above, which will influence fish species occurrence. The number of replicate samples required within randomly selected strata should be based on observed species catch rates.

The updated PSP notes collection of 150 fish will satisfy sampling in a transect. However, it is possible that the proposed target number could be reached with one school of spottail shiners or yellow perch, which could lead to a misrepresentation of the fish assemblage at that transect. Sampling cannot be standardized to both distance and sampling on-meter time; rather, sampling time, based on electrofisher “on-time” should be the standard for effort (the 500 seconds identified in the plan appears reasonable). Using distance to standardize is not preferred because the distance sampled will and can vary based on rate of drift/powering, habitat types, quantity of fish and other factors with a 500-second time period. However, FirstLight should report the distance for each transect.

Gill net set time should be reduced from the 24-hour period stated. A several-hour period (3-4 hours) set at dusk into early evening will increase netting effectiveness and reduce the risk of excessive fish mortality. Should catch rates be extremely low, longer sets could then be used. Effort could be reported in catch per net hour (with identification of timing: dusk, dusk-evening, evening).

3.3.12 Evaluate Frequency of Impact of Emergency Gates and Bypass Flume on Shortnose Sturgeon

Methodology

FirstLight states that, should field evaluation of spillway gate and bypass flume scenarios be necessary, data will be collected during the fall to avoid potential impacts to shortnose sturgeon spawning and incubation. However, the fall is when FirstLight proposes to conduct a number of downstream passage studies, and manipulating gate settings during that period could influence

study results. The Service recommends that simulated events occur during the summer period, to avoid interfering with other relicensing studies.³

3.3.13 Impacts of Project Operations on Littoral Zone Habitat

The Service has no objection to the updated PSP, as it appears to incorporate all of the comments raised during the May 22, 2013 study plan meeting.

3.3.14 Aquatic Habitat Mapping of Turners Falls Impoundment

Task 2: Analysis and Report

The Service has no objection to the updated PSP, as it appears to incorporate comments raised during the May 22, 2013 study plan meeting.

3.3.15 Assessment of Adult Sea Lamprey Spawning with Project Areas

FirstLight proposes to survey areas of suitable habitat in the Connecticut River from below Vernon Dam downstream to the Route 116 Bridge in Sunderland, as well as in selected tributaries. At the May 22, 2013 study plan meeting, the Service questioned why only three tributaries had been identified in the initial study plan (the Deerfield, Millers and Ashuelot rivers). In response, the updated PSP contains one additional tributary (the Fall River). The Service recommends that the Green and Sawmill rivers be evaluated to determine if suitable habitat in confluence areas may be affected by project operations, as sea lamprey spawning has been documented in both rivers.

Study Goals and Objectives

The last listed objective of the study is to assess whether the operations of the projects are adversely affecting sea lamprey spawning areas. This objective is too narrow. The study should assess whether the operations of the project are adversely affecting lamprey spawning, not just spawning habitat, since project-induced flow or water level changes could affect spawning behavior without substantial visible sign of direct impact to physical habitat (i.e., dewatering nests, washing nests away, deposition of fine sediment on nest). To this end, the proposed study plan would need to be revised to more closely resemble the study plan proposed by TransCanada for their upstream projects.

Task 1: Field Data Collection

As part of the field data collection, FirstLight proposes to delineate remaining wetted areas of suitable habitat to determine areal loss of habitat. Yergeau's (1983) research found that a minimum velocity over the nests was needed; on the Deerfield River, where most nests were constructed along the river banks, abrupt changes in river discharge resulted in many abandoned redds, even though the nests were still wetted. Therefore, all relevant variables (depth, velocity

³ Under the Study Schedule section of the plan, the summer of 2014 is identified as when the field investigation would take place.

and substrate) should be taken into account when determining the amount of remaining suitable habitat.

Field data collection also includes returning to a subset of 30 identified redds during a period of low water levels that follow a high flow event to assess whether the change in flows affected the habitat or resulted in nest abandonment. Preference for nest selection will be given to “nests most likely impacted by project operations.” The stated protocol and nest selection criteria will not be sufficient to fully assess the impact of project operations.

First, it is not clear what is meant by low flow events following high flow events. Since the operations of both projects can result in multiple flow and water level fluctuations daily, these normal project operations need to be assessed. Also, it is not clear if FirstLight proposes that nests would be re-visited only once or more frequently. Lastly, nest selection would be weighted to nests thought to be most likely impacted, but the actual impacts of the project on nests and spawning behavior are not known.

Since spawning lamprey would be subject to daily but variable fluctuations (varying high flows, low flows and rates of change), it will be important to assess the nests frequently to observe nest condition and nesting behavior over a full range of project operations. The study proposal by TransCanada, in response to a very similar study request, proposes a more robust sampling and observation protocol that will be far more likely to permit an evaluation of the full range of impacts to lamprey spawning habitat and spawning behavior. The TransCanada study proposes observation of nests from the arrival of lamprey at a spawning area (see comments on telemetry below) until water temperature exceeds 22°C, re-visiting a subset of nests on a daily basis. On each visit to a nest, lamprey spawning activity and physical habitat data will be collected, and photographs of nests will be taken under a range of flow conditions. TransCanada proposes to select the subset of nests that will provide as much habitat variability as possible, rather than weighting selections based on assumptions of impacts.

We recommend that FirstLight review and adopt the lamprey redd observation protocols proposed by TransCanada. Implementation of those sampling protocols would assure that sufficient information is gathered on both redds and spawning behavior, over a range of project operations and a range of redd locations and habitats.

Task 2: Data Analysis

Additional analysis of lamprey nest location data should be undertaken to compare redd locations and results of periodic observations to project operations throughout the spawning period.

This section of the updated PSP provides no details on the types of statistical analyses that will be performed on the data collected. We recommend that the narrative under Task 1, where FirstLight states that appropriate statistical techniques such as ANOVA, regression and t-tests will be used to compare variables and determine which factors may affect spawning success, be moved to Task 2.

Task 3: Report

The report should include a map of spawning areas and individual redds that are periodically monitored.

Study Schedule

At the May 22, 2013 study plan meeting, the Service voiced concern over relying solely on habitat-based surveys to evaluate spawning success relative to project operations. TransCanada is conducting a similar study, but is using radio telemetry to track sea lamprey to spawning grounds. We expressed similar concerns to them: relying on just one methodology has disadvantages. In the case of FirstLight's proposal, it is possible that, given the large geographic area, the amount of potential spawning habitat, and the highly variable passage numbers at the Holyoke and Turners Falls projects, surveys may not identify any active nests. Coupling this effort with a modest-scale radio telemetry study, as proposed by TransCanada, would help ensure that data are collected at active nest sites. If a telemetry component is not included in 2014, but an insufficient number of nest sites are observed in 2014, the Service recommends that the study be repeated in 2015, and that the methodology be modified to include a radio telemetry component.

3.3.16 Habitat Modeling for State-Listed Mussel Species Downstream of Cabot

We defer comment on this study to the Massachusetts Division of Fisheries and Wildlife's Non-Game and Natural Heritage Program.

3.3.17 Tributary and Backwater Access and Habitat

Existing Information

At the May 22, 2013 study plan meeting, the Service questioned whether disregarding larger tributaries in this investigation was reasonable. FirstLight states that larger tributaries have sufficient access during all operational phases due to the large catchment size. This reasoning does not account for channel morphology at the confluence, where large sediment bars or other morphological features may inhibit access during certain operational phases regardless of tributary drainage area.

Project Nexus

As stated above, the Service is not convinced that the larger tributaries should be discounted from this investigation. Given that there are only three such systems in the study area, it would not appear to increase the survey effort substantially to add them to the study plan. In fact, the Deerfield River is listed as an investigation area in this section, even though in an earlier section of the updated PSP, FirstLight states it will not be investigated.

Methodology

In response to comments made by stakeholders at the May 22, 2013 study plan meeting, FirstLight has revised its proposed depth criterion from 4 inches to 1 foot. The Service supports this change, as a 4-inch depth would be inadequate for the range of species expected to move upstream into tributaries (e.g., white sucker, trout, sea lamprey, etc.).

Study Schedule

FirstLight states that the survey will be conducted in 2014. The plan does not address a situation like this year, where flows have exceeded the capacity of the Turners Falls Project since the end of May (excluding June 20-27, 2013), which likely would have impacted trying to obtain low flow data. The Service recommends that, should flow conditions in 2014 limit the ability to collect low flow/headpond elevation data, the study should be repeated in 2015.

3.3.18 Turners Falls Canal Drawdown

Study Goals and Objectives

In response to feedback provided by stakeholders at the May 22, 2013 study plan meeting, FirstLight has modified the goals and objectives of this study. The Service believes the updated goals and objectives address the concerns raised at the meeting.

Task 1: Conduct Aquatic Organism Survey of Canal During 2014 Drawdown

Standing Water Surveys

There are no specifically stated methodologies in this section; rather, references are made to an assessment in 2011. During the May 22, 2013 study plan meeting a number of stakeholders expressed dissatisfaction with the qualitative nature of that survey. Assessment techniques for fishes in ponded or flowing water when the drawdown is complete should include backpack electrofishers and seine net gear. Standard approaches to determine relative abundance may include standardized effort among sample areas with fish captured, identified, enumerated and reported in a unit of effort/time, such as fish/minute, using the backpack meter timer.

A standard level of effort, such as a single backpack operator with dip net, with one or two people netting, can be utilized as the habitat conditions permit among the zones (as a standardized level of effort) for a set period of time (e.g., 500 seconds on-meter). This will allow repeated measures and comparisons among areas. Where it is not possible to use backpack shockers effectively, seine nets may be employed. Standardized methods should be developed, such as a single sweep using a bridle/rope.

The plan is not clear as to how frequently the areas of standing water will be monitored. We recommend that at a minimum, those sites be monitored three times (immediately after the drawdown is complete, in the middle of the drawdown period, and immediately prior to refilling the canal).

Dewatered Area Surveys

FirstLight proposes to quantitatively assess the impact of the canal drawdown on sea lamprey ammocetes and freshwater mussels, by deploying up to 10 randomly selected 1-meter-by-1-meter quadrats in zones 2-4. Counts and status (stranded, alive, dead) of lamprey and mussels within each quadrat would be recorded and the data extrapolated to all suitable habitat within each zone.

According to data from the Appendix G survey report, sea lamprey were observed in zones 5 and 6; therefore, those areas should be included in the quadrat survey. Additionally, from the photos presented in Appendix G, it is clear that each zone differs in width and bathymetry. The Service recommends that 10 quadrats be placed randomly in zones 2 and 6, and 20 quadrats be placed in zones 3, 4 and 5. We also recommend stratifying by bank and channel. The final number and placement of quadrats should occur in consultation with the resource agencies and Conte Lab researchers.

The plan should also address how the Station 1 forebay is impacted by the drawdown. We cannot ascertain from the Appendix G report whether that area remains wetted, as the main canal in that zone (7) apparently does. If the forebay area also becomes dewatered, it should be surveyed also.

FirstLight states that the location of sufficiently wetted areas or pools will be recorded, although the method is unclear. The Service recommends that all standing pools of water in zones 2 through 6 be mapped with a GPS unit. This information should then be used to develop graphical representations of the canal in its dewatered state, including identifying those pools where water quality data was recorded. In addition to collecting water quality information from standing pools, water temperature should be monitored in zone 7 for the duration of the drawdown with a continuous data logger(s).

Catches may be reported in units of standardized time of effort and also by unit area (quadrats). Water quality information, fish survey and quadrat data should be summarized in tabular format and included with the graphical canal representation in a report to be provided to stakeholders.

Task 2: Identify and Assess Potential Measures

The plan should identify that another potential measure to be evaluated is the need for annual drawdowns. At the May 22, 2013 study plan meeting, it was conveyed to the stakeholders that the Commission's Part 12 inspection recommends that drawdowns be conducted annually (but does not require it).

In addition to reaching agreement on measures to assess, this task also needs to include development (through consultation with stakeholders) of a study design to assess the effectiveness of any measures that will be tested in the field.

Task 3: Design Selected Measure(s)

Earlier in the updated PSP, FirstLight states that selected measures to reduce adverse effects of the drawdown will be studied in 2015 (first paragraph under the Methodology section); however,

Task 3 does not explicitly state that the selected measure(s) will be studied (only that they will be designed). The plan should specify that selected measure(s) will be designed and studied to determine the effectiveness at minimizing adverse impacts to fish and mussels.

Study Schedule

The seventh bullet should read “Install and Test – September 2015.”

This section also should describe how the proposed schedule fits into the Integrated Licensing Process and procedural deadlines.

3.3.19 Evaluate the Use of an Ultrasound Array at the Cabot Tailrace

General Description of Proposed Study

FirstLight states that this study will be conducted in 2015, pending the results of studies 3.3.1 (instream flow study) and 3.3.2 (adult shad telemetry study); however, the plan is unclear regarding how the results of those studies would inform the need to conduct the ultrasound array study. Absent all of the radio-tagged shad moving up to the dam without delay at Cabot Station under all spill conditions, it will be necessary to conduct the ultrasound array study. The Service is recommending the shad telemetry study occur in 2014 and 2015, which will allow for one full year of studying shad movement without the array and another with the array (for a portion of the migration season).

Task 1: Ultrasound Deployment

The plan does not describe specifics on study design, but states the agencies will be consulted to determine a schedule. We offer the following guidance on minimum design elements:

- ultrasound testing should be initiated once telemetered shad arrive at Cabot Station;
- two test treatments will be evaluated: array on and array off;
- there should be a minimum of six replicates per treatment per flow condition (e.g., non-generation, generation, spill, etc.);
- the first “on” treatment should begin between 10 a.m. and noon daily;
- each “on” treatment should run for at least two hours and each “off” treatment should run for a minimum of three hours (to ensure that sufficient shad are present in the tailrace when the next “on” test begins); and
- a maximum of three days of testing per week for a minimum of two weeks should be conducted (or for the number of weeks necessary to meet the minimum replicate criterion).

For example, if testing were to occur over three days, and it is assumed that shad move during daylight hours (approximately 8 a.m. to 6 p.m.), it would be possible to perform at least four tests per day, for a total of 12 tests (six replicates per treatment). Alternative testing schedules may be considered based on initial results, in consultation with stakeholders. After the first week of trials, a progress report should be provided to stakeholders that describes preliminary results.

Adjustments to the array or study design, if appropriate, and agreed to by FirstLight and interested parties, could be initiated at that time

At the May 21, 2013 study plan meeting, a stakeholder recommended that video be used to supplement the telemetry data. The Service supports this recommendation, as it would allow for observational evaluation of shad (tagged and untagged) behavior in the vicinity of the array during test treatments. Cameras should be deployed both inside the Cabot ladder and outside of the ladder entrance.

FirstLight is proposing to conduct the study in 2015. If the study were to be performed in 2014 and results proved to be insufficient to determine the effectiveness of ultrasound technology in moving fish away from the tailrace and up into the bypass, there would still be an additional study year to either redo or modify the study to employ different monitoring methods, such as hydroacoustics. Therefore, in order to maximize the chances of collecting sufficient data in one study year, the Service recommends adding in hydroacoustics to evaluate how shad respond to the ultrasound array. This would allow for larger sample sizes than telemetry and/or video alone.

Although not specified in the updated PSP, the same telemetry locations described in our comments under Study Plan 3.3.2 should be used in the ultrasound study:

- Deerfield River Confluence – full river width
- Cabot Station Tailrace
 - Radio telemetry antenna coverage of the full tailrace
 - Radio telemetry antenna coverage of the area immediately in front of the fishway entrance
- Below the Cabot Station – full river width
- Rawson Island (both channels)

Environmental and operational data should be recorded during each test period and used in data analysis and interpretation.

Task 2: Reporting

FirstLight does not describe the types of analyses that will be conducted on the data collected. For the telemetry data, FirstLight should use a test that will allow for determination as to whether there is a statistically significant (at $p \leq 0.05$) difference in the number of readings with the array on and off. This will help answer the question of whether ensouffication is a successful avoidance mechanism. In order to determine if the ultrasound array reduces or eliminates delay in the tailrace, FirstLight should analyze the telemetry data to see if there is a relationship between the number of readings for an individual tag and the treatment type (e.g., if there are fewer readings per individual under an “array on” treatment, it may indicate the array reduces delay). The video data should be qualitatively summarized. Hydroacoustic data should be analyzed to determine the relationship between the number of targets in the vicinity of the Cabot tailrace and ultrasound treatment.

3.4.1 Baseline Botanical

Task 2: Field Surveys

Wildlife and Habitat Type Mapping

The Service recommends that all eagle roosting or nesting trees, either previously documented or observed during the surveys, should be recorded, photo-documented and georeferenced.

Invasive Plant Survey

FirstLight states that the intent of the upland invasive species survey is to document significant infested areas. The word “significant” is somewhat ambiguous unless it is being used in the statistical sense, which we do not think is the case for the subject study; therefore, we recommend removing it. The Service has no objection to the proposed methodology.

Task 3: Data Analysis and Reporting

This section of the plan lacks specificity. For the bald eagle information, we recommend that the report provide maps of the project area showing locations of all eagle roosting and nesting trees. A complementary table should be provided listing the location of the trees, whether it is a roosting or nesting site, an assessment of its status (healthy, diseased, etc.) and its level of protection (e.g., within a right-of-way, on protected/conservation land, etc.). Similarly, the invasive plant data should be portrayed on maps as both polygons and point locations, as appropriate. In addition, the invasive data should be provided in tabular format, listing the infestation, species composition and estimated size of infestation.

Study Schedule

The schedule shows report preparation from September to December of 2014. FirstLight should describe how this timeline fits into the Commission’s Integrated Licensing Process and procedural deadlines.

3.5.1 Wetlands, Riparian, and Littoral Habitat Baseline Survey

Task 4: Invasive Plant Survey

In the updated PSP, this section has been expanded to provide more details on the specific invasive species to be included in the survey. As in the upland botanical survey study plan, FirstLight has added in language stating that the intent of the survey is to document significant infested areas. As stated above, the word “significant” is somewhat ambiguous unless it is being used in the statistical sense, which we do not think is the case for the subject study; therefore, we recommend removing it.

While, in general, the Service has no objection to the proposed methodology, it is still unclear to us whether FirstLight intends to survey the entire impoundment and 13-mile stretch of river

below the Turners Falls Dam for wetland and aquatic invasives. In response to this question being raised at the June 5, 2013 study plan meeting, our recollection is that FirstLight indicated that it would be surveying the entire perimeter of the project-influenced area; this does not appear to be reflected in the updated PSP. The Service recommends that FirstLight survey for riparian and aquatic invasives, by boat or on foot, along the entire perimeter of the impoundment and downstream of the dam to the Route 116 Bridge in Sunderland on both sides of the river. The shoreline area to be surveyed should include aquatic, littoral and riparian areas up to the limit of the project-influenced extent of the streambanks.

Task 6: Project Water Level Fluctuation Assessment

To address implications of water level fluctuations on federally listed Puritan tiger beetle habitat, the updated PSP proposes establishment of a cross-section transect to be used in conjunction with hydraulic modeling results. The limited habitat for the Puritan tiger beetle at Rainbow Beach is a shallow sloped area that is sensitive to water level fluctuations. Additional cross-sections and/or fine-scale surveying and mapping of the entire area should be considered so that the areal extent of habitat impacted by various river flow and Holyoke Project pool elevations can be fully assessed.

Study Schedule

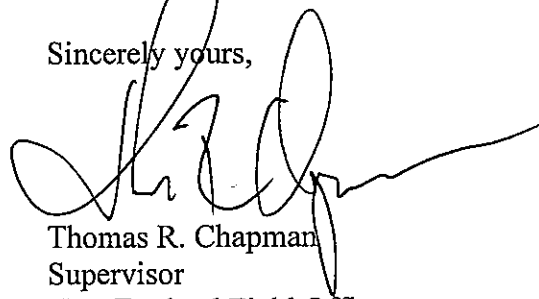
The schedule shows report preparation from September to December of 2014. FirstLight should describe how this timeline fits into the Commission's Integrated Licensing Process and procedural deadlines.

3.8.1 Evaluate the Current and Potential Future Modes of Operation

The Service has no comments on this study plan.

Thank you for the opportunity to comment on the proposed updated PSP. If you have any questions regarding these comments, please contact John Warner of this office at 603/223-2541.

Sincerely yours,



Thomas R. Chapman
Supervisor
New England Field Office

Kimberly D. Bose, Secretary
July 15, 2013

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cc: John Howard
FirstLight Power Resources
CRC, Ken Sprankle
NMFS, Bill McDavitt
NMFS, Jess Pruden
MA DFW, Caleb Slater
MA DEP, Bob Kubit
MA NHESP, Jessie
NH DES, Owen David
CRWC, Andrea Donlon
TNC, Katie Kennedy
Reading File
ES: MGrader:7-15-13:(603)223-2541

BIBLIOGRAPHY

- Franke, G.F., D.R. Webb, R.K. Fisher, Jr., D. Mathur, P.N. Hopping, P.A. March, M.R. Headrick, I.T. Laczko, Y. Ventikos and F. Sotiropoulos. 1997. Development of environmentally advanced hydropower turbine system design concepts. Prepared for U.S. Dept. of Energy, Idaho Operations Office Contract DE-AC07-94ID13223.
- Katz, H.M. 1972. Migration and behavior of adult American shad, *Alosa sapidissima* (Wilson), in the Connecticut River, Massachusetts. Master's thesis. University of Massachusetts, Amherst, MA. 97 pp.
- Kleinschmidt. 2007. Desktop Review of Downstream Passage & Turbine Survival of Diadromous Fishes Passing Through the Redeveloped Holtwood Station. Holtwood Redevelopment Project; FERC No. 1881.
- Kneeland, S.C. and J.M. Rhymer. 2008. Determination of fish host use by wild populations of rare freshwater mussels using a molecular identification key to identify glochidia. *Journal of the North American Benthological Society*. 27: 150-160.
- Kuzmeskus, D.M. 1977. Egg production and spawning site distribution of American shad, *Alosa sapidissima*, in the Holyoke Pool, Connecticut River, Massachusetts. Master's thesis. University of Massachusetts, Amherst, MA. 134 pp.
- Lawler, Matusky and Skelly Engineers (LMS). 1993. Northfield Mountain Pumped-Storage Facility – 1992 American Shad Studies. February 1993. Northeast Utilities Service Company, Berlin, CT.
- Lellis, W.A., B.S. White, J.C. Cole, C.S. Johnson, E.V.S. Gray, H.S. Galbraith and J.L. Devers. Newly Documented Host Fishes for the Eastern Elliptio Mussel *Elliptio complanata*. *Journal of Fish and Wildlife Management*. June 2013. Volume 4(1): 75-85.
- Normandeau Associates Inc. and Gomez and Sullivan Engineers P.C. January 2012. Movement and Behavior of Telemetered Emigrating Juvenile American Shad in the Vicinity of the Muddy Run Project. Muddy Run Pumped Storage Project; FERC No. 2355.
- Normandeau Associates Inc. and Gomez and Sullivan Engineers P.C. February 2012. Movement and Behavior of Telemetered Emigrating American Eel in the Vicinity of the Muddy Run Project. Muddy Run Pumped Storage Project; FERC No. 2355. 224 pp.
- Yergeau, K.M. 1983. Population demography, riverine movement and spawning habitat of the sea lamprey, *Petromyzon marinus*, in the Connecticut River. Master's thesis. University of Massachusetts, Amherst, MA. 89 pp.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

July 15, 2013

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: Comments on Firstlight's Proposed Study Plan dated June 28, 2013 for Turners Falls (P-1889) and Northfield Mountain Pumped Storage (P-2485)

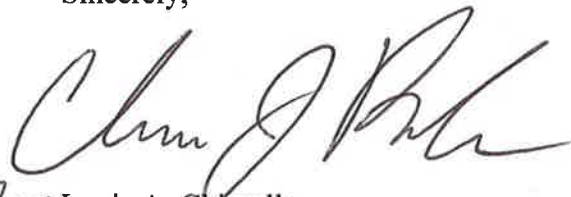
Dear Ms. Bose:

We have reviewed the proposed study plan dated June 28, 2013, that Firstlight has developed for its two projects on the Connecticut River. We have coordinated our comments with the US Fish and Wildlife Service. Our detailed comments are attached to this letter.

Several public meetings were held at FirstLight's visitor center in Northfield, MA since the filing of the proposed study plan on April 15 that allowed stakeholders to have a discussion with FirstLight about the various proposed studies. Generally, the comments we are filing reflect areas that we believe either were not addressed or need continued clarification in the Updated Proposed Study Plan.

If you have any questions or need additional information, please contact Bill McDavitt (William.Mcdavitt@noaa.gov) or 978-675-2156.

Sincerely,



for Louis A. Chiarella

Assistant Regional Administrator
for Habitat Conservation



**National Marine Fisheries Service Comments
of July 15, 2013, on Firstlight's UPDATED Proposed Study Plans
for Turners Falls (P-1889 and Northfield Mountain Pumped Storage (P-2485)).
Version filed June 28, 2013**

3.1.1. 2013 Full River Reconnaissance (FRR)

While we understand that FRR is primarily a rapid assessment at a point in time that will display bank conditions on a map, as a resource management goal, we see FRR as a tool to identify future areas in need of bank restoration. The assessment of how well previous restoration efforts have worked within the Turners Falls headpond will provide valuable guidance when decisions are made in terms of what techniques to use at future sites.

Task 1b: Geo-referenced video

Just as the land based observation data from task 1c will be used in study 3.1.2, we expect that to some degree, data from the geo-referenced video, particularly on the toe of slopes and lower banks, will also be used in study 3.1.2.

Task 4 Develop Maps, Summary Statistics, Evaluation of Conditions, and Analyze Changes in Condition since Implementation of ECP and from 2008 FRR.

We appreciate the proposed efforts to compile data from previous FRR's and to attempt to discern what features and factors were considered when identifying a potential or active erosion site. Given the large amounts of data to be collected, we suggest the data be made available through the use of online mapping services (e.g. ArcGIS.com) such that geospatial data can be used with a web browser.

Task 6: Develop Final Report, Mapping and Recommendations

Deliverable #14 mentions that recommendations of potential future stabilization sites will be mapped. The PSP does not mention the methods or factors used to determine these sites. Deliverable #16 mentions that existing stabilization projects will be evaluated but the PSP does not mention what data and what factors will be used to determine the success or failure of the techniques used at each restoration site.

Study Schedule

The Updated Proposed Study Plan (PSP) indicates that FirstLight is seeking permission from FERC to file the FRR in September 2014, approximately 6 months later than it normally would. FirstLight has filed a letter requesting permission to do this.

We are not in favor of pushing back the due date for the FRR for the following reasons

- 1) the FRR's main purpose is license compliance under the existing license,
- 2) the FRR is intended to generate a schedule and list of sites for riverbank restoration – the 2008 report lacked such a component; we see the scheduled development of potential sites as important to mitigating impacts and providing good habitat for trust species,
- 3) we think seeing the FRR before the report for study 3.1.2 (Northfield Mountain/Turners Falls Operation Impact on Erosion and Potential Bank Instability) makes logical sense because study

3.1.2 should build on the FRR,

4) FRR has its own schedule that allows for a staggered review with sufficient time for discussion and input from all parties. As such, it should continue to remain a compliance issue under the existing license and not be tied to the ILP license schedule.

3.1.2. Northfield Mountain/Turners Fall Operations Impact on Erosion and Potential Bank Instability

TransCanada has recently completed LiDAR surveys all the way down to the Holyoke Dam and the data in their impoundments will be used in TransCanada's Study 3. FirstLight could likely obtain/purchase the LiDAR data from TransCanada to include a beach formation analysis in this study.

Study Goals and Objectives

This section states “develop a comprehensive understanding of riverbank erosion”. One of the most fundamental concepts of geomorphology is that of change over time. This section is devoid of any reference to time or a time period over which the “comprehensive understanding” is developed. Various data sets mentioned in this study (e.g monumented transects, water level recorders, bathymetric maps, previous FRR's, previous erosion studies) all provide data from different time periods. FirstLight should clearly state the period of time that will be encompassed for this study.

Task 3c. Existing Water Level Monitors – Evaluation of the Maximum Daily Fluctuations of Turners Falls Impoundment Elevation on a Monthly (and Annual) Basis

In addition to the development of a “delta” duration curve, we suggest that a histogram of the “delta” data also be developed. Such a graphic makes it visually easy to determine the “delta” bins that occur most frequently.

Task 3d. Proposed Water Level Monitors – Hydrographs of the Turners Falls Impoundment Elevation versus flow

We suggest that hydrologic routing times be factored in to the analysis. Given that high flow releases out of Vernon will route through the headpond more quickly than low flows, we realize that this adjustment can be tricky. Nevertheless, to line up water surface elevations from downstream water level recorders with the exact same time stamp as Vernon release time stamps does not make sense. Given the existing 1D and 2D hydraulic models for the Turners Falls headpond, it should be possible to generate reasonable estimates for routing times and subsequent offset times to compare flow with elevation.

Task 5c. Evaluation of Round 1 Field Evaluation

The study states “FirstLight will utilize the existing 22 transects so long as they are representative of the range of riverbank features and characteristics.” However, to understand the data, this task does not state the types of categories or bins into which an existing transect could fall into in order to determine if the transects are indeed representative. Study 3.1.1. (2013 FRR) suggests some possible riverbank characteristics for upper and lower banks. Clarification on the types of categories that a transect must fall into would be helpful. With the exception of some transects around the Route 10 bridge, most of the 22 transects are bank to bank cross

sections. As such, there are well over 22 banks that have been repeatedly surveyed. The bank conditions on Stebbins Island and Kidds Island could also conceivably be used for analysis. We also note that no mention of stratigraphy or stratigraphic analysis of the banks is made in this section.

Task 6. Causes of Erosion

Given the varying driving forces acting on the banks (e.g. flowing water, boat wakes, ice debris), we suggest that it will be difficult to discern the exact cause of erosion. However, it might be possible to discern causes of bank erosion that are more likely than others for some locations based on the types of mass wasting and stages of erosion and location of these features on a given bank.

Hydraulic Shear Stress due to Flowing Water (Tractive Force)

The study states “Shield’s criteria relates velocity to the particle size of sediment at the point of incipient motion.” While this is indeed correct, Shield’s 1936 paper was conducted on homogenous sediment in flumes. We recommend that critical dimensionless shear values be used that are appropriate for the specific bank material being modeled which may or may not be homogenous. In other words, uniformly applying a critical dimensionless shear value of the commonly used value 0.06 may or may not be appropriate. This modeling approach also requires an understanding of the Reynolds number and Shield’s plot indicates that critical dimensionless shear varies as a function of the Reynolds number. As such, we ask that some discussion of the Reynolds number in terms of how smooth, transitional or rough the flow conditions are would provide helpful context in the analysis.

The bottom paragraph on page 3-34 has a sentence that states “Suspended sediment samples will also be collected over a range of flows to develop a relationship between sediment transport and hydraulic conditions.” We understand that a positive relationship exists between discharge and sediment suspended in the water column. However, years of research in this field also indicate that many rivers have orders of magnitude more data in suspended sediment samples for a given discharge due to a variety of factors such as hysteresis and available supply of sediment from the watershed. Given the timeframe of this study, we believe that limited suspended sampling will yield limited useful information.

Geotechnical analysis of hydrodynamics of flow and water level fluctuations

Rather than rely on default values for cohesion for a given layer type (e.g silty sand) we are encouraged to see that the data collected in the field will be used to provide specific cohesion values for each layer in the model. Because the model computes factor of safety as the hydrograph varies, we expect that continued dialogue with FirstLight will allow us to focus on specific time periods in order to limit the amount of output provided by the model.

Task 7: Report

To the extent possible, we ask that geospatial datasets be made available to the public. Online map services that allow users to view data via a web browser are a helpful and complimentary way to view data in addition to static maps in a report.

Also, we recommend considering some of the approaches that TransCanada is proposing from Study 2 (Riverbank Transect Studies) for the Northfield Mountain Pumped Storage Project (NMPS). These methodologies may be applicable to the FirstLight studies.

“The work products provided as part of this study will include:

- 1) A GIS shapefile of monitoring sites and table of site characteristics;
- 2) drafted overlaid topographic cross sections showing changes at each site through time;
- 3) bar graphs showing estimated volumes of soil loss through time and segregated by bank features (e.g., composition, slope, height); and
- 4) line graphs showing variations in water stage through time overlaid with bar graphs showing volume of soil loss during the time between survey events;”

In addition, we find the approach taken in TransCanada’s Study 3 (Riverbank Erosion Study) provides a logical and well-presented layout of the data they are collecting and analyzing:

“The work products to be completed as part of this study will include:

- 1) An annotated bibliography of local studies and published literature describing how a particular document relates to one or more of the study goals;
- 2) tables and figures documenting and illustrating how the character of the watershed (e.g., drainage area), valley (e.g., width), and channel (e.g., meander dimensions) vary in a downstream direction;
- 3) maps showing long-term trends in channel migration and bank erosion;
- 4) bathymetric contour maps and/or cross sections showing how the depth of the river varies across the river at selected sites;
- 5) surficial geology maps of the Connecticut River valley bottom within the study area presented on 7.5’ topographic quadrangles;
- 6) GIS shapefiles and summary tables of channel conditions for more than 300 miles of shoreline;
- 7) figures and tables of the stratigraphic and soil descriptions of bank sediments;
- 8) topographic cross sections and plan maps illustrating important bank and channel conditions;
- 9) maps and cross sections illustrating how flow stage, velocity, and shear stress vary with discharge for various points along the river based on hydraulic modeling results; and
- 10) an interim and final study report synthesizing the above deliverables into a narrative that addresses the study goals and issues raised in various study requests.”

3.2.2 Hydraulic Study of Turners Falls Impoundment, Bypass Reach and below Cabot Station

Under General Description of Proposed Study, we recommend adding NMPS pumping and generating cycles to the list of causes of water level fluctuations below Cabot Station.

Task 1. Update Turners Falls Impoundment HEC-RAS model

Page 3-55 mentions that Firstlight will install “water level recorders from approximately August 2013 until approximately November 2013 to capture a range of low and high flows and to capture a range of operating conditions at Vernon, Northfield and Turners Falls hydropower facility.” We wonder if there is a typographical error that should have read November 2014. A four month period of operating in late summer through mid-Fall does not appear to fully capture all the range of natural and operational conditions that the Turners Falls headpond can experience. If the 2013 reference is indeed written as intended, we would ask the period of operation for the referenced water level recorders be lengthened to cover at least one full year of operation.

Task 7. Unsteady Flow Model

Table 3.2.2-3 summarizes the production run matrix. We ask that ‘Max Gen’ and ‘Min-Gen’ for the power canal be clarified given the two powerhouses Firstlight operates. It is not entirely clear what these terms mean with respect to Cabot Station and Station 1 operations. We suspect that the amount of time both projects are at maximum operational capacity or the amount of time both project are shut down is minimal. As such, we would like to understand what the hydrologic and hydraulic implications for some sort of interim operational scenario means.

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

With respect to *Table 3.3.1-1: Target Species and Life Stages Proposed for the IFIM Study Reaches* the description of shortnose sturgeon (*Acipenser brevirostrum*) lifestage criteria for Reach 4 should be described as “Young of year nursery, juvenile foraging and overwintering, adult foraging and overwintering.” The *Habitat Suitability Criteria References* should reflect the following references:

Kieffer, M. and B. Kynard. 2012. Spawning and non-spawning migrations, spawning, and effects of river regulation on spawning success of Connecticut River shortnose sturgeon. Chapter 3 in Life history and behavior of Connecticut River shortnose sturgeon and other sturgeons. B. Kynard, P. Bronzi, and H. Rosenthal Editors. World Sturgeon Conservation Society: Special Publication #4. Norderstedt, Germany.

Kynard, B., D. Pugh, T. Parker and M. Kieffer, 2012b. Spawning of Connecticut River Shortnose Sturgeon in an Artificial Stream: Adult Behavior and Early Life History. Chapter 6 in Life history and behavior of Connecticut River shortnose sturgeon and other sturgeons. B. Kynard, P. Bronzi, and H. Rosenthal Editors. World Sturgeon Conservation Society: Special Publication #4. Norderstedt, Germany.

3.3.2 Evaluate Upstream and Downstream Passage of Adult American Shad

With respect to resource management goals, we would add that minimizing migration delay at hydro-electric projects is important for migrating diadromous species.

Task 2: Develop Study Design

Firstlight states that a detailed study design will be developed in consultation with the resource agencies. We are aware of the US Fish and Wildlife Service’s (USFWS) recommended test flow configurations, sample size and receiver locations for this study. We are in full agreement with these recommendations. It is our expectation that the consultation with the resource agencies will indeed be in agreement with USFWS.

Task 3. Evaluation of Route Selection and Delay

The Updated PSP adds that mobile tracking will be conducted, but it does not provide any details as to the timing, frequency and duration of the mobile tracking efforts.

Task 4. Evaluation of Mortality

In some cases, significant delay can lead to mortality (Ted Castro-Santos, personal communication). As such, we ask that a results and discussion of delay be included in the final

report. We understand that motion sensor telemetry tags will be used to detect mortality, however, we seek clarification on the time interval that will be used to denote a dead fish.

Study Schedule

The last sentence indicates that the results of the 2014 study may indicate that there is no need for a second year of study. We disagree and request that this study be conducted for 2 years due to the large degree of variability in environmental conditions that can occur from one year to the next.

Receiver location in the power canal (Figures 3.3.2-2 and 3.3.2-3).

We ask that clarification be given in terms of what assumption is made if a fish is detected at the Cabot Station Forebay but is never detected again at this location, Station No. 1 or the Gatehouse Fish Ladder.

3.3.3 Evaluate Downstream Passage of Juvenile American Shad

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

The proposed plan does not provide much detail on the flow conditions that could potentially occur during the study. The study should occur during a range of river flows and operational conditions such that the effect of NMPS is relatively large and relatively small compared to total river flow.

Task 2: Evaluate Route of Passage Choice and Delay

The Updated PSP does not specifically mention if the same receivers used for the upstream adult American shad (*Alosa sapidissima*) study will be used for this study.

The Updated PSP mentions that telemetry studies have had success when test fish are approximately 120mm in length. Given the ILP schedule, we recommend some initial testing occur in 2013 in order to confirm that test fish can indeed be detected. Such information could prove quite valuable as the 2014 field season approaches.

The proposed study also states “receivers will be set up above and below the Turners Falls Dam to determine spillage survival.” It is not clear how a radio receiver below the dam will determine whether a fish survived via spill. Task 3 indicates that fish will be recovered from tailrace and examined for injuries. We recommend that a similar approach be taken for fish that have passed via spill.

Task 3: Turbine Survival

We support the addition of the balloon tag survival study to assess turbine mortality at both power stations. In order to assess overall project survival, we recommend that mortality for fish passing via spill is an important component of this study. Given the differing hydraulic flow conditions of the bascule gates and tainter gates, it is not clear to us what percent of juveniles pass via these gates. At a minimum, we recommend that spill mortality be evaluated through the four bascule gates and one of the tainter gates (unless Firstlight can provide certainty that these gates will not be used during the downstream juvenile shad migration period). A minimum of 25 test fish per gate should be tagged and released immediately upstream of each bascule gate to

determine spill survival.

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

Task 1. Systematic Surveys.

It is assumed that the American eel (*Anguilla rostrata*) surveys will be conducted on foot.

It is not clear why the Cabot Station log sluice survey site in the previous version of the proposed study plan is not mentioned in the Updated PSP. Given that this structure passes 200 cfs from June 1 to November 15, it could serve as a potential attraction point for upstream migrating eels.

Task 2. Trap Collections

It is not clear during this study, whether Cabot or Spillway attraction flows will be operating when the fishways are not operational. We recommend a minimum amount of attraction flow from the fishway attraction flow sluices to attract the eels during this study. The other aspect of this study that is unclear is how the traps will be operated when the fishways are operational. We think it might be possible that the attraction water from the fishways could indeed be providing too much water to attract an upstream migrating eel to the ramp.

3.3.5 Evaluate Downstream Passage of American Eel

Task 1. Evaluate Timing of Downstream Migratory Movements

The text states “acoustic targets can be filtered by size and supporting data used to apportion the number of fish by size class.” We find this sentence essential for discriminating eels from other species.

We appreciate that the licensee is willing to provide a monitoring report in February 2015 to have a discussion about the results. Nevertheless, given the variability that can occur from year to year with any downstream run, regardless of whether the 2014 study is deemed ‘typical’ or not, we request that an additional year of study be conducted in 2015.

We ask that the hydroacoustic data be coupled with the operational hydrologic conditions so that all reviewers can understand the flow conditions the eels experienced during the study. We support U.S. Geological Survey S.O. Conte Anadromous Fish Research Center biologist Dr. Alex Haro’s recommendation that the survey encompass 15-20 discrete events. We also recommend that hydroacoustic evaluations start one hour prior to NMPS pumping operations in order to assess fish that could be present within the zone of pumping influence.

Task 2: Assessment of Downstream Passage of American Eels

Overall, the study does not make mention of any methods or metric to assess delay.

We support Dr. Haro’s written comments to add a trap collection at the Cabot station spillway near the north abutment

Task 2a&b: Northfield Mountain and Turners Falls Dam Route Selection Study

We recommend that some of the receiver location identified in the adult shad telemetry study be

used for this study as well as one at the NMPS intake in order to provide full depth coverage.

It is our expectation that we will be included in discussion of sample sizes. We make the following minimum sample size recommendations based upon Dr. Haro’s recommendations:

- Northfield entrainment: 50 eels per study year
- Turners route selection: 50 eels per study year
- Turners turbine mortality: 50 eels per study year for Station No. 1 and 50 eels per study year for Cabot Station

The study does not make reference to the percent of fish that will likely be detected.

With respect to sample size, we offer the following preliminary release protocol:

Location	Release Date/Time	# Eels/release
3 km u/s of TF Dam	Between Sept 15 and Nov 15, release eels at dusk on day prior to expecting the following flow conditions: <ol style="list-style-type: none"> 1. No spill at dam 2. Spill requiring use of bascule gate 3. Spill requiring use of taintor gate 	10 per condition, for a total of 30 fish
Imm. d/s of Gatehouse	Between Sept 15 and Nov 15, release eels at dusk on day prior to expecting the following operational conditions: <ol style="list-style-type: none"> 1. Only Station 1 operating 2. Only Cabot operating 3. Both stations operating (if this ever occurs) 	10 per condition, for a total of 30 fish (supplemented with fish from headpond releases)

In general, the receiver and antenna locations identified are acceptable. However, Dr. Haro had noted that it could be difficult to detect tagged fish using the Cabot log sluice. Dr. Haro had suggested that some assurance be provided that the radio method will have a high degree of detection/reliability in this location; otherwise, use of a PIT system to supplement telemetry data and increase confidence was recommended. Likewise, the plan should confirm that receivers will be configured to provide full-depth coverage at all intakes and other deep (>30 feet) locations.

If Holyoke Gas & Electric is willing to allow a receiver in the vicinity of the Holyoke project, we suggest that one is installed here to further confirm the viability of non-killed eels.

Task 2c: Mobile Tracking

A 50 day battery life may not be suitably long enough for motion-sensing tags. For example, an eel released and killed in late August would have the tag’s battery life end in mid to late October which could reduce the chance that the tag could be detected by an additional mobile survey after mid-October. FirstLight plans to manually track tagged eels via boat, vehicle or by foot between release sites to several kilometers downstream of Cabot Station. We recommend including the following additional details in this section of the plan:

- Manual tracking will be performed up to 5 km downstream of Cabot Station
- Manual tracking will occur on a weekly basis, beginning after the first release date and

ending in mid-December (or when all viable tagged eels have been detected at the Route 116 Bridge, whichever occurs first)

Task 4: Turbine Survival

In response to stakeholder comments conveyed at the June 4, 2013, study plan meeting, FirstLight has revised the study plan to confirm that a balloon tag survival study will be conducted to assess turbine mortality at Station 1 and Cabot Station. We support this proposal, but we also recommend the need to assess spill mortality. Depending on which gates are being used, spill can discharge at various locations along the dam's apron, including areas of ledge that could result in mortality to outmigrating adult eels. While it is possible to infer spill survival with data collected from motion sensor radio telemetered eels, there is no guarantee that radio tagged eels will use the gates during a spill condition.

We recommend that at a minimum, spill mortality be evaluated through the four bascule gates (unless FirstLight can provide certainty that these gates will not be used during the downstream adult eel migration period). A minimum of 25 test fish per gate should be tagged and released immediately upstream of each bascule gate to determine spill survival. We also recommend that survival through the tainter gates be assessed as well.

At Station 1, FirstLight proposes to evaluate one of the four double runner Francis units as well as the smaller, faster exciter unit. We have no objection to this proposal. In total, three turbines will be evaluated (two at Station 1 and one at Cabot Station). The overall number of test fish proposed for the Turners Falls Project is 150, which would allow 50 test fish per turbine if distributed equally. Fish would be injected into the turbines while at or near full hydraulic capacity. We support the USFWS concerns it expressed at the June 4, 2013, study plan meeting that if the units typically operate at less than full hydraulic capacity then that condition needs to be evaluated. For example, if the units are always operated at peak efficiency, then that is the condition that should be evaluated. If the units are operated at varying efficiencies then each of those conditions should be evaluated (e.g., maximum gate, peak efficiency, and minimum gate).

FirstLight provides no description of data analysis for this task. Survival through each turbine/gate setting tested should be calculated based on the number of tagged fish injected into a given turbine or bascule gate that are alive immediately and after 48 hours, adjusting for survival of control fish. Any injuries of recaptured fish should be reported. Total through-project survival should be calculated based on results of this study, other related studies (i.e., hydroacoustics and telemetry data), as well as historical operations data.

Study Schedule

The section should specify that an additional study year may be necessary due to circumstances such as (1) unfavorable environmental conditions, (2) equipment malfunction, and (3) inability to secure sufficient test fish.

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

Task 2: Examination of Known Spawning Areas Downstream of Turners Falls Dam

FirstLight's plan states that surveys will concentrate on the five known spawning locations downstream of the Deerfield River confluence. In fact, Kuzmeskus (1977) identifies nine historical spawning sites between the Route 116 Bridge and the Turners Falls Dam. All of these sites should be surveyed, in addition to any sites identified through mobile tracking of adult shad as part of the radio telemetry study (Study Plan 3.3.2). In addition, as survey crews are moving among historical sites, they should monitor for additional (previously undocumented) spawning sites.

In Phase 2 of the Updated PSP, FirstLight states that the impacts of flow fluctuation on spawning shad will be investigated at locations identified in Phase 1 "that may become dewatered when water elevations decrease due to operational changes at Cabot Station..." While we agree that those sites should be assessed, the investigation should not be limited to only those sites; there likely are spawning sites that would not become dewatered, but still would be susceptible to large flow/elevation fluctuations which could impact spawning behavior or success. Therefore, the proposed observational and physical habitat data should be collected at all identified spawning sites between Cabot Station and the Route 116 Bridge in Sunderland and various operational scenarios.

In order to determine if project operation impacts spawning behavior, FirstLight would test several discharge manipulations and compare behavior during the manipulations to "baseline" spawning behavior. If one scenario is to evaluate full discharge and then a minimum flow release, it is unclear when observations would be made relative to the discharge manipulations. We recommend that field crews observe and count spawning splashes before the flow changes, during the change, and after the change has occurred, as spawning behavior could be altered during both increases and decreases in flow. In addition, at times of test manipulation, a dedicated field crew should be tasked with tracking any radio tagged fish that may be on spawning sites so that their behavior can be evaluated relative to fluctuations in flow.

Task 3: Identification of Spawning Areas Upstream of Turners Falls Dam

The protocol for identifying spawning sites within the Turners Falls impoundment (to the base of Vernon Dam) requires more detail. For instance, surveys for shad downstream of the Turners Falls Dam will occur once 10,000 fish have passed the Holyoke Dam. A similar trigger for initiating surveys upstream of the Turners Falls Dam should be specified.

FirstLight states that upstream surveys will target areas of suitable habitat, including those containing flowing waters over coarse substrates. These terms are somewhat vague and undefined and may be overly restrictive. Given how little we know about shad spawning in the Turners Pool, we recommend that surveys occur in all waters of suitable depth (as identified in HSI curves).

Study Schedule

The first bullet in this section likely should read "October 2013 through December 2013" rather than "December 2014."

Given that temperature and water flows are intrinsically variable, the timeframe for conducting the field studies should be expanded to include all of May and June (and refined based on

passage numbers).

3.3.7 Fish Entrainment and Turbine Passage Mortality Study

Task 2: Quantification of Shad and Eel Entrainment

FirstLight proposes to perform a quantitative assessment of shad entrainment at NMPS based on the tagging and hydroacoustic monitoring that will occur under studies 3.3.2 and 3.3.3. We have no objection to using data from those studies to estimate entrainment for adult shad and outmigrating juvenile shad. However, this would leave a data gap with respect to entrainment of younger life stages of shad (i.e., larvae and pre-migrants) that reside in the Turners Falls Pool, potentially within areas of the river susceptible to multiple pump-back events at NMPS.

We recommend that entrainment of Young of Year shad at NMPS be quantified as goal of this study. The USFWS has pointed out that previous entrainment studies focusing on early life stages of shad (egg, yolk-sac larvae, post yolk-sac larvae, and juveniles) have been conducted at NMPS. Since those early 1990s studies, operations at NMPS have changed and may change further as a result of this relicensing. Likewise, ongoing passage improvements at the Turners Falls Dam will lead to more adult shad moving through and spawning in the Turners Falls Pool. Therefore, more early life stages will be prone to entrainment. The impact this may have on the shad population and achievement of restoration goals needs to be determined.

We recommend that a similar methodology to that used in the 1992 Northeast Utilities Service Company study (LMS 1993) be used by FirstLight to quantify entrainment of early life stages of shad at the NMPS Project. The sampling should begin July 1 and should continue through October.

Task 3: Estimation of Turbine Mortality

FirstLight proposes to use existing literature along with the site-specific design characteristics of the Turners Falls Project turbines to estimate mortality of resident fish entrained at Station 1 and Cabot Station. We agree with the concerns that the USFWS has voiced over using this methodology for the following reasons:

- While there is a database of turbine passage survival studies, the actual number of sites with similar design characteristics (e.g., turbine size, type, runner diameter, head, etc.) where similar target species were evaluated is quite small. Once the evaluated species are compared with potential species of interest at Turners Falls, it becomes apparent that any mortality estimates derived from the literature would be based on a very limited data set.
- As mentioned at the June 4, 2013 study plan meeting, a recent report by Kleinschmidt (2007) that used a similar methodology at the Holtwood Project (FERC No. 1881) to what is being proposed in the current study plan found that the average predicted survival values derived from the Advanced Hydro Turbine Model (Franke *et al.* 1997) were higher than actual empirical studies conducted at the Holtwood Project for juvenile alosids. Where empirical data were taken from other projects, results showed a higher survival for some species/life stages evaluated than from the modeled results (for adult river herring and adult eels). Where empirical studies showed lower survival than modeled results, Kleinschmidt appears to attribute the discrepancies to flaws in the field studies, while results showing higher survival

in the field studies are attributed to differences in turbine specifications (rather than to any inherent flaws in the Franke *et al.* model). We acknowledge that field studies rarely are conducted under perfect conditions, however, it is equally plausible that the Franke *et al.* (1997) model requires further refinement which additional empirical studies may help inform.

We recommend that the results of the empirical mortality studies that will be conducted on adult and juvenile shad and adult eels be compared to estimates derived using the Franke *et al.* (1997) model. This comparison should allow further insight into the appropriateness of using a model versus empirical study to calculate turbine mortality at a project.

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

Study Goals and Objectives

Objective number 5 states that the computational fluid dynamics (CFD) modeling will be coupled with the telemetry study and passage counts to understand conditions preferable for guiding fish to entrances. We note that fish movements are also influenced by other variables, therefore FirstLight should also record and evaluate influences of river temperatures and flows on movements and passage information.

Project Nexus

FirstLight states that existing information indicates that substantial numbers of down migrating fish use the log sluice/bypass. Given the research that has been done at the USGS S.O. Conte Anadromous Fish Laboratory, this statement is not accurate with respect to eels and should be clarified accordingly.

Task 3: Construct Three-Dimensional Model

The description of the model does not identify grid size to be used in the model. Without some idea of the size of the grid to be used, it is impossible to know if the CFD modeling will mean anything. For example, a 2-foot grid cell will not provide fine enough resolution to tell us anything about sweeping velocities at the intake rack or the capture velocities in front of the downstream bypass. The final study plan should define the grid size and provide justification for the proposed grid size.

Task 4. Execute Model Production Runs

We understand that executing a production run is not an insignificant effort and that output options with 3D hydraulic models are vast. Nevertheless, we would like to gain a better understanding of the proposed 9 production runs. Namely, we would like to know what operating condition the licensee will be simulating.

Since tailwater conditions greatly affect the functionality of both ladder entrances, FirstLight should run the model for different tailwater conditions based on the normal range of tailwater levels.

3.3.9 Two-Dimensional Modeling of the Northfield Mountain Pumped Storage Project Intake/Tailrace Chanel and Connecticut River Upstream and downstream of the Intake/Tailrace

Methodology

FirstLight proposes to develop a 2-D model of the NMPS intake/discharge area in order to evaluate potential impacts to fishes and bank erosion. In the initial study plan, this assessment was to occur from the NMPS project to 1 km upstream and downstream of the intake/discharge area. At the May 21, 2013 study plan meeting, stakeholders commented that the distance should be expanded from 1 km to 5 km; however, the Updated PSP does not incorporate this change.

The proposed River2D model is steady-state model. Based on some estimates of hydrograph speed and wave celerity, it may take 30 minutes before changes in intake/discharge conditions at the pumps are propagated throughout the extent of the 2-km-long proposed model (or longer with a more extended model we recommended). Given the diurnal nature of both shad movement and pumped storage operations, a transient River2D model seems warranted to assess NMPS effects on fish and to inform agency management decisions. The existing steady-state Woodlot model (2007) may be adapted to transient set-up and we recommend this be done.

Task 3: Build and Calibrate 2D model

The study states that the River2D model will be calibrated against field-collected velocity profiles. Some additional clarification on how these profiles will be measured such as at what depth and with what equipment would be helpful.

FirstLight indicates that in the proposed model, the “initial uniform gridded base mesh will be generated on an approximately 50-75 foot spacing” and refined where necessary. This initial grid size may have been appropriate for the original Woodlot model, but this proposed model is focusing in part on the intake/discharge structure which is approximately 75 feet across. That means the entire intake is only one grid cell. The baseline for grid size should be based on getting ten or more cells laterally across the intake/discharge structure and refined moving out. Without this level of resolution, the FirstLight model will not be very accurate or helpful in the proximity of the structure.

Task 4: Conduct and Analyze Production Runs

At the May 21, 2013 study plan meeting, there were at least two comments made by stakeholders relative to velocities. The first (made by the USFWS Connecticut River Coordinator) concerned velocity measurements at the NMPS intake. Because only mean column velocity will be used in the model, we recommend that FirstLight develop separate velocity profiles for the intake. FirstLight’s consultant indicated that it would be possible to provide those data, as an acoustic doppler current profiler (ADCP) unit will be used to collect velocity measurements at the intake while gathering calibration data. This effort should be included in the study plan. These data are important because differential velocities across the intake area relate directly to potential for entrainment based on, among other variables, where a fish tends to reside in the water column (e.g., alosids tend to be surface oriented, whereas eels tend to be bottom oriented).

The second comment related to deliverables. While the Updated PSP states that model run results will include 2-D water depths and velocities, FERC's consultant had requested that the study plan include more details regarding how the results would be presented (e.g., vector plots, pseudo-color maps, etc.). It does not appear that FirstLight has addressed this issue.

3.3.11 Fish Assemblage Assessment

As discussed at the May 30, 2013 study plan meeting and in a follow-up conference call with FERC staff on June 18, 2013, endangered shortnose sturgeon occur in the area where the electrofishing transects are proposed. Shortnose sturgeon may be affected if exposed to electric current generated during these activities. Due to the sensitivities of spawning adults and early life stages present in Transect 5 and the presence of juveniles and adults year round in Transect 6, we recommend that the study be modified to eliminate the potential for effects or that FERC initiate formal consultation pursuant to section 7 of the Endangered Species Act (ESA) with NMFS to assess effects of this study.

Our preliminary assessment is that to avoid effects to shortnose sturgeon, electrofishing in Transect 6 would need to be removed from the study and a seasonal restriction would be required for transect 5 to ensure that no electrofishing is carried out when shortnose sturgeon may be present (April 15-June 30). We have discussed the possibility of a seasonal restriction for Transect 5 with staff from the State of Massachusetts (MA) and the U.S. Fish and Wildlife Service (USFWS) and it is our understanding that they would not object to this change. However, based on preliminary discussions with MA and USFWS staff, it is NMFS' understanding that the goals and objectives of this study would be negatively impacted if Transect 6 was removed from the study. If electrofishing occurs in Transect 6, adverse effects to shortnose sturgeon may occur.

We believe that a Biological Opinion, with an appropriate Incidental Take Statement, is necessary if electrofishing will take place as it is currently proposed for Transect 5 and 6. Because any take of shortnose sturgeon would be incidental to the proposed action, and this study can not be considered to be "directed research" on shortnose sturgeon, authorization under Section 10(a) (1)(A) of the ESA is not appropriate. An example of a Biological Opinion we have produced for similar electrofishing studies is available on our website (http://www.nero.noaa.gov/protected/section7/bo/oldbiops/epa_ct_and_merrimack_ibi_2009_we_b_archive.pdf)

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

Task 2: Scenario Development

This section states "Emergency scenarios will not be evaluated in this study because changes in emergency protocols are not anticipated by FirstLight." Despite that emergency protocols will remain unchanged; it was NMFS understanding that information on emergency operations would be included in the analysis of existing operations data that will be provided to the Service. NMFS would recommend this sentence be changed to reflect that all operations data will be

analyzed and provided to NMFS for review, including the emergency operations and protocols. Regardless of whether emergency operations and protocols change, NMFS needs this information to understand all of the impacts on shortnose sturgeon as a result of these operations.

Otherwise NMFS is satisfied with the revisions that have been incorporated into the study and are reflected in Firstlight's Proposed Study Plan dated June 28, 2013 for Turners Falls (P-1889) and Northfield Mountain Pumped Storage (P-2485).

3.3.15 Assessment of Adult Sea Lamprey Spawning with the Turners Falls Project and Northfield Mountain Project Area

Task 1: Field Data Collection

The last paragraph of this section states "Shear stresses for dominant substrate types at each of the 30 nests will be determined...." Shear stress is determined through collected field observations and subsequent calculations; typically this is considered analysis, not data collection. Additionally, this sentence is not clear as rivers exert a shear stress on the bed and its particles. It is not clear if the idea is to determine how much shear stress is required to mobilize the dominant particle size in a nest, or if it to simply report the shear stress that river exerts on the dominant substrate at a given nest. Given that depth is a key component of shear stress, and that "the information will be used to determine the likelihood of bed load mobilization or scour" it seems as though the analysis is to determine at what flow the dominant particle size in the nest gets mobilized. Given the complexities of sediment transport with spatial and temporal variability, embeddedness, grain size shapes, roughness within the nest and around the nest, and field measurement limitations, we ask that FirstLight use caution and explicitly state all the hydraulic assumptions being made when conducting this analysis.

We would also like to point out that TransCanada is performing a fairly similar study related to sea lamprey (*Petromyzon marinus*) spawning (Updated Study 16 Sea Lamprey Spawning Assessment). TransCanada's approach includes tracking lamprey that are tagged at the Vernon project. TransCanada states that it is willing to share its radio frequency information with FirstLight and expects that FirstLight will share its frequencies as well. This approach differs significantly to the methods that FirstLight proposes. Rather than spending time at the three locations FirstLight mentions (below Vernon, mainstem gravel bar and shallow water habitats and, in the vicinity of Rawson Island) tracking tagged lamprey could conceivably reduce the amount of time spent in the field looking for redds. Some of the other methods that TransCanada proposes in its sea lamprey assessment study include the following:

- Weighing and measuring tagged fish
- Tracking tagged fish by boat, car or possibly aircraft
- Deeming project affected areas as suitable, then characterizing substrate, depth. Water quality variables such as temperature, dissolved oxygen, turbidity, pH, and conductivity will be collected.
- Collecting velocity and depth data over a range of flows
- Photographing redds
- Observing redds from the time of lamprey arrival to the time of lamprey departure
- Monitoring of embeddedness and percent sand over the life of the active redd

Analysis includes presenting a map of each located redd, characterizing the success of each redd based upon larvae emergence and degree of project effect (e.g none, moderate, large and severe). The methods that TransCanada present in their proposed study appear to directly relate to the forth bullet point that FirstLight presents in its Updated PSP which states “Collect the information to assess whether operations of the Turners Falls Project and Northfield Mountain Project are adversely affecting spawning areas.” As such, we recommend that an approach that is far more similar to TransCanada’s methods and analysis be adopted for this study.

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

The goal and objectives of this require a clear understanding of the methods that will be used. The Updated PSP correctly notes that complimentary juvenile shad and American eel studies will provide useful information from hydroacoustic monitoring and tagging of fish to examine the question of delay in the canal.

A standard level of effort, such as a single back-pack operator with dip net and single or pair of people also netting, can be utilized as the habitat conditions permit among the zones (as a standardized level of effort) for a set period of time (500 seconds on-meter). This will allow repeated measures and comparisons among areas. Back-pack shocking will not effectively sample ponded areas where seine nets may be employed. Standardized methods may be developed, single sweep, using bridle/rope. The varied substrates may not permit this net gear. Additionally, assessment of sea lamprey ammocetes should be conducted and may include a sampling quadrats among strata using some basic criteria (substrate type and exposed, wetted, submerged), which can be applied to existing aerial images, from a qualitative visual assessment, that can be described with some digital images of these areas for support. Fishes may be sampled by electrofishing wetted or ponded/flowing areas. Catches may be reported in units of standardized time of effort and also by unit area (quadrats). Quadrat sizes should be determined based on observed densities one sampling can begin (i.e., 1 m², or 10 m²). A starting figure may be 10 replicates among strata type which may include 5 types (i.e., exposed, damp/wetted, submerged, flowing and substrate type – fines, gravel, rock). Sampling, as noted, should begin as quickly as possible following the drawdown.

The Updated PSP states that the fate of juvenile sea lamprey in the canal remains unknown and additional efforts to fill in this information gap will be included. It is unclear how this will be done. The study can be designed to obtain information on relative abundance, distribution, sizes of juvenile lamprey with this survey and document occurrences of exposed/desiccated juveniles. A follow-up repeat of the survey targeting sea lamprey may be conducted prior to re-watering, allowing several days of time since the initial surveys to compare observed data and thus potential infer losses with any detected declines. This will be difficult given the potential movement to ponded areas of some size in the area of Cabot intake as an example.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109-3912

July 11, 2013

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Re: Northfield Mountain Pumped Storage Project, FERC Project No. 2485-063
Turners Falls Hydroelectric Project, FERC Project No. 1889-081

Dear Secretary Bose:

On April 15, 2013, pursuant to the regulations of the Federal Energy Regulatory Commission (FERC), 18 C.F.R. § 5.11, FirstLight Hydro Generating Company (FirstLight), a subsidiary of IPR-GDF SUEZ North America, Inc., Licensee of the Turners Falls Hydroelectric Project (FERC No. 1889) and the Northfield Mountain Pumped Storage Project (FERC No. 2485), filed its Proposed Study Plan (PSP) for the relicensing of the Turners Falls Project and Northfield Mountain

EPA is providing comments on a portion of the PSP, specifically Section 3.1 Geology and Soils, focusing those portions of the proposed studies which deal with management measures available to minimize sediment transport from the Upper Reservoir at Northfield Mountain during and after maintenance drawdowns.

In June, 2010 EPA Region 1 issued an Order for Compliance to FirstLight concerning unauthorized discharges of sediment to the Connecticut River which occurred during a drawdown of the reservoir. Part of EPA's Order includes the requirement that FirstLight submit a report identifying measures to prevent discharges of sediments associated with draining the pumped-storage reservoir in the future and a schedule for their implementation. Subsequently FERC staff on January 20, 2011 requested a plan to avoid or minimize the entrainment of sediment in the Project works during Upper Reservoir Maintenance drawdowns. A Sediment Management Plan (Plan) was developed in consultation with EPA and Massachusetts Department of Environmental Protection and filed with FERC on July 15, 2011. It contains proposed methods to assess sediment dynamics in the Project's Upper Reservoir as well as the Turners Fall impoundment. According to FirstLight, the final report will contain standard operating procedures and protocols to determine when the Plan will be implemented. These procedures and protocols will be developed in consultation with EPA and MA DEP.

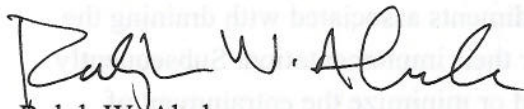
EPA's believes that the work being carried out during the Plan for the Northfield Mountain Project must be fully integrated into the FERC licensing process for the project. The proposed study plan does not adequately do that. If done properly, the results of the Plan, which are designed to avoid or minimize silt into the project's works, would be incorporated into future license conditions for the project. EPA and MA DEP are engaged in ongoing discussion with FirstLight about details of the Plan including an assessment of various sediment management techniques for the Project.

An important element of the Plan is real time monitoring of Total Suspended Sediment (TSS) in the Connecticut River and within the intake channel of the Upper Reservoir. Results of this monitoring, especially in the Connecticut River, should be useful in terms of a better understanding of sediment transport in this portion of the river. However, no provision is made for incorporating this information in the proposed studies as written. EPA believes that this information should be incorporated into the Plan.

According to the licensing schedule for the project updated study reports will be filed by 9/12/2015. At the same time, the Proposed Study Plan states that a final Sediment Management Plan will be submitted to FERC by December 1, 2015. The licensing schedule calls for a Draft License Application by December 4, 2015. This is a very tight schedule for comments and review of the Plan, especially with respect to incorporation of Plan results into the License Application. It seems prudent to require a nearly Final Sediment Plan be filed at the same time as all of the other study reports. That would allow sufficient time to incorporate the results into the License Application.

Thank you for the opportunity to comment on the Proposed Study Plans. If you have any questions about EPA's comments please contact me at (617)918-1629, abele.ralph@epa.gov or Toby Stover at (617) 918-1604, stover.toby@epa.gov.

Sincerely,



Ralph W. Abele

Water Quality Branch
Office of Ecosystem Protection
EPA Region 1



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Western Regional Office • 436 Dwight Street, Springfield MA 01103 • 413-784-1100

DEVAL L. PATRICK
Governor

RICHARD K. SULLIVAN JR.
Secretary

KENNETH L. KIMMELL
Commissioner

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

July 12, 2013

Re: Northfield Mountain Pumped Storage Project, FERC No. 2485-063
Turners Falls Project, FERC No. 1889-081

Comments to Updated Proposed Study Plan (PSP) submitted by FirstLight June 28, 2013.
Section 3.1.1 *2013 Full River Reconnaissance Study*
Section 3.1.2 *Northfield Mountain/Turners Falls Operations Impact on Existing Erosion
and Potential Bank Instability*
Section 3.2.1 *Water Quality Monitoring Study*
Stakeholder Comment Letters

Dear Secretary Bose:

The Massachusetts Department of Environmental Protection (MassDEP) has participated in the Proposed Study Plan (PSP) process through formal written requests, attendance at public hearings and discussions with FirstLight Hydro Generating Company (FirstLight) and others. MassDEP's study requests made March 1, 2013 focused on its regulatory obligation to issue a Water Quality Certification in 2018 and preliminary information that it will want to consider in the process of issuing a Water Quality Certification. MassDEP appreciates the efforts of FirstLight in adopting requests of MassDEP and its further revisions of those requests in response to MassDEP's comments at public hearings. MassDEP submits specific comments with respect to a limited number of items in the PSP.

In the course of those public hearings and in subsequent communications with stakeholders, primarily the Franklin Regional Council of Governments (FRCOG) and Connecticut River Watershed Council (CRWC), MassDEP has heard requests for additional studies (or more specifically revised study methodologies and deliverables) related to streambank erosion and other issues which will be considered by MassDEP in its issuance of a Water Quality

Certification. While MassDEP would use the information from the studies it has requested in its consideration of an Application for a Water Quality Certification, it will likely require additional information at the time of that review. Studies sought by FRCOG, CRWC and others will provide additional information from FirstLight for the MassDEP's review of that application and likely reduce MassDEP's need to request additional information in connection with its review of that application. As a result, MassDEP has included highlights from those stakeholder letters within this comment letter.

I. Section 3.1.1 *2013 Full River Reconnaissance Study*

See Stakeholder Comment Section Below.

II. Section 3.1.2 *Northfield Mountain/Turners Falls Operations Impact on Existing Erosion and Potential Bank Instability*

The Department has requested FirstLight to evaluate strategies to manage and minimize sediment release from the power canal at Turners Falls during dewatering activities. FirstLight will be conducting the related study 3.3.12 entitled: "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 of Cabot Station." and will evaluate the impact of these events on sediment transport and bottom velocities within known shortnose sturgeon spawning and rearing habitat below Cabot Station. The Department recommends our request for strategies evaluation be added as an additional task within Study 3.3.12 if sediment transport is shown to be a problem downstream of Cabot Station.

III. Section 3.2.1 *Water Quality Monitoring Study*

In 2001, the U.S. EPA approved New York and Connecticut's Long Island Sound (LIS) dissolved oxygen Total Maximum Daily Load. Nutrient loading has been established as a cause for low dissolved oxygen levels observed in Long Island Sound. The Department believes actions taken to minimize nutrient loading is justified now while establishing the quantity of nutrients released from the Project site serves little purpose. Nutrient sampling therefore has not been requested in this study.

The Department has requested FirstLight determine the level of contamination in sediment impeded by the Turners Falls dam. FirstLight is not proposing to perform this work due to the availability of sediment analysis data taken from the Northfield Mountain Hydroelectric Project in 2010. FirstLight believes this data adequately characterizes sediment found at the Turners Falls dam. The Department disagrees. The Millers River enters the Connecticut River between Northfield Mountain and Turners Falls and has sediment contaminated with PCBs to a level that

has caused a ban on eating fish taken from the river. In addition there are several municipal and industrial wastewater treatment plants that discharge to the Millers River. We recommend the FERC keep sediment sampling at the Turners Falls dam a part of the water quality monitoring study.

IV. Stakeholder Comment Letters

FRCOG and CRWC have provided MassDEP copies of draft comments that each expects to submit to FERC on the updated PSP prior to the July 15, 2013 deadline. It is clear that MassDEP, FRCOG and CRWC are in agreement that the process historically used by FirstLight to study erosion (the FRR) has not generated sufficient reliable information upon which MassDEP can issue a Water Quality Certification. FRCOG and CRWC further indicate an inability of other agencies (i.e. ... NOAA - National Marine Fisheries) to carry out their regulatory obligations based upon the historic work and the information to be generated by the updated PSP as proposed.

MassDEP, in light of its position that the Full River Reconnaissance (FRR) has not generated information sufficient to allow the issuance of a Water Quality Certification, submitted a March 1, 2013 letter to FERC which stated that "the various studies conducted to date, lacked sufficient scope, data and/or quality controls to MassDEP to rely on them as they exist or to support an expansion of the scope as a cost effective approach". In its March 1, 2013 letter, MassDEP included requests for studies for both sediment transport and water quality. Inherent to both studies is the issue of erosion.

The attachment to MassDEP's March 1, 2013 letter stated general study goals of assessing measures to minimize sediment transport and to investigate bank instability. Resulting information needs to provide information sufficient for MassDEP to "understand current and proposed effects on water level fluctuations, both natural and anthropogenic, and to identify sites where biostabilization techniques or other measures may be beneficial to water quality." The comments further stated general objectives including; "mapping and scientific descriptions of active and recent bank erosion, analysis of prior stabilization area, soils analysis, fixed recoverable data transects with periodic revisiting and data collection, water levels/pool fluctuations, soil scientist analysis and land use mapping".

MassDEP's comments further state with respect to FirstLight's Erosion and Sediment Control Plan that "MassDEP anticipates working with stakeholders to address specific needs and to ensure that all subsequent observations and evaluations are based upon scientifically reproducible geomorphologic criteria that has been established and is free from potential observer bias or prejudice. In this manner all parties will be able to contrast and compare the same data and make more meaningful assessments." CRWC and FRCOG identify a lack of detail with respect to methodology and deliverables in the updated PSP and concerns that this results in

a lack of scientific reliability and value, including value to MassDEP in reviewing an Application for a Water Quality Certification.

MassDEP's review of draft comments of FRCOG and CRWC were made in light of MassDEP's general principals stated in its request for studies and MassDEP's stated commitment to work with stakeholders. Further, MassDEP is cognizant of its impending obligation to issue a Water Quality Certification and the opportunity for public participation, including the right to appeal any Water Quality Certification issued by MassDEP. As a result of that review, MassDEP wishes to express its support of the principals and requests in the letters it expects FRCOG and CRWC to submit to FERC.

MassDEP's study request, although providing general specific principals for the studies and information sought, is not overly detailed as to the extent of the information sought, the manner of collection (methodologies) or the specific information and formats that should be presented (deliverables). Instead, MassDEP sought to ensure that "subsequent observations and evaluations are based upon scientifically reproducible geomorphologic criteria that has been established and is free from potential observer bias or prejudice. In this manner all parties will be able to contrast and compare the same data and make more meaningful assessments." In other words, MassDEP's comments do not design the studies; the comments merely provide general guidance for such studies and include MassDEP and stakeholder participation in developing those specifics.

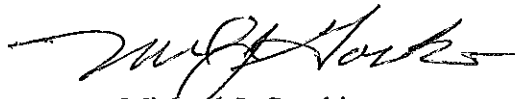
The comments of FRCOG and CRWC seek inclusion of details in the PSP that MassDEP anticipated would be addressed with stakeholder input, as set forth in MassDEP's March 1, 2013 Comments. In their comments, FRCOG and CRWC seek, among other things: (1) specific time of year requirements and/or time durations for studies, (2) a more specific identification/description of erosion events for both type and stage (i.e. ... Fields model of 4 types and 6 stages rather than a single "mass wasting" category), (3) a written and visual (photos) description of erosion, (4) analysis and inclusion of historic data, (5) a photographic log of riverbanks (6) image logs over time, (7) installation of water level monitors with sufficient duration, specific locations and frequency readings, and (8) clearly identifiable deliverables; all appear consistent with MassDEP's generally stated goals for scientific data that can be compared and contrasted in order to make more meaningful assessments. It is also consistent with study goals stated by MassDEP with respect to fluctuations within the Turners Falls Pool and correlation with slopes and soil response, development of future stabilization projects, as well as the guiding principal of scientifically based work.

In addition, CRWC provides a number of comments requesting clarification of information in the PSP which should be considered. Further, CRWC's comments identify portions of the study related to issues such as: fish passage, habitat, migration and spawning; impacts on odenate and other state-listed species; impacts on mussels; and impacts on eel. Although those areas are not

within MassDEP's expertise, it will rely on its sister agencies at the Division of Fisheries and Wildlife (including the Natural Heritage and Endangered Species Program) with respect to these issues as MassDEP reviews FirstLight's Application for a Water Quality Certification. Finally, CRWC identifies studies of TransCanada as a model for FirstLight's studies due to the level of detail and the benefits that might be derived from a similar approach by FirstLight and the ability to compare the data.

MassDEP urges FERC to give due consideration to its comments as well as the comments and requests of FRCOG, CRWC and MassDEP's sister agencies (as well as other commenters) as the information generated would be consistent with MassDEP's study requests and expected to provide valuable information for consideration by MassDEP with respect to First Light's forthcoming Application for a Water Quality Certification. It would likely expedite the issuance of the Water Quality Certification as the information would address comments and questions that MassDEP can reasonably expect from FRCOG, CRWC, MassDEP's sister agencies and others, if the information that they have requested is not generated as part of this study process.

Respectfully,



Michael J. Gorski
MassDEP
Regional Director
Western Region



Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

July 12, 2013

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

COMMENTS

Northfield Mountain Pumped Storage Project No. 2485
Turners Falls Project No. 1889
Updated Proposed Study Plan

Dear Secretary Bose,

The Massachusetts Division of Fisheries and Wildlife (Division) is the agency responsible for the protection and management of the fish and wildlife resources of the Commonwealth. The Division is also responsible for the regulatory protection of imperiled species and their habitats as codified under the Massachusetts Endangered Species Act (M.G.L. c.131A). The Massachusetts Endangered Species Act (MESA) was enacted in December 1990. Implementing regulations (321 CMR 10.00) were promulgated in 1992 and recently revised and implemented as of November 2010. The MESA provides a framework for review of projects or activities that occur within mapped areas of the state, called *Priority Habitat*, and published in the Natural Heritage Atlas. As such, we monitor operations at hydroelectric projects within the Commonwealth, as well as comment on proposed hydroelectric facilities. The Division has the following comments in response to the June 28 filing of FirstLight Hydro Generating Company "Updated Proposed Study Plan for the Turners Falls Hydroelectric Project (P-1889) and Northfield Mountain Pumped Storage Project (P-2485)."

General Comments:

In general FirstLight has attempted to incorporate the comments and suggestions received from stakeholders on the April 15, 2013 Proposed Study Plan (PSP). A few issues remain.

www.mass.gov/masswildlife

3.3.2 Hydraulic Study of Turners Falls Dam Impoundment, Bypass Reach and below Cabot Station

Page 3-53 of the Study Plan should reference collection of transects associated with state-listed macro-invertebrate and plant species. As further described below within the Division's comments on Study No. 3.5.1, transects should be established in both occupied and unoccupied patches of tiger beetle and state-listed plant habitat for use in conjunction with hydraulic modeling results. Because fine-scale variability in elevation, slope, substrate, and flow dynamics have the potential to significantly impact habitat suitability for these species, multiple transects may be needed to fully understand the extent and quality of habitats at these sites. The Division would strongly encourage the Proponent to consult with the Division prior to initiation of field work in order to seek concurrence that transect selection and data collection are sufficient to enable fine-scale analyses.

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

The site visit scheduled for July has been canceled and will be rescheduled in August.

Table 3.3.1-1 target species: Sea Lamprey spawning and incubation should be added to Reach 1 and 2. Substrate may be lacking but fish will be there when more water is added to the bypass reach.

HSI Criteria: The Division believes that good progress is being made to identify which HSI curves for which species/life history stages will be used to determine habitat availability and flow recommendations and the addition of curves which represent fish guilds rather than individual species shows some merit and should be followed up.

The Study Plan, as it relates to state-listed mussel species, does not provide any information regarding the application of IFIM methodologies (including both data collection and subsequent modeling) to Reach 5, the only reach where state-listed mussels are currently known to occur. The Division acknowledges that the broader study methodology for Reaches 4 and 5 may require further consultation between the Proponent and the Division upon completion of mussel surveys, as outlined within Study No. 3.3.16. However, given that the Proponent is proposing to use IFIM study methodologies as the primary avenue for assessing how project operations affect state-listed mussels and their habitats, Tasks 2-6 of the Study Plan should be amended so as to detail the Proponent's plan to apply appropriate data collection, modeling, and analysis methodologies for state-listed mussel species in Reach 5.

Existing Information and Need for Additional Information

In the second and third paragraphs of page 3-68, the Proponent proposes to limit the survey area to the 13-mile reach between Cabot Station and the Route 116 Bridge in Sunderland. The Study Plan also suggests that additional freshwater mussel studies associated with the FERC license of the Holyoke Dam (including portions of the Connecticut River south of Dry Brook in Sunderland) will provide information on the distribution and habitat of state-listed mussel species in Reach 5. If the Proponent intends to use data collected pursuant to methodologies not approved under the Turners Falls Hydroelectric Project (No. 1889), the Study Plan should be amended to confirm that that data will be collected pursuant to the requirements set forth under the final, FERC-approved Study No. 3.3.16.

Methodology

See General Notes 1, 2 and 3, below.

Study Reaches and Transect Selection (1-D and 2-D Modeling)

In the final paragraph of page 3-71, the Study Plan states that, for Reach 5, “the modeling approach for this reach will be further evaluated in consultation with the study team and is presently proposed to involve collecting water surface elevation data and hydraulic modeling (See Study Plan 3.2.2) in areas with suitable habitat for target species such as freshwater mussels.” The Division notes that all known records for state-listed mussel species within the project area occur within Reach 5. Although the exact details of how IFIM study methodologies will be applied to Reach 5 may require further consultation between the Proponent and the Division upon completion of mussel surveys, the Division notes that water surface elevation data and hydraulic modeling will not (by themselves) be sufficient to enable assessment of how project operations impact suitable and potentially suitable habitat for freshwater mussels in Reach 5. Water elevations represent one of several factors – including, primarily, changes in flow dynamics (e.g., flow velocity and velocity dependent factors such as sheer stress) - likely to affect state-listed mussels, their habitats, and the long-term viability of mussel populations in the Connecticut River. The Study Plan should be revised to clarify how IFIM methodologies will be applied and which modeling approach (1-D or 2-D model) the Proponent believes should be employed, as further detailed above.

Habitat Suitability Index Criteria

1. On page 3-74 the Study Plan suggests that host fish for freshwater mussel species will be limited to *deep slow* and *shallow slow* guilds. The Study Plan should include a summary of references confirming that all known and potential host fish species (as detailed on page 3-75) will be captured by the proposed guilds.
2. On page 3-74 the Study Plan suggests that host fish and/or mussel HSI criteria will be used as the target lifestage/criteria for the IFIM study in Reaches 1-4. The Study Plan states that the target lifestage/criteria for Reach 5 will “be

determined based on results of mussel survey in fall of 2013 in consult with MDFW and MA Natural Heritage.” As further detailed below as well as in the Division’s comments on Study No. 3.3.11 and 3.3.16, the Division finds that the use of host fish as a proxy for persistent mussel habitat is not a preferred or plausible approach and would likely misrepresent mussel habitat availability and persistence.

3. On page 3-74 the Study Plan currently does not include Eastern Silvery Minnow (*Hybognathus regius*) or Burbot (*Lota lota*) - both of which are state-listed as “Special Concern” - in the list of species to be assessed using habitat suitability indices (HSI) criteria. In order for the Division to assess the impacts of project operations on both existing and potential habitat for these state-listed fish species, both should be included in Reaches 1-4.

Freshwater Mussels

1. The footnote on page 3-72 states: “FirstLight proposes to adapt empirical data collected within Reach 4 during mussel survey work... to develop HSI criteria specific to yellow lampmussel if this species is found there in sufficient abundance. These criteria can then be applied retroactively...” Yellow lampmussel is only one of three state listed species, and the Division requests that HSI curves also be developed for the eastern lampmussel (*Ligumia nasuta*) and Dwarf wedgemussel (*Alasmidonta heterodon*). As further detailed below as well as in the Division’s comments on Study No. 3.3.11 and 3.3.16, if individuals are not found in sufficient abundance to calculate habitat parameters, data may be supplemented from additional data collected in adjacent sections of the Connecticut River or defensible sources in the literature. As detailed above, the Division notes that all known records for state-listed mussel species within the project area occur within Reach 5 and that data collection for HSI curve development should target these areas. Use of host fish as proxy for persistent mussel habitat is not a preferred or plausible approach. Therefore, the Study Plan should be amended to define how additional data will be acquired, or otherwise, define an abundance threshold below which an alternative approach (see comments on Study No. 3.3.11) would be used.
2. The final paragraph on page 3-72 and Table 3.3.1-2 on page 3-75 reference several mussel species – including the eastern elliptio, alewife floater, eastern floater, and triangle floater – that are not currently state-listed under the MA Endangered Species Act. The Division notes that, under the Massachusetts Endangered Species Act and its implementing regulations, the Proponent is not required to assess project impacts on species that are not currently state-listed.
3. On page 3-72, the Study Plan states that freshwater mussel habitat suitability will be assessed in all study reaches, and that host fish habitat suitability will be used as a proxy for mussel habitat persistence in the event that satisfactory

HSI curves cannot be developed for freshwater mussels. The Division would highlight several concerns with this approach:

- a. Persistence of host-fish habitat should not be confused with the persistence and presence of mussel habitat. Mussel presence is governed by physical habitat characteristics beyond those preferred by host fish. Flow related variables (velocity, shear stress, depth) experienced by mussels at high flows represent factors more likely to impact mussel populations (Layzer & Madison 1995, Hardison & Layzer 2001, Morales et al 2006, Allen & Vaughn 2010, Daraio et al. 2010, and Maloney et al. 2012). Host fish presence and habitat persistence are therefore not adequate predictors of mussel habitat availability, and absence of mussels in the presence of persistent host fish habitat will only confirm the loss of suitable mussel habitat. If used alone, the Study Plan should clarify that host fish habitat persistence does not fully represent freshwater mussel habitat suitability and indicate how it intends to assess project impacts on existing and potentially suitable mussel habitat.

Regarding state-listed mussels, this Study Plan should seek to document habitat availability, persistence and, through later analysis, how or if habitat availability/persistence is affected by current and potential project operations. The Study Plan proposes to use host-fish as a proxy for mussel habitat. As outlined above, although state-listed mussel habitat must overlap with host-fish to ensure physical contact between the two species, such overlap may be highly limited both temporally and spatially. Further, most of the potential host fishes, with Tessellated Darter and Sturgeon as notable exceptions, are resident fish species with broader habitat tolerances than have been documented for state-listed mussels. Therefore, the Division finds that the use of host fish as proxy for persistent mussel habitat is not a preferred or plausible approach, and would likely misrepresent mussel habitat availability and persistence.

- i. **Preferred Mussel Modeling Option:** HSI curves should be established for *Lampsilis cariosa*, *Ligumia nasuta* and *Alasmidonta heterodon*, which should in turn be used for defining and modeling habitat persistence. HSI should be calculated from habitat parameters of each freshwater mussel lifestage. Data used to calculate habitat suitability should be generated from proposed mussel studies (Study No. 3.3.16), and may be supplemented from data collected in adjacent sections of the Connecticut River or defensible sources in the literature. This approach is preferred because it specifically focuses on habitat suitability of freshwater mussels in reaches affected by Northfield Mountain and TFD project operations,

and has the ease of integrative analysis in PHABSIM with other species under study. Habitat suitability of known host fishes can be included in the development of HSI curves of the mussels.

The Division notes that while this is the preferred approach, we continue to be concerned that there may be insufficient data – collected under the currently proposed Study Plan or available in the literature – to support the creation of robust and representative HSI curves for each of the three state-listed species. In this circumstance, it is critical that an alternative modeling approach based on mussel habitat be employed rather than seeking to use fish as a representative proxy.

- ii. **Alternative Mussel Modeling Option:** An alternative approach to modeling mussel habitat through PHABSIM would be to utilize habitat persistence modeling via methods similar to Parasiewicz et al. (2012) and Maloney et al. (2012). These authors have used modeling methods similar to PHABSIM to develop habitat persistence models for mussels. The results of these models yielded useful and robust information about how flows interact with the persistence of mussel habitat. Both Parasiewicz et al. (2012) & Maloney et al. (2012) specifically applied these models to *Alasmidonta heterodon*, a target for this Study Plan, in the Upper Delaware River to focus on the relationship between hydraulics and species habitat distribution consistent with current knowledge of *A. heterodon* habitat (Strayer & Ralley, 1993). To ensure collection of appropriate data to support the utilization of these models, we recommend that the Proponent carefully look at the modeling data needs, especially related to substrate and flow.
- b. While the Division does not support the use of host fish as proxy for persistent mussel habitat, the modeling of individual host fish habitat, as part of the overall modeling effort, would yield critical information as to the presence and availability of host fish habitat. Such an analysis would allow for a more robust understanding of mussel ecology needs in the Connecticut River and whether host fish habitat availability is a limiting factor to mussel distribution.
 - i. **Preferred Host Fish Modeling Option:** Develop HSI curves for *confirmed* host fish in order to model host fish habitat persistence and mussel dispersal across barriers. The Division notes that although *potential* host fish species have been identified in some cases, *actual* host fish species remain poorly understood. For example, Table 3.3.11-1 of the Study Plan

acknowledges that glochidial host fish for *Ligumia nasuta* is unknown. Congeners of this species metamorphose on a number of fish species that are primarily inland freshwater species (i.e. bass, sunfish, perches, etc. [Corey et al. 2006]), suggesting that the proposed use of American shad as a host/habitat proxy may not be appropriate. Further, white sucker is listed as a potential host to be used as a proxy for modeling *Lampsilis cariosa* habitat suitability. This species is not a likely host, as only one glochidium was identified from a single fish, whereas other potential host fish species were observed with multiple encysted glochidia on multiple fish (Kneeland & Rhymer 2008).

The identification of suitable host fish relationship for *Lampsilis cariosa* and *Ligumia nasuta* are needed and can be determined through a laboratory host trial, described further under the Division's comments on Study No. 3.3.11. Such studies are not necessary for *Alasmidonta heterodon*, as Tesselated Darter has been well established as a confirmed host fish in laboratory and field studies (Michaelson & Neves 1995); this relationship should be documented in Table 3.3.1-2. For the other two species, once a suitable host fish is identified, the IFIM model for the *confirmed*, suitable host fish may be used to focus on host fish habitat, passage, and determine if these are limiting factors in the persistence of mussel species in the Connecticut River. However, as noted before and below, this does not indicate that mussel habitat or lifecycles are unaffected by the dam, only that some factor(s) other than host availability and passage is responsible for limited availability and persistence of suitable mussel habitat.

Furthermore, instream habitat alterations may affect host fish presence in reaches both above and below the dam. Any associated loss in host abundance would also manifest a decline in mussel populations, which the Proponent cites on page 3-72 as a reason to use host fish habitat persistence as a proxy for mussel habitat where mussel HSI curves cannot be developed. However, the Division reiterates that mussel habitat suitability is often not congruent to host fish distribution, but a subset nested within host fish distribution where other biotic and abiotic factors affect presence and abundance of unionids (Vaughn & Taylor 2000, Rashleigh 2008, Daraio et al. 2012, and Schwalb et al. 2012).

Therefore, the Division is concerned about the proposed omission of glochidial assessments (see Study No. 3.3.11)

because, without a more concrete understanding of which fish species are actually utilized as hosts within the Connecticut River, and which species are particularly important in enabling mussels to complete this key stage of their life cycle, fish passage and habitat persistence would have to be assessed and ensured for all potential host fish species. Further, the design of any potential fish passage devices would be dramatically more difficult without a targeted understanding of swimming speeds, necessary approach velocities, attraction flows, etc. for key fish species.

- ii. **Alternative Host Fish Modeling Option:** Develop HSI curves for all potential hosts as surrogates for confirmed host fish. Should the Proponent wish to assume that all potential host fish species are equally important for purposes of the re-licensing process, model habitat persistence of all potential host species in reaches affected by flow alteration, and agree to enable passage of all potential host species as part of re-licensing discussions, the Division would willingly cede this request while highlighting our above concerns about the inefficiencies and engineering challenges this would present.

If a host fish is determined to be present, persists, has adequate migration across barriers in the absence of a viable mussel population, then the Division would conclude that host fish availability is not a limiting factor in mussel distributions in the Connecticut River, and that other factors are limiting mussel persistence.

Task 2: Field Data Collection

1. In the fifth paragraph on page 3-76, the Study Plan states that “at transects portraying mussel habitat (determined in consultation with MDFW), bottom velocity measurements will also be collected, or simulated using the IFG4 program in PHBASIM which facilitates modeling “nose” velocities (*i.e.* velocities occurring at the depth at which a species/lifestage is known to occupy).” Data collection should include a full velocity profile, with near substrate data collection being particularly important to modeling shear stress. Simulated data should be calibrated to field collected data from transects portraying mussel habitat under various flow conditions that adequately encompass the range of flows observed under current and potential flow regimes.
2. On page 3-76, data collection methodologies for Reach 5 are not, but should be, detailed. See comments above regarding the need for detailing data collection methodologies for Reach 5.

Tasks 3-6

See comments above regarding the need for detailing modeling and analysis methodologies for Reach 5.

3.3.2 Upstream and Downstream Passage of American Shad

Radio tracking- Sample size- how many fish will be tagged and where?

Mobile tracking- need more on methods- Frequency? Locations?

More than one PIT tag reader will be required per fishway in order to determine direction of travel (upstream vs. downstream)

Is it feasible to install PIT tag reader(s) at the Northfield Mountain intake/discharge or at the upper reservoir to directly evaluate entrainment?

Why is the northernmost extent of the study at Northfield Mount Hermon and not the Vernon Dam?

3.3.3 Downstream Passage of American Shad

Radio tags- Sample size- how many fish will be tagged?

Balloon tags- All turbines will be tested “at or near hydraulic capacity”. Does this represent normal operation?

3.3.4 Upstream Passage of American Eel

Systematic eel surveys-why was the area around the downstream fish bypass removed from the list of sites to be studied?

The temporary eel traps are described as being 6 feet long and 1 foot wide. Is 1 foot wide enough to have the 2 different substrates used side by side as the methods describe? Please describe the substrate types to be used.

Will Cabot or Spillway fishway attraction flows be operated during the period when fishways are not operational to attract eels? How will the traps be run when the fishways are operational?

3.3.5 Downstream Passage of American Eel

Radio tag study: What is the sample size?

The hydroacoustic study should take place for more than one year because of year-to-year variability.

Another receiver site should be added upstream of the Holyoke Dam but downstream of the Route 116 bridge to confirm viability of eels passed downstream.

3.3.6 Shad Spawning

Will the Turners Falls Power Canal be added to the study as a survey site as discussed?

3.3.7 Fish Entrainment and Turbine Mortality

The Division is not convinced that no field data collection is necessary. How will realistic numbers for American shad egg and larva entrainment at NMPS be developed?

How will “developing a qualitative scale of entrainment risk” translate to an estimate of impacts on fish populations?

3.3.8 CFD of Fishway Entrances and Powerhouse Forebays

A CFD model of the Station No. 1 discharge into the bypass reach could determine potential impacts to fish migrating upstream through the bypass reach.

3.3.10 Assess Operational Impacts on Emergence of State-listed Odonates in the Connecticut River

General Description of Proposed Study

The first paragraph of page 3-171 proposes to limit the study area to the Turner’s Falls Dam (TFD) Impoundment and the 13-mile reach below the TFD. The Study Plan states that “the near-complete lack of a shallow vegetated littoral zone and rocky substrate in the upper reservoir, together with its characteristic water level fluctuations, would likely preclude state-listed odonates (particularly riverine species, which are the focus of this study).” The Division is concerned about the proposed omission of surveys within the Upper Reservoir and is not aware of any surveys/assessments that confirm the Proponent’s assertion that current conditions likely preclude the presence of state-listed species. As outlined in the Division’s original study request, appropriate substrates for odonates vary by species but may include sand, silt, rocks, trees, coarse woody debris, undercut banks, tree / plant roots, and anthropogenic structures. Shallow vegetated littoral habitat and rocky substrates do not represent the only habitat/substrate in which emergence and eclosure of state-listed odonates will occur.

The Division’s original study request was not specifically limited to riverine species, and the Study Plan should seek to assess operational impacts to *all* state-listed species with the potential to be impacted by the project. For example, the Division believes that *Enallagma carunculatum* (Tule Bluet, state-listed as “Special Concern”) has the potential to utilize habitats within the Upper

Reservoir. This species is known to occur within the TFD Impoundment and riverine habitats in the Connecticut River near the confluence with Deerfield River; the Upper Reservoir is well within the flight distance of this species and appears to offer suitable habitat. Additionally, the TFD Impoundment exhibits water level fluctuations similar to the Upper Reservoir, suggesting that the Proponent's assertion (e.g., that water level fluctuations in the Upper Reservoir preclude presence) is not supported.

Additionally, the third paragraph of page 3-172 acknowledges that "the extent to which water level fluctuations disrupt emergence and eclosure is not well understood. The concern is whether emergent larvae ascend a great enough vertical distance, and quickly enough, to avoid being inundated after eclosure begins." Northfield Mountain Power Station currently operates with no restrictions on the timing, frequency, or magnitude of pumping, generation, or pool elevation within the Upper Reservoir. The Division notes that the potential impacts of water level fluctuations on state-listed species are not limited to those occurring within the mainstem of the Connecticut River. Project operations in the Upper Reservoir certainly warrant further assessment *if* state-listed odonates are present, making qualitative surveys within the Upper Reservoir a necessary first step toward assessing this issue.

Methodology

It is critical that data collection be sufficient to enable robust statistical analyses of survey results for each species across a variety of habitat conditions. Based on the Study Plan – which is currently limited to four qualitative and four quantitative sites - the Division is concerned that natural heterogeneity/variation will make detection of trends impossible within a robust statistical analysis (including multivariate methods) without sufficiently large sample sizes. The Division recommends that the Study Plan be amended to explicitly state that additional data will be collected (either within the same season or during the next study season) should initial data collection be found to be insufficient. Judgment of sufficiency should be based upon power analyses or similar statistical methods to determine if data collection is sufficient to robustly explain heterogeneity/variation, and should be confirmed through consultation with the Division. In addition, the Division is willing to work with the Proponent to develop pre-approved, maximum data collection thresholds to guide this process and ensure sufficient data collection. A set of conclusions based solely on non-parametric statistical methods will undermine the utility and analysis power of the study.

See General Notes 1, 2 and 3, below.

Task 3 (Qualitative Surveys for Larvae and Exuvia)

The Division notes that the Study Plan will likely generate data sufficient to document species *presence* but not species *absence*. Documenting species absence would require more extensive survey effort and does not appear to be proposed at this time. Therefore, the Division recommends that the Study Plan be

amended to explicitly acknowledge intent to document species presence, or otherwise include methods sufficient to document species absence.

1. The third paragraph of page 3-173 suggests that three representative study reaches will be located downstream of the TFD. Based on known records of state-listed odonates along the Connecticut River, the Division believes that specific regions have seen relatively less study compared with others, including: 1) Barton's Cove, 2) Reach 3 (as defined in Study No. 3.3.1), and 3) the reach between the Railroad Bridge and Third Island in Deerfield/Montague. The Study Plan should be revised to confirm that the three reaches to be located below the TFD will be targeted in order to fill the latter two data gaps, and that two study sites be located within the reach between Railroad Bridge and Third Island. Additionally, the Division would suggest that surveys within each study reach focus on state-listed odonate species not yet documented within the target reach, but which are known to occur in similar habitats within other regions of the Connecticut River. These species include, by reach, the following target species:

- a. Barton's Cove – *Gomphus fraternus* and *Gomphus ventricosus*.
- b. Reach 3 – *Gomphus fraternus* and *Gomphus ventricosus*.
- c. Railroad Bridge to Third Island, Montague/Deerfield – *Gomphus abbreviatus*, *Gomphus fraternus*, *Gomphus vastus*, *Gomphus ventricosus*, *Neurocordulia yamaskanensis*, *Stylurus amnicola*, and *Enallagma carunculatum*.

2. The Study Plan does not provide information regarding the effort (amount of time to be spent per unit of area) proposed for survey of each study reach. Further, using fixed survey transect lengths will make capturing the diversity of habitats characterizing target reaches, with sufficient replication, unlikely. Without knowing the extent and location of suitable habitat within these reaches, basing survey effort on specified linear feet of river bank to be surveyed is not appropriate and may greatly under-represent critical habitats and habitat variability. Therefore, the Division believes that the Study Plan should stratify effort by habitat type and then standardize effort (amount of time to be spent per unit of area) within each habitat type. This would ensure sufficient coverage of all potential habitats throughout these regions while allowing field work to remain adaptive. Because the purpose of these surveys is to document *presence* of specific state-listed odonates, surveys within a particular reach may cease in advance of the specified effort *if* surveys successfully document the presence of all species suspected to occur within that reach.

3. The third paragraph of page 3-173 suggests that surveys will be conducted just prior to spring emergence (late May to early June) to maximize detection of all species. The Division notes that some state-listed species, such as Riverine Clubtail (*Stylurus amnicola*, state-listed as “Endangered”), are known to

emerge no earlier than late June. This suggests that the proposed survey window may be too narrow to adequately capture all species with the potential to occur. The Division believes that, at a minimum, surveys should be conducted between May 10th and June 30th, as needed, to capture the emergence periods of all target odonate species.

4. In addition to the data parameters proposed on page 3-173, elevation above the water surface, vertical and lateral distance from the water's edge, compass direction of the animal, its lateral aspect, and substrate should also be recorded for all exuvia collected during qualitative surveys. This data would supplement – and effectively improve the accuracy of - data collected under Task 4 survey activities with minimal additional cost.

Task 4 (Quantitative Surveys for Emergence/Eclosion Behavior)

1. The second paragraph on page 3-174 suggests that transect surveys (see comment on Task 3, #2 in regard to transects) will occur every two weeks from June through August. Emergence of some state-listed species can begin as early as early-May of any given year, depending on weather conditions; the Study Plan should be amended such that surveys commence in mid-May and extend through the end of August.
2. The second paragraph on page 3-174 states that “if possible, emerging larvae will be watched/tracked as they progress upslope, and the time it takes for them to stop and eclose will be recorded.” The Division specifically requested the collection of data sufficient to determine how long emergence takes for state-listed species. The time it takes a teneral to complete the emergence process is a critical piece of information which, in conjunction with a better understanding of the rate and magnitude of water level fluctuations (to be provided by Study No. 3.2.2), is necessary to enable assessment of whether and to what extent water level fluctuations affect the ability of tenerals to complete the emergence process.

Indeed, page 3-172 acknowledges that “... the concern is whether emergent larvae ascend a great enough vertical distance, and quickly enough, to avoid being inundated after eclosion begins.” Further, the fourth paragraph of page 3-174 states that “field data gathered during Task 4, particularly the timing (e.g., when species emerge), distance travelled (both horizontal and vertical), and duration (i.e., speed) of travel and eclosion for species and/or species groups will be used in concert with the hydraulic model to determine which species are most vulnerable to fluctuating water levels, and under what conditions they are most susceptible.” These questions represent the key goals of this study, and the Division is concerned that the lack of a robust plan to assess emergence time will undermine the utility and analysis power of the study. Therefore, the Study Plan should be revised to include a study framework geared to sufficiently assess how far tenerals travel **and** how long the emergence process takes. Assessing how long the emergence process takes

where possible is unlikely to provide data sufficient to answer these questions. See additional comments on Task 3, #2 regarding survey effort.

3. The first paragraph on page 3-174 states that “six transects will be established within each [of four] study reach, for a total of 24 transects.... Each transect will be perpendicular to the river, 1 m wide, and will extend upslope approximately 12 m...” The Division is concerned that the Study Plan – which would effectively yield survey of 24 linear meters of river – is unlikely to provide sufficient spatial coverage of different habitat conditions (from substrate and vegetative community type to water depth and velocity) nor a sufficient number of data observations for each species (or species group) to enable robust data analysis. One approach to overcome this concern would be to stratify the sampling within known emergence habitat type (e.g., gradually sloping mud banks, natural vegetation, rip rap, etc.) and then ensure sufficient observations are collected within each emergence habitat type. The Division remains available for consultation to help determine appropriate habitat stratification for each species, and to work with the Proponent to develop pre-approved, maximum data collection thresholds to guide this process and ensure sufficient data collection. Modifications of the Study Plan – which might include modifying transects such that they run parallel to the river and ensuring that transects are a minimum of 50m in length, at various upslope distances from the river (terminating at 12m, as proposed) – may greatly improve detection of emergence within different habitat conditions. See additional comments on Task 3, #2 regarding survey effort.
4. The second paragraph on page 3-174 states that surveys “will be timed to coincide with weather and flow conditions that are conducive to emergence.” The plan should clarify the parameters under which surveys will occur, including both appropriate weather conditions and flows. Surveys should occur on weekdays and non-holidays to minimize the affect of boat traffic wake on survey results, and should occur on two consecutive days (with suitable conditions) between 4AM (or two hours prior to dawn) to 12PM. Additionally, the Division notes that, in order for surveys to yield an accurate representation of the range of travel distances and emergence time periods, surveys should occur no sooner than 24-48 hours after stabilization of water levels. The Division is concerned that, without stabilization of water levels (e.g., no peaking during a sufficient time window prior to field work), collected data will be biased toward individuals and species that travel far / fast enough to be observed and measured; individuals that do not will have been washed away by water level peaks and therefore escape observation. For similar reasons, surveys should occur no sooner than 24-48 hours after a significant rain event, the magnitude of which should also be specified.
5. In addition to the data parameters proposed on page 3-174, elevation above the water surface, vertical and lateral distance from the edge of water, the

compass direction of the animal, its lateral aspect, and substrate should also be recorded for all exuvia collected during qualitative surveys.

3.3.11 Fish Assemblage

Boat electrofishing: Not clear if this will take place in day and night.

The Division recommended sampling with eel pots but this has not been added to the methods.

Selection of study reaches: Firstlight should describe how the study reaches will be chosen. In the April 15, 2013 PSP, Firstlight cited Kiraly (2012) methods for stratified-random study design. However in the June 28, 2013 updated PSP, Firstlight has removed this citation, and failed to describe how their proposed study still represents a stratified-random design.

Potential effects on SNS: The Division believes that a fish assemblage study can be conducted throughout the entire proposed geographic scope without significant impacts to Shortnose sturgeon, and encourages FirstLight to consult with NOAA to choose acceptable methods, locations within all reaches, and time of year to complete the study. Special care needs to be used when employing gill nets as SNS are particularly vulnerable to this gear type. Net soak time should adhere to these NOAA guidelines¹:

Gillnet soak time as a function of water temperature and DO.

Net set duration (hours)	Temperature at sampling depth	Minimum DO at sampling depth
14	Up to 15°C	4.5 mg/L
4	15° to 20°C	4.5 mg/L
2	20° to 25°C	4.5 mg/L
1	25° to 28°C	4.5 mg/L
No sampling	Over 28°C	4.5 mg/L

General Description of Proposed Study

The Study Plan states that the Proponent “is not proposing to evaluate mussel larvae on host fish because the relationships are already well understood (Table 3.3.11-1); the level of effort proposed will provide data on the distribution and relative abundance of state-listed fish species and host fish species.” The Division is concerned about the proposed omission of glochidial assessments because, without a more concrete understanding of which fish species are actually utilized as hosts within the Connecticut River (see Study No. 3.3.1) – and which species

¹ Kahn, J. and Mohead, M.. 2010. A protocol for use of shortnose, Atlantic, Gulf, and green sturgeons. NOAA Technical Memorandum NMFS-OPR-45. 62 pages.

are particularly important in enabling mussels to complete this key stage of their life cycle – fish passage and habitat persistence would have to be assessed and ensured for all potential host fish species.

Watters (1996) found that 30-60% of all native mussels were negatively impacted by damming of rivers, which causes shore erosion and siltation and both suffocates mussels and impairs their reproductive cycle through the loss of or access to host species by impeding fish passage (Bogan 1993). Given the well-documented insufficiency of current fish passage structures at the TFD, the Division believes that the TFD and its associated operations effectively impair the ability of rare mussel species to colonize suitable habitats both above and below the TFD.

Furthermore, instream habitat alterations may affect host fish presence in reaches both above and below the TFD. Any associated loss in host abundance would also manifest a decline in mussel populations, which the Proponent cites on page 3-72 (Study No. 3.3.1) as a reason to use host fish habitat persistence as a proxy for mussel habitat where mussel HSI curves cannot be developed. The Division reiterates that mussel habitat suitability is often not congruent to host fish distribution, but a subset nested within host fish distribution.

The intent of this element of the Division's original study request is to target which host fish species are most critical in the Connecticut River, and therefore, guide analysis and potential re-design of current fish passage structures at the TFD to ensure passage of critical host fishes. It is, in effect, complimentary to Study Plans 3.3.1, 3.3.2, 3.3.3, 3.3.4, and 3.3.5, all of which seek to assess habitat persistence and upstream and downstream passage for migratory fish species, except that the species of concern for mussels requires identification to ensure adequate design. Further, the design of any potential fish passage devices would be dramatically more difficult without an understanding of swimming speeds, necessary approach velocities, attraction flows, etc. for key host fish, making design of any passage devices difficult, at best.

Notwithstanding the above, the Division acknowledges that an un-targeted, field based glochidial assessment for all potential host fish is not necessary or feasible. Analysis of species with small home ranges, or with minimal potential to utilize fish passage structures, would not inform analysis and potential re-design of existing passage facilities. However, the Division holds that a targeted assessment of key species or genera is necessary, appropriate, feasible and consistent with studies for other taxonomic groups, which would inform design criteria for passage structures. Said assessment should focus on larger-bodied fish species with the potential to be impacted by the current fish passage system at the TFD and inform/benefit from potential improvements to that system. Applicable methods have already been developed and could readily be applied; these include 1) genetic or morphometric identification through field collection and subsequent

laboratory analysis (Kneeland & Rhymer 2007 & 2008), or 2) laboratory host fish trials (Johnson et al. 2012 and Fritts et al. 2012).

The Division would suggest laboratory fish trials; based on recent conversations with labs that have recently conducted similar work, such a study offers an established, cost-feasible method to identify primary hosts. Because a known suitable host exists for *Alasmidonta heterodon* (tessellated darter: Michaelson & Neves 1995), laboratory trials should be prioritized to determine suitable hosts for *Lampsilis cariosa* (state-listed as “Endangered”) and *Ligumia nasuta* (“Special Concern”). Using a tiered approach to assess host suitability, the study should progress to the next tier only where no suitable primary hosts are found in previous trials. A suitable primary host should be defined as any fish species with > 40% metamorphosis success using established host fish protocols (Johnson et al. 2012 and Fritts et al. 2012).

Tier 1:

- One species of black bass (*Morone salmoides* or *M. dolemieu*)
- Striped bass (*M. saxatilis*)
- One species of shad/herring (*Alosa spp.*)

Tier 2 (if no suitable hosts found above):

- One species of sunfish (*Lepomis spp.*)
- One species of chub (*Semotilus corporalis* or *S. atromaculatus*)
- One species of sucker (*Catostomus spp.*)
- Yellow perch (*Perca flavescens*)
- One catfish species (Bullhead – *Ameiurus spp.*, or Channel catfish – *Ictalurus punctatus*)

Tier 3 (if no suitable host found above):

- As needed and in consultation with the Division.

Level of Effort and Cost

Laboratory methods and analyses similar in design and approach to Johnson et al. (2012) and Fritts et al. (2012) will likely range from \$ < 40,000 – 80,000.

3.3.12 Effects of spill at Cabot on Sturgeon

The Division agrees with the proposed study approach. If it can be determined that these spill events can be eliminated (at least any volitional events) it may not be necessary to study further.

3.3.13 Littoral Zone Fish Habitat

The Division agrees with the proposed approach to study the zone of reservoir fluctuation (176 to 185 ft msl) and shallower areas (less than 1 foot deep at minimum pond elevation).

3.3.15 Sea Lamprey Spawning

The Division agrees with the proposed study approach. However project operation may preclude lampreys from even trying to use otherwise good spawning habitat (lampreys may wisely choose not to nest in areas dewatered or scoured by project operations). Is there a way this could be addressed in the study or will these areas become apparent through the IFIM/persistent habitat analysis?

3.3.16. Habitat Assessment, Surveys, and Modeling of Suitable Habitat for State-listed Mussel Species in the Connecticut River below Cabot Station

The Study Plan proposes to limit the survey area to the 13-mile reach between Cabot Station and the Route 116 Bridge in Sunderland, and that additional freshwater mussel studies associated with the FERC license of the Holyoke Dam (including portions of the Connecticut River south of Dry Brook in Sunderland) will provide information on the distribution and habitat of state-listed mussel species in Reach 5. If the Proponent intends to use data collected pursuant to methodologies not approved under the Turners Falls Hydroelectric Project (No. 1889), the Study Plan should be amended to confirm that that data will be collected pursuant to the requirements set forth under the final, FERC-approved Study No. 3.3.16.

Existing Information

1. In the third paragraph on page 3-227, the Study Plan notes that the species most vulnerable to changes in water elevation and flow dynamics would have an affinity for nearshore habitats or other shallow areas, which are most likely to become dewatered or vulnerable to heat stress or predators during periods of low flow. The Division agrees with this assertion, but notes that changes in flow dynamics – including increased flow velocity and sheer stress – also have the potential to significantly impact habitat suitability for rare mussel species in areas that are not susceptible to the factors outlined above. Increases in flow velocity, shear stress and scour are important factors that will have reportedly altered the persistence of habitat used by unionid mussels throughout their lifecycle (Layzer et al. 1993, Layzer & Madison 1995, Layzer & Scott 2006). Indeed, an understanding of how flow dynamics – and therefore the persistence of suitable habitat and refugia – change at relatively fine scales across a range of flow regimes is a crucial component of the Division’s assessment of potential project impacts.
2. On page 3-227 the Study Plan recognizes three state-listed species of freshwater mussel (*Lampsilis cariosa*, *Ligumia nasuta*, and *Alasmidonta heterodon*). However, Study No. 3.3.1 only proposes creation of HSI curves for *Lampsilis cariosa* (Page 3-72 footnote). The Division requests that HSI curves be created for all three state-listed species.

Methodology

See General Notes 1, 2 and 3, below.

Task 2 (Phase 1 Mussel Survey and Habitat Assessment)

1. The Study Plan suggests that at least one site per mile will be surveyed, with additional sites delineated for survey in areas of greater habitat complexity. Further, the Study Plan suggests a minimum of 1.0 person-hours of survey effort per site, with one-hour timed searches sufficient to cover a 200-meter section. The Division requested systematic and sufficient coverage of all potentially suitable habitats in order to ensure detection of state-listed mussels. Indeed, the Division's standard mussel survey protocols require that all suitable habitats within a proposed project area – identified through a comprehensive habitat assessment, as proposed in the Division's original study request - be surveyed concurrent with or subsequent to the assessment. The Division is concerned that the Study Plan does not explicitly describe the criteria to be used in identifying potentially suitable habitat during the habitat assessment, nor ensure that all potentially suitable habitats will be surveyed. Therefore, the Division requests that the Study Plan provide additional detail regarding its plan to provide sufficient and thorough survey coverage of all suitable habitats.
2. The Study Plan suggests that a suite of morphometric and site specific data will be collected for state-listed mussels as well as the first 50 individuals of a non-listed species. The Division also requests that each state-listed mussel and the first 50 individuals of non-listed species be tagged with an individual identifier (e.g. Hallprint shellfish tags); individual identification will be useful for long-term monitoring and use in quantitative population estimates.
3. The Study Plan suggests that key instream habitat parameters (such as water depth, flow velocity, substrate, water temperature, etc.) will be collected at all survey sites. The Division notes that these instream habitat parameters should be collected pursuant to the applicable standards outlined within Study No. 3.3.1, and that the Proponent explicitly detail (either in situ or by reference to Study No. 3.3.1) the procedures that will govern data collection. The Division notes that data collection should include a full velocity profile in order to understand how velocity and other parameters change both horizontally and vertically. Complete profiles should be conducted in transects perpendicular to the flow of the river channel, including (but not limited to) a minimum of one transect within the mussel population, one transect immediately upstream of the population, and one transect immediately downstream of the population.

Collection of flow velocities at or near the substrate surface, and at varying flows, is particularly critical to informing further analyses of how various flow regimes affect mussel behavior and persistence of potential habitat (e.g., relative shear stress, etc.). Therefore, the Division would recommend that the Study Plan explicitly specify (either in situ or by reference to Study No. 3.3.1) that velocity measurements will be collected at near-substrate depths within all potentially suitable habitats, and that IFIM models incorporate changes in

temperature, velocity, depth, shear stress, and habitat persistence for all lifestages in the mussel lifecycle.

4. The Division notes that water temperature is a particularly important factor in determining mussel habitat suitability, and that temperature data should be collected and modeled as part of the Study Plan (see Castelli et al., 2012). Of particular concern is the relevance of temperatures during low flows and the rate of temperature change caused by peaking, as thermal thresholds are likely affected by acclimation temperature (Galbraith et al. 2012, Pandolfo et al. 2010). As a minor addition to IFIM fieldwork, we recommend point temperatures be taken at all test flows within a representative subset of transects within suitable mussel habitats.

Task 3 (Phase 2 Habitat Assessment and Mussel Survey)

1. The Study Plan suggests that additional mussel surveys will be conducted at sites where state-listed mussel species are found. Additionally, the Study Plan suggests that quantitative sampling will occur if and where state-listed mussel densities are high enough, so as to provide a more accurate assessment of density and population size. The Study Plan should provide a greater degree of specificity regarding potentially appropriate sampling methods and detail where/when each survey methods would be employed. At a minimum, the plan should include repeated site visits (to measure detection probability and population size; see Meador et al. 2010) as well as appropriate use of transects and/or quadrat excavation in a percent of occupied patches (depending on patch size). Individual identifier tags (e.g. Hallprint shellfish tags secured with Superglue) should be used on all state-listed species and the first 50 non-listed mussel individuals (see comment on Task 2 above) to better enable population size estimation and long-term monitoring of individuals.
2. The Study Plan suggests that additional habitat data – in the form of cross-channel transects – will be collected to support the Study No. 3.3.1, and that transect number will depend on population size and habitat complexity. The Division notes that Study No. 3.3.1 will need to be applied within both occupied and unoccupied patches of suitable mussel habitat in order to fully understand project impacts. Given that mussel populations are currently known to occur within Reach 5, transects will need to be located so as to collect data from a sufficient number of suitable sites within this reach and other reaches, if appropriate. The Division notes that transects should be located, and appropriate data collected, pursuant to the applicable standards outlined within Study 3.3.1, and that the Proponent explicitly detail (either in situ or by reference to Study 3.3.1) the procedures that will govern these details. Proposed transect locations should be submitted to and approved by the Division to ensure that mussel occurrence data has been accommodated.

Task 4 (Effects of Flow Regime on State-listed Mussels) (3-150)

1. The Study Plan does not reference the need to delineate HSI curves for state-listed mussels, though these are needed to inform habitat modeling in Study No. 3.3.1. HSI curves represent a critical component of Study No. 3.3.1 and related modeling efforts if they are to accurately delineate suitable mussel habitats and assess project impacts. The Study Plan should explicitly outline the Proponents plan for creating data-driven HSI curves for each mussel species. The Division reiterates that HSI curves for state-listed mussels are generally not well understood, and data collection from a suite of both occupied and unoccupied sites is needed to inform curve creation. However, others have been successful at modeling persistent habitat using methods similar to PHABSIM (Parasiewicz et al. 2012, Maloney et al. 2012, Daraio et al. 2010, Morales et al. 2006, and Layzer & Madison 1995).
2. The Study Plan states that IFIM and hydraulic models will be supplemented with detailed habitat data where state-listed mussels are found. However, the objective of Phase 1 (page 3-226) states that in the absence of detection, potential habitat will be mapped based on species habitat preferences. The Division reiterates that HSI curves represent a critical component of Study No. 3.3.1 and related modeling efforts if they are to accurately delineate suitable mussel habitats and assess project impacts. The Division believes it is possible to create HSI curves, and requests that this Study Plan (and Study No. 3.3.1) identify alternative sources and methods for collecting supplemental data where necessary.

3.3.17 Tributary and Backwater Habitat

The Division agrees with the proposed study approach.

3.3.18 TF Canal Drawdown

The methodology is described as “the 2011 survey methods, with minor modifications”. What are these modifications, or are they already incorporated in the text that follows?

3.5.1. Wetlands, Riparian, and Littoral Habitat

Methodology

See General Notes 1, 2 and 3, below.

Task 1(Literature Review)

1. The Division is willing to provide information regarding the location and extent of known state-listed plant and tiger beetle populations. The Study Plan should be revised to specify that the Proponent will consult with the Division to identify known habitats for state-listed species so as to ensure that known populations are adequately surveyed and assessed.

2. The Study Plan suggests that “pre-survey, biologists will review life histories of wildlife and phenology of listed plants for known listed species at the Project to select field survey windows to optimize observations.” The Division supports this approach; however, the Study Plan should be revised to confirm that the Proponent will consult with the Division during this review to ensure concurrence on appropriate survey windows and diagnostic identification characteristics.

Task 3 (Sensitive Plant Survey)

1. In the first paragraph of page 3-270, the Study Plan suggests that rare plant surveys within suitable habitats will employ a time per unit area approach, to be “determined based upon the extent of the survey area, location, and the complexity of the plant diversity and population densities.” The Division supports this approach; however, the Study Plan should be revised to include appropriate time per unit area thresholds, or otherwise confirm that the Proponent will consult with the Division to establish appropriate time per unit area thresholds in advance of field work so as to ensure concurrence of survey intensity within suitable habitats.
2. In the first paragraph of page 3-270, the Study Plan states that “dates and times, the areas that were surveyed, and elevations taken with a level rod” will be collected. The Division notes that surveys should, at a minimum, also collect information regarding the spatial extent of the population, number of individuals, substrate, and plant vigor. Data related to plant vigor or health of a particular population should include spatial mapping of vigor as it varies across spatial / elevation gradients; see additional comments on Task 3, #4.
3. In the first paragraph of page 3-270, the Study Plan suggests that data will only be collected at sites where state-listed plants are located. The primary goals of the study, as stated in the third paragraph of page 3-262, “are [to] quantify the impacts of water level fluctuations and the current and proposed flow regimes on state-listed rare plant species”. This, in turn, requires that the study: 1) delineate all suitable habitat for state-listed plants (particularly species inhabiting mud flats, sand bars, and high energy shore and cobble island habitat types); 2) determine habitat suitability preferences for state-listed plants by comparing flow parameters within and between occupied and unoccupied patches of suitable habitat, and 3) assess how quality, quantity, and location of habitat changes over a range of water elevations and inundation frequency/duration/timing. Therefore, the Study Plan should be revised to confirm that all suitable habitats will be identified and mapped, and that data sufficient to enable hydrological modeling of water elevations and timing, duration, and frequency of flooding – including cross-sections, as further described below – will be collected from both occupied and unoccupied patches of suitable habitat. The Division notes that the goals and

methods referenced here are nearly identical to those outlined for state-listed tiger beetles (see Task 6, below).

4. On the last paragraph of page 3-267, the Study Plan states that “this task will collect the necessary field information to evaluate the effects of these changes in water level elevations on the life cycle of state-listed species and in particular, the germination, growth, and dispersal of species inhabiting mudflats, sand bars, and cobble islands.” However, the Division notes that the Study Plan does not lay out a framework through which the affects of project operations on the life cycle (including germination, growth, or dispersal) of state-listed plants will be quantified. At a minimum, the Division would suggest that cross-sections (see comments on Task 6, #1 below) be established in both occupied and unoccupied patches of suitable habitat. Fine-scale analysis is necessary to enable accurate hydrologic modeling and facilitate analysis of how germination, growth, or dispersal may be affected by the timing, duration, extent, and frequency of flooding. The Division notes that – because fine-scale variability in elevation, slope, substrate, and flow dynamics have the potential to significantly impact habitat suitability – multiple cross-sections are likely needed to fully understand the extent and quality of habitats at these sites. The Division would strongly encourage the Proponent to consult with the Division prior to initiation of field work in order to seek concurrence that data collection and survey methodology are sufficient to enable fine-scale analyses.
5. Table 3.5.1-1 should be revised to include Upland White Aster (*Oligoneuron album*), state-listed as “Endangered,” and identified in the Division’s original study request.

Task 6 (Project Water Level Fluctuation Assessment)

1. The Study Plan suggests that a cross-section will be established in known areas of tiger beetle habitat, for use in conjunction with model results. As outlined above, the Division believes that fine scale variability in elevation, slope, substrate, and flow dynamics has the potential to significantly impact habitat suitability and that multiple cross-sections will be needed to fully understand the extent and quality of habitats at these sites. Additionally, cross-sections should also be placed in unoccupied but potentially suitable habitats to support the analyses further described under #2, below. The Division would strongly encourage the Proponent to consult with the Division prior to initiation of field work in order to seek concurrence that surveys are sufficient to enable fine-scale analyses.
2. As outlined in the fourth paragraph of page 3-262, the Division requested integration of modeled river flows and water levels with a habitat assessment for state-listed tiger beetle species. Similarly, the Division requested that the model should, as stated in the fourth paragraph, “specifically assess the influence of existing and proposed Project operations on water levels for both

known populations and potential habitats for the Cobblestone Tiger Beetle (*Cicindela marginipennis*) and the Puritan Tiger Beetle (*Cicindela puritana*). In the first paragraph of page 3-273, the Study Plan states that a “hydraulic model will be developed as part of Study No. 3.2.2. Specifically, this information will be used to address how hydraulically connected habitats and vegetation is affected, and how operations have or may affect known populations and potential habitats for state-listed invertebrate species, including the Puritan and Cobblestone Tiger Beetles.” However, the Study Plan does not appear to include a habitat assessment to identify *potential habitat* for state-listed tiger beetles; instead, the Study Plan appears to limit its analysis to known habitats.

The Connecticut River harbors the only known population of each species in Massachusetts. Although assessing impacts to known habitats is a crucial component of the Study Plan, assessing impacts to potential habitat – which might otherwise support viable populations under modified flow regimes – is similarly critical to supporting the long-term viability of each species in the Connecticut River. The Study Plan should be modified to include the Proponent’s plan to conduct a habitat assessment for state-listed tiger beetle species sufficient to identify potential habitat within the TFD Impoundment and downstream of the TFD to Rainbow Beach. As requested, field assessments of both existing and potential habitats should involve collecting flood depth, timing, duration, and extent - as well as frequency and changes to substrate characteristics - sufficient to permit assessment of how the quality and extent of both existing and potentially suitable habitat changes over a range of flows. The measurements should be taken over a range of test flows, between the existing minimum flow and maximum project generation flows, and synthesized to quantify habitat suitability for each species under each test flow.

3.6.1 Recreation Use/User Contact Survey

Figure 3.6.1-1 draft survey, item #8: Group all fishing activities (shore, boat, ice) and hunting in the list

Figure 3.3.1-3 draft survey, item #8: Group all fishing activities (shore, boat, ice) and hunting in the list

3.6.3 Whitewater Boating Evaluation

The Division will not support seasonally inappropriate flow regimes for whitewater boating (i.e. high flows in mid-summer) as these flows will adversely affect the aquatic biota that the Division is seeking to reestablish and protect in the bypassed reach of the Connecticut River.

REFERENCES:

1. Allen, D. C., Vaughn, C. C., Feb. 2010. Complex hydraulic and substrate variables limit freshwater mussel species richness and abundance. *Journal of the North American Benthological Society* 29 (2), 383–394.
2. Bogan, A. E., 1993. Fresh-water bivalve extinctions (Mollusca, Unionoida) - a search for causes. *American Zoologist* 33 (6), 599–609.
3. Castelli, E., Parasiewicz, P., Rogers, N., Nov. 2012. Use of frequency and duration analysis for the determination of thermal habitat thresholds: application for the conservation of *Alasmidonta heterodon* in the Delaware River. *Journal of Environmental Engineering* 138 (8), 886–892.
4. Corey, C. A., Dowling, R., Strayer, D. L., Sep. 2006. Display behavior of *Ligumia* (bivalvia: Unionidae). *Northeastern Naturalist* 13 (3), 319–332.
5. Daraio, J. A., Weber, L. J., Newton, T. J., Jun. 2010. Hydrodynamic modeling of juvenile mussel dispersal in a large river: the potential effects of bed shear stress and other parameters. *Journal of the North American Benthological Society* 29 (3), 838–851.
6. Daraio, J. A., Weber, L. J., Zigler, S. J., Newton, T. J., Nestler, J. M., Jun. 2012. Simulated effects of host fish distribution on juvenile unionid mussel dispersal in a large river. *River Res. Applic.* 28 (5), 594–608.
7. Fritts, A. K., Fritts, M. W., Peterson, D. L., Fox, D. A., Bringolf, R. B., Dec. 2012. Critical linkage of imperiled species: Gulf sturgeon as host for purple bankclimber mussels. *Freshwater Science* 31 (4), 1223–1232.
8. Galbraith, H. S., Blakeslee, C. J., Lellis, W. A., Mar. 2012. Recent thermal history influences thermal tolerance in freshwater mussel species (Bivalvia:Unionoida). *Freshwater Science* 31 (1), 83–92.
9. Hardison, B. S., Layzer, J. B., Jan. 2001. Relations between complex hydraulics and the localized distribution of mussels in three regulated rivers. *Regul. Rivers: Res. Mgmt.* 17 (1), 77–84.
10. Johnson, J. A., Wisniewski, J. M., Fritts, A. K., Bringolf, R. B., Dec. 2012. Host identification and glochidia morphology of freshwater mussels from the Altamaha River basin. *Southeastern Naturalist* 11 (4), 733–746.
11. Kneeland, S. C., Rhymer, J. M., Aug. 2007. A molecular identification key for freshwater mussel glochidia encysted on naturally parasitized fish hosts in Maine, USA. *Journal of Molluscan Studies* 73 (3), 279–282.
12. Kneeland, S. C., Rhymer, J. M., Mar. 2008. Determination of fish host use by wild populations of rare freshwater mussels using a molecular identification key to identify glochidia. *Journal of the North American Benthological Society* 27 (1), 150–160.

13. Layzer, J. B., Gordon, M. E., Anderson, R. M., May 1993. Mussels - the forgotten fauna of regulated rivers - a case study of the Caney Fork River. *Regulated Rivers - Research & Management* 8 (1-2), 63–71.
14. Layzer, J. B., Madison, L. M., Aug. 1995a. Microhabitat use by freshwater mussels and recommendations for determining their instream flow needs. *Regulated Rivers: Research & Management* 10 (2-4), 329–345.
15. Layzer, J. B., Madison, L. M., Aug. 1995b. Microhabitat use by freshwater mussels and recommendations for determining their instream flow needs. *Regul. Rivers: Res. Mgmt.* 10 (2-4), 329–345.
16. Layzer, J. B., Scott, E. M., May 2006. Restoration and colonization of freshwater mussels and fish in a southeastern United States tailwater. *River Res. Applic.* 22 (4), 475–491.
17. Maloney, K. O., Lellis, W. A., Bennett, R. M., Waddle, T. J., Jun. 2012. Habitat persistence for sedentary organisms in managed rivers: the case for the federally endangered dwarf wedgemussel (*Alasmidonta heterodon*) in the Delaware River. *Freshwater Biology* 57 (6), 1315–1327.
18. Meador, J. R., Peterson, J. T., Wisniewski, J. M., Mar. 2011. An evaluation of the factors influencing freshwater mussel capture probability, survival, and temporary emigration in a large lowland river. *Journal of the North American Benthological Society* 30 (2), 507–521.
19. Michaelson, D. L., Neves, R. J., Jun. 1995. Life history and habitat of the endangered dwarf wedgemussel *Alasmidonta heterodon* (Bivalvia:Unionidae). *Journal of the North American Benthological Society* 14 (2), 324+.
20. Morales, Y., Weber, L. J., Mynett, A. E., Newton, T. J., Sep. 2006. Effects of substrate and hydrodynamic conditions on the formation of mussel beds in a large river. *Journal of the North American Benthological Society* 25 (3), 664–676.
21. Pandolfo, T. J., Cope, W. G., Arellano, C., Bringolf, R. B., Barnhart, M. C., Hammer, E., Jun. 2010. Upper thermal tolerances of early life stages of freshwater mussels. *Journal of the North American Benthological Society* 29 (3), 959–969.
22. Parasiewicz, P., Castelli, E., Rogers, J. N., & Plunkett, E. (2012). Multiplex modeling of physical habitat for endangered freshwater mussels. *Ecological Modeling*, 228, 66.
23. Rashleigh, B., Oct. 2008. Nestedness in riverine mussel communities: patterns across sites and fish hosts. *Ecography* 31 (5), 612–619.
24. Schwalb, A. N., Morris, T. J., Mandrak, N. E., Cottenie, K., Apr. 2013. Distribution of unionid freshwater mussels depends on the distribution of host fishes on a regional scale. *Diversity Distrib.* 19 (4), 446–454.

25. Strayer, D. L., Ralley, J., 1993. Microhabitat use by an assemblage of stream-dwelling unionaceans (Bivalvia), including two rare species of *Alasmidonta*. J-NABS 12, 247-258.
26. Vaughn, C. C., Taylor, C. M., Feb. 2000. Macroecology of a host-parasite relationship. *Ecography* 23 (1), 11–20.
27. Watters, Jan. 1996. Small dams as barriers to freshwater mussels (bivalvia, unionoida) and their hosts. *Biological Conservation* 75 (1), 79–85.

GENERAL NOTE #1: The Division shall be notified, in the form of a Rare Animal or Plant Observation Form, of any state-listed species observed during field surveys associated with any study herein. The Proponent can take advantage of the Division's new data submittal tool, the Vernal Pool & Rare Species Information System (VPRS):

http://www.mass.gov/dfwele/dfw/nhesp/species_info/vprs_home.htm

VPRS is an online mapping and data submittal application that provides users with a way to submit rare species observation reports and vernal pool certification forms to the NHESP electronically. Additionally, the system provides the ability to bulk upload data from a spreadsheet, making data submission more efficient for large-scale survey efforts. The Division would encourage the Proponent to contact our office for further details in advance of field surveys and data collection so as to ensure that data can be submitted in as efficient and cost-effective format as possible.

GENERAL NOTE #2: Field identification of many state-listed species requires considerable expertise and field experience. Therefore, all study plans requiring field surveys and identification of state-listed species should be amended to include the following requirements:

1. Field surveys should be conducted by a qualified biologist in appropriate quality habitats throughout the project area (or a portion thereof, as appropriate), using methodologies consistent with the "NHESP's Endangered Species Habitat Assessment & Survey Guidelines" guidelines.
2. The NHESP requires pre-approval of the biologist prior to conducting surveys. We can provide contact information for pre-approved biologists on a species or taxa specific basis, or we can review the qualifications of other proposed biologists (in which case a copy of the biologist's resume and qualifications should be sent to the NHESP for prior review).
3. The selected biologists shall submit written survey protocols for NHESP approval prior to initiation of field work. Survey protocols shall list the specific taxonomic characteristics for definitive identification as well as the characteristics of similar or easily confused species. Please ensure that the biologist contacts our office to discuss these species and their photo-documentation requirements.
4. Collection or handling of state-listed species requires the selected biologist submit a Scientific Collection Permit Application for NHESP review and approval prior to initiation of field work.

GENERAL NOTE #3: Many rare species are sensitive to unauthorized collection. External reports or other external materials or products developed using these data shall not reveal site locations without written consent by the NHESP. A copy of any external reports, manuscripts, or other products related to state-listed species shall be provided to the NHESP upon completion.

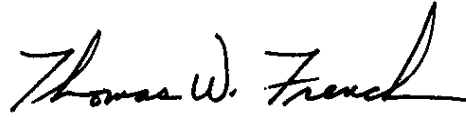
Thank you for this opportunity to comment.

Sincerely,



Caleb Slater, Ph.D.
Anadromous Fish Project Leader

Sincerely,



Thomas W. French, Ph.D.
Assistant Director for the Natural Heritage
& Endangered Species Program



The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner



July 15, 2013

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

RE: Comments on Updated Proposed Study Plan for FERC No. 1889 (Turners Falls) and 2485 (Northfield Mountain)

Dear Secretary Bose:

The New Hampshire Department of Environmental Services (DES) is responsible for issuing federal Clean Water Act § 401 water quality certifications (401 certifications) in New Hampshire. State statutory authority for issuing 401 certifications is provided in RSA 485-A:12, III. DES is also responsible for establishing and administering surface water quality standards for New Hampshire.

DES has reviewed the Updated Proposed Study Plan filed by FirstLight on June 28, 2013 for the following two hydroelectric projects on the Connecticut River:

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

Comments on the Updated Proposed Study Plan are attached. Please note that DES also supports the comments submitted by the New Hampshire Fish and Game Department in a letter dated July 11, 2013.

We thank you for the opportunity to comment. Should you have any questions, please do not hesitate to contact either myself (602-271-2983) or Owen David (603-271-0699).

Sincerely,

Gregg Comstock, P.E.
Supervisor, Water Quality Planning Section
New Hampshire Department of Environmental Services

July 15, 2013
New Hampshire Department of Environmental Services (NHDES)
Comments on
FirstLight Power Resources (FL)
Updated Proposed Study Plan (PSP) dated June 28, 2013
for
Turner Falls Hydroelectric Project (FERC Project No. 1889) and
Northfield Mountain Pumped Storage Project (FERC Project No. 2485)

General

NHDES Comments:

1. The extent of FirstLight's and TransCanada's study responsibilities downstream of the Vernon dam should be clarified so that study plan responsibilities can be assigned appropriately. It is our understanding at this time that FirstLight's studies extend upstream to the Vernon dam.

2. NHDES requests to be included on any working groups formed to advise any of the following FL proposed studies.

FL Proposed Study #3.1.1: 2013 Full River Reconnaissance Study

Relevant NHDES Study Requests: 21c (partially addressed - also see FL PS #3.1.2 and FL PS # 4.1.1).

NHDES Comments:

p. 3-12. Task 4 Develop Maps, Summary Statistics, Evaluation of Conditions, and Analyze Changes in Condition since Implementation of ECP and from 2008 FRR. It is stated that the purpose of these comparisons is to evaluate trends in river bank erosion. NHDES recommends that the study include any changes in operation of the FL Projects during the study period to see if such changes in operation during the study period are related to any apparent trends.

FL Proposed Study #3.1.2: Northfield Mountain / Turners Falls Operations Impact on Existing Erosion and Potential Bank Instability

Relevant NHDES Study Requests: 21c (partially addressed - also see FL PS #3.1.1 and FL PS # 4.1.1).

NHDES Comments:

p. 26, Study Goals and Objectives. Consistent with NHDES study request 21c, the objectives of this and/or other studies should address the following:

1. determine how water level fluctuations within the minimum and maximum operating range and discharges from peaking operations at the FL hydroelectric projects contribute to shoreline erosion;
2. identify and determine the effects of shoreline bank erosion and riverbank failure on other resources (i.e. riparian areas and shoreline wetlands, rare plant and animal populations, water quality, aquatic and terrestrial wildlife habitat, etc.);
3. identify techniques that could be used to mitigate the effects of project operations or other mitigation techniques that could be developed to reduce on riverbank erosion within the impoundment and downstream of the tailrace.

p. 3-33, Task 5d. Field Evaluation - Round 2. For transects in New Hampshire the density of the survey points used to define geometry of the river bank should be specified. The density will need to be quite high to detect changes in riverbank geometry that may be primarily attributable to project operation. In its study request, NHDES proposed installation of horizontal pins into the bank to help measure erosion over the short and long term. If the density of survey points is not considered high enough to detect subtle changes in riverbank geometry, NHDES will likely request that pins be installed at the New Hampshire transects as described in its original study request.

Also, it appears that only one survey of the transects will be taken. Consistent with NHDES study request 21c, NHDES requests that monitoring of bank geometry at transects in New Hampshire be conducted on a biweekly basis to help isolate the potential affects of daily project operation on riverbank erosion and instability.

p. 3-26. Methodology. The study should compare the water elevations due to project operation to the elevation along the riverbanks below which there is a lack of vegetation, undercutting, etc. and determine if there is a correlation. The study should also address the potential of daily project operations making the riverbanks more prone to erosion (i.e., due to lack of vegetation, undercutting, etc.) and how this may impact the frequency and magnitude of massive erosion when high flows occur.

The study should also address how daily project water level fluctuations may impact groundwater levels and movement within the riverbank and the extent to which this may be destabilizing the banks and making them more prone to erosion failure under higher flows.

The analysis should also evaluate how changes in operation of the Projects may affect riverbank erosion along the river.

FL Proposed Study #3.2.1: Water Quality Monitoring Study

Relevant NHDES Study Requests: 25c

NHDES Comments:

p.3-38, General Description of Proposed Study, last paragraph, last sentence. It is stated that FL is not proposing to collect nutrient parameters in the Connecticut River upstream of the Massachusetts border because it is not consistent with MADEP's request and would not provide useful information if collected from a limited area. NHDES disagrees with this statement for the following reasons. The FL project impounds water approximately 5.5 miles in New Hampshire. Operation of the FL projects therefore impacts New Hampshire surface water quality and must not cause or contribute to violations of New Hampshire surface water quality standards. NHDES uses nutrient parameters in its assessment of waters required by EPA and the Clean Water Act [section 305(b) and 303(d)] for determining designated use support such as aquatic life and primary contact recreation. Further, this is not an unreasonable request as TransCanada is proposing to collect this data in all three of its impoundments. Collection of weekly nutrient parameters (total phosphorus, nitrite/nitrate, Kjeldahl nitrogen and chlorophyll-a) at the sampling site in New Hampshire, as described in NHDES study request # 25c, should therefore be included in the proposed study.

p. 3-41, Task 1: Develop Sampling Plan. It is stated that a water quality sampling plan will be submitted to MADEP for approval prior to sampling. A sampling plan (including quality assurance procedures) for the monitoring station in New Hampshire should be submitted to NHDES for approval prior to sampling to ensure

that data is collected in a manner that can be compared to New Hampshire water quality standards and is of sufficient quality for use in Clean Water Act Section 305(b) / 303(d) assessments.

p. 3-42, Task 3: DO and Temperature Profiles. Weekly profiles should be conducted at the sampling station in New Hampshire as proposed in NHDES study request # 25c to determine if stratification is occurring and the proper depth to set the datalogger. To determine compliance with New Hampshire dissolved oxygen criteria (Env-Wq 1703.07) dataloggers deployed in the impoundment should be set at the bottom of the epilimnion (if stratified) or at 25% depth if not stratified.

FL Proposed Study #3.2.2: Hydraulic Study of Turners Falls Impoundment, Bypass Reach and below Cabot Station

Relevant NHDES Study Requests: 14a (this is also covered in FL PS # 3.8.1)
NHDES Comments:

It is our understanding that the model will predict velocities which will be used in other studies. Considering the importance of velocity on erosion, aquatic habitat, etc., NHDES recommends that calibration of the model include comparison of predicted velocities at several cross sections to measured velocities.

FL Proposed Study 3.3.2: Evaluate Upstream and Downstream Passage of Adult American Shad

Relevant NHDES Study Requests: 2.
NHDES Comments:

See comments submitted by the New Hampshire Fish and Game Department

FL Proposed Study #3.3.5: Evaluate Downstream Passage of American Eel

Relevant NHDES Study Requests: 3
NHDES Comments:

See comments submitted by the New Hampshire Fish and Game Department

FL Proposed 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

Relevant NHDES Study Requests: 4
NHDES Comments:

See comments submitted by the New Hampshire Fish and Game Department

FL Proposed Study #3.3.14: Aquatic Habitat Mapping of Turners Falls Impoundment

Relevant NHDES Study Requests: 15b (this is also covered in FL PS # 3.5.1)
NHDES Comments:

See comments submitted by the New Hampshire Fish and Game Department

FL Proposed 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

Relevant NHDES Study Requests: 15b (this is also covered in FL PS # 3.3.14)
NHDES Comments: NHDES requests that the study plan 1) indicate use of field GPS units (with accuracy specified) for mapping, 2) that data will be uploaded and annotated in GIS so that plant species and their distribution are all georeferenced, and 3) that the shapefiles generated from the field work will be shared with resource agencies such as NHDES

FL Proposed Study #3.8.1: Evaluate the Impact of Current and Future Modes of Operation on Flow, Water Elevation and Hydropower Generation

Relevant NHDES Study Requests: 14a (this is also covered in FL PS # 3.2.2)

NHDES Comments:

The study request submitted by NHDES requested that modeling be conducted to evaluate the potential effects of climate-altered flows on project operations over the course of the license. FirstLight's proposal does not address this objective, but should. Given studies such as those by researchers at the University of New Hampshire¹ that show that flood and drought frequency in New Hampshire has changed over the past 40 years, and is very likely to continue to change, climate change scenarios are necessary. Much of this type of modeling is already underway around the state, though not in the Connecticut River. NHDES requests that FL address how they will evaluate the potential effects of climate-altered flows on project operations over the course of the license in their study plan.

One of the objectives in our study request was to compare hourly discharge and water surface elevations at various locations in New Hampshire at current and proposed operating conditions to model results assuming instantaneous run-of-river at the Projects. Running the model assuming instantaneous run-of-river will help place bounds on the possible range of results and provide a relative idea of the sensitivity of the model. NHDES therefore requests that this scenario be run.

Comments on Study Requests that FL does not Propose to Conduct

FL #4.1.1: Study of Shoreline Erosion Caused by Northfield Mountain Pumped Storage Operations

Relevant NHDES Study Requests: 21c (partially addressed - also see FL PS #3.1.1 and FL PS # 3.1.2).

NHDES Comments:

See comments for FL proposed study 3.1.2 above.

FL #4.2.2: Climate Change and Continued Project Operations

Relevant NHDES Study Requests: 27

NHDES Comments:

See comments for FL proposed study 3.8.1 above.

FL #4.3.1: Shad Population Model for the Connecticut River

Relevant NHDES Study Requests: 6

NHDES Comments:

See comments submitted by the New Hampshire Fish and Game Department.

¹ Hayhoe, K., C. P. Wake, T. G. Huntington, L. Luo, M. D. Schwartz, J. Sheffield, E. Wood, B. Anderson and J. Bradbury. 2007. Past and future changes in climate and hydrological indicators in the US Northeast. *Climate Dynamics*, 28(4), 381 - 407.

Vermont Department of Environmental Conservation*Agency of Natural Resources*

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FILED AND DISTRIBUTED ELECTRONICALLY

July 15, 2013

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

RE: COMMENTS ON UPDATED PROPOSED STUDY PLANS
Wilder Hydroelectric Project – FERC No. 1892-026
Bellows Falls Hydroelectric Project – FERC No. 1855-045
Vernon Hydroelectric Project – FERC No. 1904-073
Northfield Mountain Pump Storage Project – FERC No. 2485-063
Turner Falls Project – FERC No. 1889-081

Dear Secretary Bose:

The Vermont Agency of Natural Resources (Agency) herein provides comments on the proposed study plan developed by TransCanada Hydro Northeast, Inc. (TransCanada) for the Wilder (FERC No. 1892), Bellows Falls (FERC No. 1855), and Vernon (FERC No. 1904) projects. TransCanada filed its proposed study plan on April 15, 2013 followed by six full-day meetings between May 13, 2013 and June 7, 2013 to received comments and recommendation from the resource agencies and other stakeholders. On June 20, 2013, TransCanada submitted a document to the resource agencies and stakeholders summarizing the comments and suggestions received during the meetings and stating whether or not they would be incorporated in the revised study plan. TransCanada filed a revised proposed study plan on July 8, 2013 with FERC. The Agency's comments are on the June 20, 2013 summary document and the July 8, 2013 updated proposed study plan.

The Agency also is providing comments on the proposed study plan developed by FirstLight Hydro Generating Co. (FirstLight) for the Northfield Mountain Pump Storage (FERC No. 2485) and Turners Falls (FERC No. 1889) projects. FirstLight filed its proposed study plan on April 15, 2013 followed by eight full-day meetings in which representatives from the Agency participated to give comments and recommendations on the study plans. FirstLight filed an updated study plan with FERC on June 28, 2013. Although the two projects are located on the Connecticut River in Massachusetts, project operations fluctuate flows and water levels in the Turners Falls impoundment, affecting about 5.7 miles of Vermont waters between Vernon dam and the Vermont/Massachusetts boundary. These operations may influence migratory fish species that must move upstream past these projects to reach habitat in Vermont, move from Vermont waters downstream past the projects, or both. Fish such as American shad and American eel use Vermont waters (Connecticut River and its tributaries) as part of their life cycle, and must be able to migrate to these waters from ocean habitats and then return. Other fish species such as walleye, brown trout and other species also move upstream and downstream to meet seasonal habitat needs, such as to find spawning habitat, over-wintering habitat, feeding areas or more favorable temperature conditions.

These movements may be localized or may involve miles of travel, but they are very important to production and survival. The Agency's comments on the study plan reflect these concerns and we request that FERC recognize the Agency's interest in these projects and take into consideration our comments and suggestions.

General Comments:

FERC's Scoping Document 2 states that the Turners Falls impoundment extends to the base of the Vernon dam. During the study plan meetings held in May and June, FirstLight stated that its hydraulic model indicates that the impoundment does not extend to the base of Vernon dam, but ends at a point downstream. TransCanada has subsequently included the reach downstream of the Vernon dam in the study area in all relevant study plans. The Agency requests that FirstLight provide information on the operation of its projects so that the frequency, duration, and periodicity of conditions when the Vernon discharge has a significant influence on this reach of river can be fully understood. This information is necessary for the Agency to evaluate seasonal flow requirements to protect aquatic biota and habitat downstream of Vernon dam.

In general TransCanada and FirstLight have attempted to incorporate the Agency's comments and suggestion in their revised study plans, but issues remain. The Agency's comments for TransCanada (Attachment A) and FirstLight (Attachment B) are attached.

Thank you very much for considering our comments.

Very truly yours,



Brian T. Fitzgerald
Streamflow Protection Coordinator

Attachments

c: Shannon Morrison, Department of Environmental Conservation
Marie Caduto, Department of Environmental Conservation
Lael Will, Department of Fish and Wildlife
Rod Wentworth, Department of Fish and Wildlife
Robert Popp, Department of Fish and Wildlife
Eric Sorenson, Department of Fish and Wildlife
Mark Ferguson, Department of Fish and Wildlife
John Warner, U.S. Fish and Wildlife Service
Melissa Grader, U.S. Fish and Wildlife Service
Gregg Comstock, N.H. Department of Environmental Services
Owen David, N.H. Department of Environmental Services
Gabe Gries, N.H. Fish and Game Department
Caleb Slater, MA Department of Fish and Game
Kevin Mendik, National Park Service
John Ragonese, TransCanada
John Howard, FirstLight
David Deen, Connecticut River Watershed Council
Kim Greenwood, Vermont Natural Resources Council
Chris Moore, Trout Unlimited – Vermont Council

Attachment B
VANR Comments on FirstLight Proposed Study Plan

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

The goal of this study is to identify and assess potential locations for upstream American eel passage at the Turners Falls Project.

According to the Updated Proposed Study Plan dated June 28, 2013 systematic surveys of eel presence and relative abundance will be conducted 10-12 times during the 2014 eel upstream migratory season. The first survey will be initiated within one week of eels being observed downstream of the project area at the Holyoke eel pass, with subsequent surveys occurring at night after precipitation events throughout the 2014 migration season. The study plan should clarify an end date for the surveys.

According to Murphy and Willis (1996) systematic surveys are conducted by selecting sampling units and or events at regular intervals. For example, TransCanada is proposing to conduct visual surveys at night, once per week, downstream of each dam on foot (wading) or from a boat from May 1 through October 15 (or when water temperature exceeds 50°F). This sampling regime more closely reflects the definition of systematic and should be considered. Please clarify how this study meets the definition of systematic, as surveying after precipitation events is more impromptu rather than systematic.

Recorded data will include location, observation of eels (presence, absence) and relative numbers, relative sizes, behaviors, and time/date of observation, recent weather, and current discharge. Please clarify what it is meant by relative, as the term estimated might be more appropriate.

In addition to visual surveys the Agency requests that eel pot trapping be conducted to gain a better understanding of eel numbers and sizes. Data collected should include location, number captured (or recorded as none captured), estimated sizes, and time and date of observation. Each eel should be assigned a length class (0 to 6 inches, 6 to 12 inches, 12 to 18 inches, and >18 inches). The first 10 individuals within each length class should be individually measured for total length (nearest mm) and wet weight (nearest gram). The first 10 individual eels in the >18-inch length class should also have eye diameter measurements recorded. To facilitate collection of length and weight data as well as prevent unnecessary injuries to the eels, it may be necessary to anesthetize individuals using an appropriate anesthetic for the species (i.e., ice, clove oil, or MS-222).

Murphy, B. R., and D. W. Willis, editors. 1996. Fisheries techniques, second edition. American Fisheries Society, Bethesda, Maryland. 732 pages.

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

In order to determine the impacts that project operations have on shad spawning the Agency requests that shad eggs be sampled in randomly selected areas after observed spawning events. As stated in the updated study plan ichthyoplankton nets will be deployed downstream of suspected spawning areas that may potentially become dewatered. However, dewatering is only one factor that could potentially affect spawning success (e.g. sedimentation could also impact spawning success). Therefore, the Agency requests that eggs also be randomly collected to quantify viability, and to represent a range of conditions that could potentially hinder success. Density of eggs collected per sample should be determined by enumerating a sub-sample and relating that to volume of water filtered. Spawning activity and fervor should be described subjectively and relatively to other spawning activities observed. Factors affecting egg collection, i.e. water turbulence, high velocities, shallow depth, should be noted. In order to gauge the effects of project operations on shad spawning, collected data should be analyzed and compared to project operational data. The times and dates of all observed spawning activities, substrate description, water measurements (i.e., velocity, temperature, dissolved oxygen, pH, conductivity, and turbidity), and observational characteristics or anomalies (e.g., extensive water roiling or turbulence) should be recorded and related to the operational data.

Observed effects of the projects should be classified per operational regime observations: 1. no effect –no observable effect on spawning, viable eggs were collected; 2. moderate effect – observable possible effect on normal spawning activity; spawning may have been hindered but viable eggs were collected; and 3. adverse effect – project operations likely to have prevented successful spawning of shad; no viable eggs collected.

3.3.7 Fish Entrainment and Turbine Passage Mortality Study

The goal of this study is to assess fish impingement, turbine entrainment, and turbine passage survival at the two Projects. The requestors proposed that a field study be conducted to assess fish entrainment from the Connecticut River at the Northfield Mountain Project. In addition to the desktop analysis as described in the proposed study plan, the Agency requests that estimates be ground-truthed by obtaining a sub-set of the actual numbers impinged or entrained. Results would then be more conclusive.

3.3.11 Fish Assemblage Assessment

The goal of this study is to provide baseline information pertaining to the fish assemblage structure within the study area. Specific objectives include to:

- Document species occurrence, distribution, and relative abundance of resident and diadromous fish within the project area along spatial and temporal gradients.

- Describe the distribution of resident and diadromous fish species within reaches of the river and in relationship to habitat.
- Compare historical records of fish species occurrence in the project area to results of this study.

Methodology:

The study area will be divided into stations based on habitat type; multiple methods of fish capture will be used in each station. Please describe the habitat types, the spatial extent of each station, whether or not stations will be continuous or non-continuous within the study area, how many samples will be collected with each gear type, how the sample locations will be selected in each station, and whether or not all gear types will be used in each station.

Task 1: Sampling Location Selection

The licensee states that prior to field sampling, stations to be sampled will be selected to ensure all habitat types are adequately represented. Alternative sampling locations will also be identified by habitat in case a selected sampling station is inaccessible.

However, on page 3-178 the licensee states that the proposed study will include a statistically rigorous and comprehensive stratified-random design similar to what has been used successfully on large rivers a high degree of spatial heterogeneity. Please clarify how the study design will accomplish this. Employing a stratified-random sample design ultimately removes bias from the collected data, allows for clear interpretation of results, and provides the best information for making decisions. To capture the spatio-temporal variability, sites/samples should be stratified by habitat type, depth of water, day or night (or time of day), as well as distance from the dam, and season (spring, summer fall).

The study area will be divided into stations based on habitat type; multiple methods of fish capture will be used in each station. Selected locations within each station will be sampled during the early summer and again in the fall. At least 18 stations will be sampled during each sampling event. Early summer sampling will be performed when spawning anadromous species are present; fall sampling will be performed when most juvenile fish are large enough to sample. The Agency requests that sampling be conducted spring (April-June), summer (July-August), and fall (September-October), in order to capture the temporal variability (i.e. fishes occupy different habitats during different seasons).

Proposed methods include boat electrofishing (shoreline and littoral habitat), gill nets (deeper, benthic areas), and seine net (wadeable shoreline and littoral habitat). The licensee should also consider employing a benthic trawl in order to actively (vs. passively) target deep water benthic habitat.

Fish assemblage studies typically employ a multi-gear approach as referenced in Bonar, S. A., W. A. Hubert, and D. W. Willis, editors. 2009. Standard methods for sampling North American freshwater fishes. American Fisheries Society, Bethesda, Maryland. 335 pages.

The Agency recommends that sampling methodologies are consistent with the American Fisheries Society national standards as referenced above.

Task 2: Fish Capture

Please specify if electrofishing will occur during the day or night. The Agency recommends a combination of both in order to capture fishes that move inshore during the night (e.g. bass).

The licensee is proposing that gill nets will be set in selected locations and allowed to fish for 24 hours prior to retrieval. Due to high mortality associated with a 24-hour soak time, the Agency recommends that sets be limited to two hour duration.

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

The goal of this study is to collect information in order to determine if project operations negatively impact fish species so that appropriate mitigation measures may be developed, if warranted, to protect and conserve the species utilizing project waters. Specific objective of this study are to 1) assess timing and location of fish spawning in the littoral zone, 2) delineate, qualitatively describe (e.g. substrate composition, vegetation type and relative abundance), and map shallow water habitat types subject to inundation and exposure due to project operations, evaluate potential impacts of impoundment fluctuation on nest abandonment, spawning fish displacement and egg dewatering. However, it is well known that the widened impoundments due to the dams replace riverine (lotic) habitats with a lake-like (lentic) environment. These impoundments serve as repositories for silt and sediments that cover natural gravel substrate that serve as spawning and habitats. Therefore, the Agency is requesting that the study investigate sedimentation, or the amount of fines within a nest (in addition to nest abandonment, spawning fish displacement, and egg dewatering) as a potential negative impact due to the project's impoundments.

In addition to visual surveys, the Agency requests that the licensee deploy egg traps in order to assist in the identification of spawning sites for species such as walleye and white sucker; two riverine fish species which broadcast spawn their eggs. Egg traps should be constructed of standard 8x16 inch concrete blocks wrapped in hog's hair synthetic filter media that forms an ideal surface to collect the broadcasted white sucker and walleye eggs. Egg traps should also be set in some of the lower tributaries with the proper habitat that are influenced by project operations to attempt to locate their spawning sites.

The Agency requests that data on the depth of the nesting site, fish species, water quality data (temperature, DO, pH, conductivity, and turbidity) and habitat type (i.e., aquatic weed bed, gravel bar) be recorded. Water level recorders should also be employed to facilitate determining the effects of project operations on spawning of target resident fish species.

3.3.14 Aquatic Habitat Mapping of Turners Falls Impoundment

Due to the higher turbidity in the lower river, the Agency requests that habitat data be collected using a side scan sonar system, and then validated via ponar dredge or through use of a sediment probe to generally classify substrates.

In order to quantify the composition of substrates collected from the ponar grab, the Agency recommends that samples be brought back to the lab for further analysis. Percent composition by weight using the modified Wentworth scale would provide additional information on the aquatic benthic habitat, and would not require much more effort.

3.3.15 Assessment of Adult Sea Lamprey Spawning within the Turners Falls Project and Northfield Mountain Project Area

The goal of this study is to determine the impacts that operations of the Turners Falls Project and Northfield Mountain Project may have on sea lamprey spawning activity. One of the objectives of the study is to collect the information to assess whether operations of the Turners Falls Project and Northfield Mountain Project are adversely affecting spawning areas (*i.e.*, if flow alterations are causing dewatering and scouring of lamprey spawning area).

As identified in Vermont's Wildlife Action Plan (Kart et al. 2005), one of the threats identified is degraded spawning habitat due to sedimentation. Recording percent embeddedness would ascertain if sedimentation is having an impact on survival to emergence and should be included in the analysis. The Brusven Index describes sediment size and percent embeddedness using a three digit number. The number in the 10s place is the largest materials in the sample termed the dominant particle size. The figure in the ones place represents the material surrounding the dominant particles and the decimal place is used to describe the percent embeddedness (fines). These are standard methods for salmonid redd surveys (Gallagher 2007).

See Gallagher, S.P, P.K. Hahn, and D.H. Johnson. 2007. Redd Counts. Pages 197–234 in D.H. Johnson, B.M. Shrier, J.S. O'Neal, J.A. Knutzen, X.Augerot, T.A. O'Neil, and T.N. Pearsons. Salmonid field protocols handbook: techniques for assessing status and trends in salmon and trout populations. American Fisheries Society, Bethesda, Maryland.

In order to identify specific lamprey spawning sites within the study area, and observe spawning activity of lamprey, the Agency requests that a minimum of 30 lamprey be radio tagged and tracked to spawning locations. All redds should be enumerated and a sub-sample of redds(to include as much habitat variability as possible) should be chosen to monitor daily. Environmental variables including water velocity, depth, temperature, exposure, and relative condition of redds/area will be measured; and the grounds photographed if possible, over the range of normal project discharges in order to characterize operational effects.

The Agency requests that success of spawning by sea lamprey within the project-affected areas be characterized by emergence of larvae from capped redds, if larvae emerge, spawning was successful. If eggs do not hatch, and no larvae emerge, spawning was not successful. Emerging

larvae should be enumerated and timing of emergence relative to redd construction will be documented. Redds should be characterized as to location, range and average depth, general surrounding substrate, and range and average water velocity.

Effects of the projects will be classified per operational regime observed as:

- 1) No effect - no observable difference to habitat/redd structure or lamprey activity – successful spawning documented.
- 2) Moderate effect – observable difference to habitat/redd structure and/or behavior noticeable but not enough
- 3) Large effect – observable structural differences to habitat/redds and observable decreased spawning activity – minimal to no successful spawning documented.
- 4) Severe effect – noticeable habitat/redd degradation, i.e. de-watered, scoured out, and conditions, depth, water velocity, preclude normal spawning activity – no successful spawning documented.

3.3.17 Assess the Impacts of Project Operations of the Turners Falls Project and Northfield Mountain Project on Tributary and Backwater Area Access and Habitat

The goals of this study are to determine if water level fluctuations from the Turners Falls and Northfield Mountain Projects result in reductions of available aquatic habitat due to movement barriers and/or habitat alterations.

Methodology (18 CFR § 5.11(b)(1), (d)(5)-(6))

The licensee states that common tools to evaluate water level impacts may be used including: bathymetric mapping; habitat measurements (*e.g.*, substrate, depth and velocity), and water quality information (*e.g.*, dissolved oxygen, temperature, turbidity, and pH). Other methods (river bed surveys, visual inspections, GIS/GPS mapping, and hydraulic/habitat modeling) will also be utilized.

The Agency requests that water level recorders (pressure transducers) be employed to determine if water level fluctuations from project operations cause impediments to fish movement into and out of tributaries within the project-affected areas. If the water level drops to 1 foot or less water depth during low impoundment water levels, it should be assumed that movement is impeded. Water level recorders should be placed in tributary areas and operate for an entire year to collect hourly depth changes and water temperature. Additional water quality data should be collected in these areas (temperature, DO, pH, conductivity, and turbidity) if it is found that access to the main river is impeded.

Utilizing pressure transducers in addition to the methods described would provide more conclusive results.



United States Department of the Interior

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NORTHEAST REGION
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IN REPLY REFER TO:

July 14, 2013

Filed Electronically

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

National Park Service Comments on Updated Proposed Study Plans for FirstLight Power Resources Turners Falls Hydroelectric Project No. 1889-081 and Northfield Mountain Pumped Storage Project No. 2485-063

The NPS appreciates the opportunity to have participated in several face to face meetings between the applicant and their consultants, FERC and numerous stakeholders in order to address comments received on the PSP and to refine the proposed studies based on that input. The following comments are filed in order to assist the applicant in their data collection and analysis.

General Comments

The Connecticut River and its 7.2 million-acre watershed includes National Forests, National Historic Sites, National Wildlife Refuges, National Scenic Byways, Partnership Wild and Scenic Rivers, National Recreation Trails, National Natural Landmarks, Important Bird Areas, and segments of the New England National Scenic Trail; the Appalachian National Scenic Trail; the East Coast Greenway Trail; the Northern Forest Canoe Trail; Revolutionary Route National Historic Trail, a Ramsar wetland site, and an American Heritage River, and approximately two million acres of public and private conservation land.

These projects are located on the nation's first National Blueway, so designated by DOI Secretary Salazar on May 24, 2012. Secretary Salazar noted that "The Connecticut River Watershed is a model for how

communities can integrate their land and water stewardship efforts with an emphasis on ‘source-to-sea’ watershed conservation [as we] seek to fulfill President Obama’s vision for healthy and accessible rivers that are the lifeblood of our communities and power our economies.” Among the stated goals are to advance a whole river and [utilize] a water-based approach to conservation, outdoor recreation, education and sustainable economic opportunities in the watersheds in which we live, work and play.” As such, these relicensings present a once in a generation opportunity to address and correct deficiencies in recreational opportunities. Therefore, it is critical that in attempting to reach users and equally important, those who for whatever reason do not use the river, the survey’s content and method for reaching current and potential recreational users must be adequate.

3.6.1. Recreation Use/User Contact Survey

Numerous RAs and NGO noted that this study would be considerably improved if it were to capture non-users, including those who may have used project related facilities in the past and no longer do so and those potential users who for various reasons, do not utilize project area facilities. Several methods for capturing those users and their input were identified. In brief, the NPS believes it would be simple, cost effective and produce useful data if the applicant were to avail themselves of the MA, VT and NH members of organizations such as the Appalachian Mountain Club (AMC), whose members would logically have an interest in recreating on the Connecticut River. The AMC has graciously offered to work with the applicant to transmit updated survey questionnaires to their membership in the project area. AMC has also developed a recreation plan for the Connecticut River Blueway, referenced above. A similar offer has been extended by the CT River Watershed Council and should be taken advantage of. This will provide far better data than the proposed limited on site survey questions. The study as proposed may have been adequate before the internet, but given the availability of computerized NGO mailing lists and municipal databases, to not collect this data will result in incomplete information for FERC to base their licensing and study related decisions. FirstLight’s rejection on page 3-276 of utilizing electronic means to reach users and potential users is unwarranted. What is likely to occur is that the applicant will obtain meaningful data indicating additional facilities are needed and existing facilities need improvements. By limiting the scope and means of their survey, they will inevitably come to the conclusion that the scope of additional mitigation measures should also be limited. By not asking

important questions, important data will be missed. There is no clear rationale offered for why the applicant will not avail itself of the resources being offered by the NGO community to facilitate and improve this critical survey.

Numerous deficiencies were identified in the proposed user surveys:

There are no questions related to river level fluctuations and adequacy of access to the river at various times under different operational scenarios. It is well known that under certain operational modes, river access is severely if not completely curtailed. Abutters should be included in any comprehensive survey as they have direct knowledge of operational impacts.

The number of spaces for regular car spaces should be differentiated from trailer spaces. For example, the state boat ramp at Barton Cove has no parking spaces for regular cars that bring canoes and kayaks on top of their vehicle; all spaces are for trailers only.

There is no space for noting the condition of parking spaces, camp sites, docks, or boat launch facilities.

The “Standardized Survey Form” (Figure 3.6.2-2 in the updated PSP) that is part of Study 3.6.2 does not appear to gather data about the dates that a particular day or overnight facility is open to the public. The Draft Recreation User Survey (Figure 3.6.1-1 in the updated PSP) has no questions about user satisfaction for times of year that facilities are not open, only the users experience on the day of the survey. Barton Cove campground closes after Labor Day weekend; however, the survey questions do not address whether there is a demand for camping beyond Labor Day.

Weather conditions such as temperature and precipitation should be added to the survey to provide data for the reviewer as to why an area may have been crowded or relatively unused on for example, a weekend holiday.

Question 8 should include fishway viewing, and birding/wildlife viewing, rowing, swimming from a boat, swimming from shore, and multi-day float trips. Types of activities should be grouped for easier viewing and choosing, along with a place for respondents to write “other.”

More information should be collected from the responder such as age, gender, whether they are part of a private group or formal program, such as an educational trip.

As noted during the meetings, there are situations where the presence of a boat ramp may actually limit access for certain kinds of users. Concrete ramps may be unsuitable for hand carried boats, where sites with a small floating dock can allow these users to access the river. Simply identifying a boat ramp does not provide adequate information for the types of users and potential deficiencies.

The revised study should extend the time it is to be conducted beyond Sept 30, allowing it to capture users in the fall and winter seasons which may well account for significant use. The survey also does not account for use by minors; however, by utilizing AMC data, for instance, those users will be identified through family membership data. The revised study should also include a method to reach school groups. Although the towns may or may not have that data, queries should be put to area schools to ID which of them go on field trips and equally important, why they may not visit river based recreational facilities nearby. Additionally, the study data collection phase should extend to two years to allow for vagaries in weather and economic conditions which change from year to year. A single field season may provide good data, but a second year is certainly preferable. The field surveys should also extend to ½ hour before sunrise and ½ hour after sunset. The current proposal to start them ½ hour after sunrise and end ½ hour before sunset will miss many if not most anglers who tend to put in before sunrise and/or may take out after sunset.

3.6.4. Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boats

Extensive work has been done by the Friends of the CT River Paddlers Trail relative to river access campsites in terms of appropriate frequency (how far apart on the river) as well as maintenance and facility needs. Efforts are underway to expand the trail into Massachusetts and Connecticut. This data should be incorporated into the study in order to identify obstacles to multi-day paddling trips, which also include the lack of adequate or existing portages around project dams.

FirstLight's land base should be used to identify what parcels could serve as new primitive campsites or, where necessary, river access locations deemed. The Trust for Public Land has developed a map of potential campsites for

non-motorized boaters on the Connecticut River in Massachusetts and was done in conjunction with the efforts to expand the Connecticut River Paddlers' Trail into Massachusetts and Connecticut. The map generally follows the Paddlers' Trail standard of one campsite per five river miles, which is the recommended frequency. FirstLight facilities do not meet this standard. The map should be included by FirstLight in its study of "informal sites" that could be used to support more recreation on the river.

The revised study should include a comprehensive assessment of the condition of each site, along with how various ratings (good, fair or poor) are defined and applied. The adequacy of the portage at Turners Falls must also be addressed in order to cure existing deficiencies in the opportunities for multi-day paddling trips.

As noted during the meetings, there are situations where the presence of a boat ramp may actually limit access for certain kinds of users. Concrete ramps may be unsuitable for hand carried boats, where sites with a small floating dock can allow these users to access the river. Simply identifying a boat ramp does not provide adequate information for the types of users and potential deficiencies.

The revised study should extend the time it is to be conducted beyond Sept 30, allowing it to capture users in the fall and winter seasons which may well account for significant use. The survey also does not account for use by minors; however, by utilizing AMC data, for instance, those users will be identified through family membership data. The revised study should also include a method to reach school groups. Although the towns may or may not have that data, queries should be put to area schools to ID which of them go on field trips and equally important, why they may not visit river based recreational facilities nearby. Additionally, the study data collection phase should extend to two years to allow for vagaries in weather and economic conditions which change from year to year. A single field season may provide good data, but a second year is certainly preferable. The field surveys should also extend to ½ hour before sunrise and ½ hour after sunset. The current proposal to start them ½ hour after sunrise and end ½ hour before sunset will miss many if not most anglers who tend to put in before sunrise and/or may take out after sunset.

As noted during the meetings, there are situations where the presence of a boat ramp may actually limit access for certain kinds of users. Concrete ramps may be unsuitable for hand carried boats, where sites with a small floating dock can allow these users to access the river. Simply identifying a boat ramp does not provide adequate information for the types of users and potential deficiencies.

The revised study should extend the time it is to be conducted beyond Sept 30, allowing it to capture users in the fall and winter seasons which may well account for significant use. The survey also does not account for use by minors; however, by utilizing AMC data, for instance, those users will be identified through family membership data. The revised study should also include a method to reach school groups. Although the towns may or may not have that data, queries should be put to area schools to ID which of them go on field trips and equally important, why they may not visit river based recreational facilities nearby. Additionally, the study data collection phase should extend to two years to allow for vagaries in weather and economic conditions which change from year to year. A single field season may provide good data, but a second year is certainly preferable. The field surveys should also extend to ½ hour before sunrise and ½ hour after sunset. The current proposal to start them ½ hour after sunrise and end ½ hour before sunset will miss many if not most anglers who tend to put in before sunrise and/or may take out after sunset.

3.6.5 Land Use Inventory

A comprehensive identification of licensee owned lands adjacent to the project boundary should be included in the application. The proposal by FirstLight to evaluate only lands within the project boundary and a 200 foot strip of abutting lands will not provide adequate data relative to areas which if developed, could adversely impact river resources, from development and impact on aesthetic values to upland land use practices that may adversely impact water quality and sedimentation. In some cases, these adjacent lands could be appropriate for providing additional recreational access to the river, new trails or connections to existing trails. Without this easily available data, the FERC will not have a complete picture of land use activities that impact project resources. Permanent protection of abutting licensee owned lands would also confer aesthetic benefits to those using the river by providing views from the river of undeveloped lands. Regarding lands within the project boundary, those not integral to project operations should be permanently preserved and in many cases consist of prime agricultural lands. Even those lands currently under Agricultural Preservation Restrictions are only temporarily protected. Permanent protection ensures the long term viability of these important resources. Numerous non-governmental organizations and federal, state and local entities have identified valuable and important land protection locations and opportunities along the Connecticut River. This information should be identified and used

collectively to determine appropriate opportunities for land protection in the context of these relicensing proceedings.

3.6.7 Recreation Study at Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use

Maintaining and improving an appropriate level of educational benefits provided for the public at Northfield Mountain was raised at the June 11 meetings. Educational programs are clearly important to schools and other educational institutions in the region and should be assessed in this study. Our understanding is that such programs have been decreased in recent years. Public education programs offered at the visitor's center involves using the Recreation Use and User Contact Survey to identify opinions of current recreation/education users at Northfield Mountain. However, neither river nor trail users are addressed in this survey of educational program users. Records of attendance numbers at Northfield Mountain's educational and school programs, the number of programs offered, and attendance numbers should be provided for the past 10 years. The types of programs and staffing it takes to run them should also be described.

There is also no information relative to the report's contents, how the data will be presented or what if any, opportunities the RAs and NGOs will have to participate in the evaluation and conclusions provided by the data.

The NPS appreciates the opportunity to work with the applicant to revise their proposed studies in order to provide the FERC with adequate information on which to base their licensing related decisions. Therefore, the NPS requests that the FERC direct the licensee to revise its proposed study plans to address the concerns raised above.

Questions or comments on this submittal should be addressed to Kevin Mendik at kevin_mendik@nps.gov or by phone at 617-223-5299.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read "Kevin Mendik", is written over a horizontal line.

Kevin R. Mendik
NPS Hydro Program Manager
Northeast Region

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

FirstLight Power Resources Turners Falls Project No. 1889
Northfield Mountain Pumped Storage Project No. 2485

AMERICAN WHITEWATER COMMENTS ON UPDATED PROPOSED
STUDY PLAN FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (NO. 1889)
AND NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (NO. 2485)
FILED BY FIRSTLIGHT POWER RESOURCES ON JUNE 21, 2013

American Whitewater submits these comments to FERC in response to the Updated Proposed Study Plan for the Turners Falls Hydroelectric Project and Northfield Mountain Pumped Storage Project operated by FirstLight Power Resources. Our organization has previously submitted comments and study requests asking the licensee to study the impact of its hydroelectric operations on the recreational opportunities available to non-motorized boaters -- whitewater boaters, multi-day through paddlers and flatwater paddlers -- in the project area.

American Whitewater has been engaged in the hydropower relicensing process for over 25 years and has worked with FERC and numerous licensees to study the impact of hydroelectric projects on recreational boating opportunities throughout New England. We have assisted with recreational facility and use assessments and controlled whitewater boating flow studies during the relicensing process on rivers throughout the region including the Deerfield, Kennebec, Rapid, Magalloway and Penobscot Rivers.

Based on our experience with the hydropower relicensing process in New England and elsewhere, we submit these comments to address the deficiencies in the licensee's proposed study plans and respectfully request that FERC direct the licensee to amend its proposed study plans to address these deficiencies, as follows:

General Comments

- 1. The licensee's proposed study plans will not adequately assess the demand for non-motorized boating in the project area.**

The licensee plans to study the demand for non-motorized boating (flatwater, multi-day trips, whitewater boating) in the project area, yet proposes no methodology for assessing the demand. Interviewing existing recreational users in the project area about their interest in whitewater boating in the natural bypassed reach below Turners Falls Dam will yield no meaningful data on the extent to which the public would benefit from restoring whitewater flows there. Existing recreational users in the project area are a self-selected group who utilize the facilities in the

project area because they believe that the existing facilities are sufficiently adequate to meet their recreational needs. While some whitewater boaters may have an interest in other forms of recreation, their primary interest is in whitewater boating, which is not available in the project area due to the lack of sufficient water flows in the natural bypassed reach. Instead, whitewater boaters may likely be found on the Deerfield River or elsewhere where they can pursue their interest in whitewater boating. They will not be found fishing at Barton Cove or hiking on Northfield Mountain. Collecting data from fishermen, hikers, campers, and flatwater canoeists on their interest in whitewater boating would not inform the licensee or FERC about whitewater boating demand.

In order to perform a defensible study on the demand for whitewater boating in the project area, the licensee must develop a methodology that will provide meaningful data. This methodology should include surveying boaters on the Deerfield River, collecting data from area outfitters, using internet-based surveys, and working with organizations such as American Whitewater, New England Flow, and the Appalachian Mountain Club to survey their members' interest in paddling at Turners Falls once sufficient water has been restored to the natural bypassed reach to permit whitewater boating.

Likewise, the licensee's plan to study the demand for multi-day canoe and kayak trips on the Connecticut River will yield no meaningful data on the public's interest in paddling downriver on the Connecticut. Virtually all through paddlers are currently deterred from exploring this section of the Connecticut River due to the lack of a portage trail at Turners Falls and the lack of adequate boat launch and camping facilities. Instead, these boaters are limited to paddling sections of the Connecticut River north of the Massachusetts border, in other areas where there are adequate facilities, or are unable to pursue their recreational interests. The licensee proposes no methodology for assessing this demand other than interviewing existing recreational users in the project area, whose interests in multi-day canoe and kayak trips may be even less than those of the general public. Existing recreational users in the project area are a self-selected group who utilize the facilities in the project area because they believe that the existing facilities are sufficiently adequate to meet their recreational needs.

In order to perform a defensible study on the demand for multi-day canoe and kayak trips in the project area, the licensee must develop a methodology that will provide meaningful data. The Connecticut River and Watershed was designed as the nation's first National Blueway in 2012, and the licensee needs to coordinate its study with TransCanada to determine the public's interest in through paddling on the Connecticut River. The National Blueways System has as its goal "to advance a whole river and watershed-wide approach to conservation, outdoor recreation, education, and sustainable economic opportunities in the watersheds in which we live, work, and play."

2. The licensee's proposed study plans will not assess the extent to which the inadequacy of its recreational facilities diminishes the recreational opportunities in the project area.

While the licensee proposes to conduct an inventory and assessment of the recreational facilities in the project area, it does not propose to survey non-users to determine whether the lack of adequate facilities deters or prevents them from pursuing their recreation interests in the project area. With regard to whitewater boating, the absence of sufficient flows except during high water spillage events, the lack of adequate access points and parking, and the presence of rebar or other hazards, has deterred or prevented virtually all boating in the natural bypassed reach below the Turners Falls Dam. The licensee needs to include in its facility inventory and assessment, a discussion of the facilities, or lack thereof, for whitewater boating.

Likewise, the licensee needs to include in its facilities inventory and assessment a discussion of the adequacy of its facilities for through paddlers in the project area. The lack of any portage trail, and the lack of adequate camping and boat launch facilities, should be included in the licensee's study, as these inadequacies serve as a strong deterrent to those who would otherwise choose to enjoy this section of the Connecticut River. Instead, the licensee proposes to study only the adequacy of its recreational facilities for those who find the facilities sufficiently adequate to meet their needs. In order to determine what additional facilities may be needed, the licensee will need to tailor its survey to address the needs of those who may be unable to paddle the Connecticut River due to the absence or inadequacy of the facilities to meet their particular needs.

3. The licensee has not sufficiently involved the boating community in the design and implementation of proposed recreation studies.

The licensee has not involved the boating community in the design and implementation of studies to collect data on the demand for whitewater boating in the natural bypassed reach or the adequacy of facilities to support whitewater boating. Without the active involvement of organizations representing whitewater boaters, the licensee is in danger of underestimating demand for boating below the Turners Falls Dam and failing to adequately identify the obstacles to boating this section of the river. While the licensee has developed survey instruments as part of its user and facilities surveys, they have not sufficiently involved the boating community in the development of these instruments. Furthermore, while the licensee plans to collect data from current recreational users, it has no plans to collect data from non-users. For example, the licensee does not propose to collect data from boaters on the Deerfield River where many boaters who are currently unable to paddle on the Connecticut River might otherwise be found. Had the licensee more fully included the boating community in the design and implementation of these surveys, it would have been able to collect more meaningful data than it will otherwise be able to collect. The licensee should work with groups such as American Whitewater, New England

FLOW, the Appalachian Mountain Club and the Connecticut River Watershed Council to design surveys that will solicit the views of its members on the reason for non-use of project facilities. This will better inform the study process.

Specific Comments

3.6.1 Recreation Use/User Contact Survey

While the licensee acknowledges that FERC proposed that the data be collected from “unique stakeholder groups that may not be practically accessed through on-site surveys (e.g. adjacent residential landowners, residents of the counties in which the projects are located, rock climbers, whitewater boaters).” The licensee does not, however, propose to collect data from any whitewater boaters due to the fact that there are no whitewater boaters utilizing the natural bypassed reach. The licensee has no plans to survey users at other locations such as the Deerfield River, no plans to collect data from whitewater outfitters serving the Deerfield and other area rivers, no plans to work with organizations such as American Whitewater, New England FLOW or the Appalachian Mountain Club to survey their members, no plans to develop an internet-based survey, and no plans to conduct any focus groups to determine the extent of interest in boating in the project area.

While the licensee proposes to conduct user counts and maintains that this data will provide it with information on the recreation use at the project, this data will provide no information on the non-use of the project by whitewater boaters who cannot access the project due to the inadequacy of the facilities or the manner in which the licensee operates the project. The licensee simply ignores the request by FERC that it collect data on unique stakeholder groups such as whitewater boaters.

The licensee has identified two goals for this study: 1) Determine the amount of recreation use and demand at the Turners Falls and Northfield Mountain recreation sites; and, 2) Interview the recreating public to determine user opinions and goals with regard to the recreation sites, including the perceived adequacy of recreation facilities and access at the Project. Yet nothing in the licensee’s study plan is designed to collect data on demand by non-users, including whitewater boaters and through paddlers. The licensee makes no attempt to identify the perceived adequacy of its facilities by these user groups.

Instead, the licensee proposes to collect data from the self-selected group of existing users on their interest in whitewater boating and canoeing/kayaking. In its Draft Recreation User Survey, Figure 3.6.1-1, and in its Draft Residential Abutters Survey, Figure 3.6.1-3, the licensee intends to determine the demand for whitewater kayaking in the natural bypassed reach and the demand for multi-day canoeing and kayaking. The licensee offers no explanation for how these surveys will inform the process of identifying the demand for these activities or the need for

improvements in its facilities. At best, these surveys will demonstrate that there is limited interest in whitewater boating and through paddling by those who enjoy motorized boating and or by those who abut the project area. It will not, however, show the extent of the demand for these activities by those who go elsewhere due to the inadequacy of the recreational facilities to support these activities in the project area, such as the lack of water in the natural bypassed reach or the lack of a portage trail.

3.6.2 Recreation Facilities Inventory and Assessment

While the licensee states that it is completing its Recreation Facilities Inventory Assessment, it does not state whether it assessed the presence and adequacy of facilities from the perspective of whitewater boaters and through paddlers. Without coordinating its study with organizations representing these groups, it cannot, for example, determine whether its concrete pad boat launch facility will meet the needs of paddlers in fiberglass touring boats. It cannot assess whether its shuttle service in lieu of a portage trail meets the needs of through paddlers. It cannot assess whether the access provided in the natural bypassed reach is adequate to enable whitewater playboaters to reach the broken dam area. The licensee has made no effort to coordinate its assessment of these facilities with stakeholder groups that have a great interest in utilizing the recreation facilities. As a result, the study will not provide a complete picture of what currently exists in the project boundary. Instead, the licensee assesses the adequacy of the recreation facilities solely from the perspective of existing users and makes no attempt to assess the sites from the perspective of the non-user who may have been deterred or prevented from utilizing the sites based on its current condition.

In addition, the licensee should extend the project boundary below Cabot Station to include all facilities above the confluence with the Deerfield River. The canoe shuttle service put-in lies outside of the project boundary, and the confluence of the Connecticut and Deerfield Rivers below the project boundary has an impact on the recreation opportunities in the natural bypassed reach. Accordingly, the licensee needs to expand the southern end of the project boundary to the confluence of the Deerfield River.

3.6.3 Whitewater Boating Evaluation

American Whitewater and New England FLOW support efforts by the licensee to study the potential for whitewater boating in the natural bypassed reach at Turners Falls and credit the licensee for utilizing the study techniques recommended by Whittaker et al., in *“Flows and Recreation: A guide to studies for river professionals”* (2005). We look forward to working with the licensee to refine its surveys and methodology in order to achieve the study objectives. Notwithstanding our general support for the licensee’s approach, our organizations have several concerns that should be addressed by the licensee.

The licensee proposes to study whether current or future demand exists for whitewater boating in the natural bypassed reach. The licensee, however, provides no methodology or explanation as to how it intends to accomplish this objective. It has no plans to survey boaters on the Deerfield River in Charlemont, it has no plans to do any outreach on social media or message boards, it has no plans to do internet-based surveys, it has no plans to contact whitewater outfitters in the region, and it has no plans to reach out to organizations such as American Whitewater, New England FLOW, and Appalachian Mountain Club to survey their members to determine their interest in kayaking in the natural bypassed reach. Furthermore, a determination of demand for whitewater boating is premature until the controlled flow study has been completed and optimal flows have been identified. Only after the on-water study has been completed and a determination has been made as to whether there are suitable flows for down river paddling, playboating, SUP or tubing, can the licensee undertake to determine the extent of the demand for these types of boating. As stated above, the licensee's proposal that it determine demand using its user contact survey of non-whitewater boaters is wholly inadequate.

Furthermore, demand is only one consideration in determining whether whitewater flows should be restored to the natural bypassed reach. Once a determination has been made that the natural bypassed reach is boatable at certain levels, FERC should require that the licensee provide scheduled releases in order to provide whitewater paddlers with the opportunity to enjoy this section of the river. Given that millions of people in Massachusetts, Connecticut, Vermont and New Hampshire live within several hours of Turners Falls, and the fact that tens of thousands of people kayak, canoe, raft, paddleboard and tube on the Deerfield and other surrounding rivers, demand for paddling in the natural bypassed reach at Turners Falls can be presumed if suitable flows are provided.

The licensee further states in its proposed study plans that it intends to determine the number of days per month that the acceptable and optimum flows for whitewater boating would be available under current and any proposed mode of operation. The current condition at Turners Falls is that the licensee diverts approximately 17,000 cfs into the power canal at Turners Falls for generation, spilling only minimum flows into the natural bypassed reach unless flows exceed its generating capacity. The licensee should also examine the extent to which it is able to forego generation or utilize its excess capacity in the upper reservoir at Northfield Mountain in order to provide additional flows to enable whitewater boating in the natural bypassed reach.

3.6.4 Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boats

FirstLight proposes to conduct a study of recreation use at the Northfield Mountain Project but does not propose to conduct a survey of non-users or displaced users who are unable to pursue their recreation interests in the project area due to the inadequacy of the facilities. Without speaking with non-users and displaced users, the licensee cannot assess whether its facilities are

adequate to meet the needs of multi-day canoe paddlers and kayakers. While the licensee acknowledges that FERC regulations require the licensee to provide an estimate of existing and potential recreational use of the project area as well as measures for creating, preserving and enhancing recreational opportunities at the project, it does not provide a methodology for obtaining this information from these potential user groups.

As was made clear in the study plan meetings, the inadequacy of certain facilities is a deterrent to recreational use by some boaters. For example, the lack of a portage trail, and the inadequacy of the boat launch and camping facilities has an adverse impact on these river users, and without reaching out to these individuals and groups, the licensee will be unable to fully appreciate the concerns of these non-users and displaced users and will be unable to adequately assess the demand for paddling by these individuals.

The licensee should work closely with groups such as the Appalachian Mountain Club and the Connecticut River Watershed Council to identify and survey non-users and displaced users in order to identify the obstacles to their utilization of the river.

Conclusion

American Whitewater respectfully requests that FERC accept these comments and direct the licensee to revise its proposed study plans to address the concerns raised. Thank you for considering these comments.

Respectfully submitted this 12th day of July, 2013



Bob Nasdor
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**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

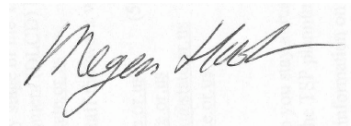
FirstLight Power Resources

**Turners Falls Project (P-1889)
Northfield Mountain Pumped Storage
Project (P-2485)**

CERTIFICATE OF SERVICE

Pursuant to Rule 2010 of the Commission's Rules of Practice and Procedure, I hereby certify that I have this day caused the foregoing **American Whitewater Comments on Updated Proposed Study Plan for the Turners Falls Hydroelectric Project (P-1889) and Northfield Mountain Pumped Storage Project (P-2485)** to be served upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated this 12th day of July, 2013.



Megan Hooker
American Whitewater

New England *FLOW* ~~~~~

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UNITED STATES OF AMERICA FEDERAL ENERGY REGULATORY COMMISSION

**Turners Falls Project No. 1889-081
Northfield Mountain Pumped Storage Project No. 2485-063**

NEW ENGLAND FLOW'S COMMENTS ON UPDATED PROPOSED STUDY PLANS FOR THE TURNERS FALLS HYDROELECTRIC PROJECT, FERC PROJECT NO.1889-081, AND THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT, FERC PROJECT NO. 2485-063.

Since 1988 New England FLOW (FLOW) has promoted the protection, enjoyment, and understanding of the mountains, forests, waters, and trails of the New England region. FLOW is the largest coalition of whitewater boaters in the Northeast many of whom live within three hours of the Connecticut River and would enjoy this section as a daylong or longer trip or as a whitewater opportunity.

Representatives of New England FLOW attended face-to-face sessions held by FirstLight at its Northfield Mountain facility to discuss the proposed study plans. We reference our comments made at those meetings.

FirstLight should be complimented for selecting qualified consultants to administer these studies. The consultants acknowledged our suggestions at the face-to-face meetings and displayed a good knowledge of the river. Our comments below are intended to help them gather more and better data from their surveys and research.

Summary of comments:

In this filing, we emphasize that FirstLight should also survey non-users of the river, who may have been pushed away by a lack of recreation facilities or by facilities that are not suited to their forms of recreation. We suggest that more sophisticated and contemporary survey techniques be used by the applicant, including more qualitative forms such as focus groups. We also make what we consider important comments about the non-existent portage trail around the Turners Falls Dam, educational benefits at Northfield Mountain, the whitewater boating study in the bypass reach, and about the failure of FirstLight to do a contingent valuation study.

Comments on specific studies:

3.6.1 Recreation Use/User Contact Survey.

3.6.4, Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boats.

3.6.7, Recreation Study and Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use.

At the face-to-face session, it was suggested by several people that surveys should ask why people do NOT use the Connecticut River. Surveying an audience that does NOT use the river might reveal deficiencies in the applicant's recreation plan and facilities.

TRC Senior Consultant Sarah Verville, who advises FirstLight, commented that mail surveys are expensive and "don't give good information." That's not accurate. Mail surveys don't have to involve hundreds of thousands of mailings. Data obtained by mail surveys is just as accurate as the kinds of surveys FirstLight has proposed.

This is a case where the applicant may have a conflict of interest in proposing and designing a user survey. If the survey indicates that people in the area find the recreation facilities provided by the applicant are inadequate, then FERC may require them to spend money to improve the facilities. The conflict is exposed when the applicant proposes to avoid negative information, as is the case here.

Barton Cove, the facility just upriver from the Turners Falls Dam, can serve as an example. The put-in at Barton Cove has a two-lane concrete boat ramp, a short metal dock during the summer, and parking for trailers. If you go to this put-in, the trailers in the parking lot reveal who uses the facility—power boaters who haul their craft around on trailers. If you just survey them, they are likely to be fairly satisfied with the facility. But who is not there? Car-top boaters, self-propelled boaters—such as canoeists, kayakers, sailors, and rowers who find that concrete boat ramps damage their equipment—among others. If you check out the ramps at the boat houses on the Charles River in Boston, you would notice they are made of wood, which does not damage the wooden or fiberglass hulls of rowing shells and small sail boats.

The user surveys proposed would provide data from people who already decided this particular facility meets their needs—or else they wouldn't be there. It reifies the position of the power company that what they provide is adequate. Surveying people who find the facilities don't meet their needs is more in line with the purposes that we believe FERC has in mind here.

The point here, we believe, is to establish whether or not FirstLight is meeting its obligations to the public in terms of recreation facilities. They should survey the public that avoids using their facilities along with those who use them.

FirstLight's consultants described a fairly narrow survey plan that is reminiscent of older, less accurate survey methods, before there was an Internet or more contemporary surveying techniques. The costs of surveying non-users need not be large. It was suggested that FirstLight could tap into the mailing lists of NGOs participating in the relicensing process, such as the AMC that has thousands of members in the area and has a recreation plan for the Connecticut River Blueway. American Whitewater and FLOW also represent memberships whose only bias is an appreciation for the outdoors, which in this case would be a positive benefit. It was also suggested that FirstLight do selected mailings, and they engage in a broader range of survey techniques that produce greater accuracy, such as focus group interviews. Ken Hogan of FERC commented that it is common in FERC processes to look at NGOs and municipalities that have recreation plans or development plans in the region.

We recommend user surveys for these three studies be reconsidered from the beginning, expanded to reach a larger audience including non-users, and that more sophisticated survey techniques be included. There is no point in having FirstLight spend the projected \$215,000 for surveys in studies 3.6.1, 3.6.4, and 3.6.7 when a simple academic evaluation of the techniques would indicate the money was wasted. It makes more sense for FERC to simply order the task done in a proper manner. The goal being to develop better outcomes from the information received (We note here for the record that TransCanada plans to survey non-users for similar studies it is conducting. That point was made by Ms. Verville and John Howard of GDF/Suez and FirstLight at the TransCanada study meeting on June 6, 2013, in White River Junction, Vermont.)

Since we consider the current study to be fatally flawed in several respects, we have not evaluated the proposed survey instruments that would be handed out at random sites to users. We look forward to providing feedback on surveys that are more properly designed.

3.6.2 Recreation Facilities Inventory and Assessment:

Most of this work was done previously. The information that has appeared so far in the PAD is inadequate because it lists, as part of the inventory, facilities that are not owned or operated by FirstLight. The applicant seems to be taking credit for facilities developed and maintained by others, and are not in their control over the proposed period of the license. We recommend this inventory assessment focus on the facilities that are owned and maintained by FirstLight, especially put-ins, take-outs, trails, developed and primitive campsites, and facilities for non-motorized boats.

The Trust for Public Land has developed a map of potential campsites for non-motorized boaters on the Connecticut River in Massachusetts. The map was created as part of the effort to expand the Connecticut River Paddlers' Trail into Massachusetts and Connecticut. The map generally follows the Paddlers' Trail standard of one campsite per five river miles, which is the recommended frequency. FirstLight facilities are clearly inadequate by this standard and far worse than the frequency of campsites operated by TransCanada in Vermont and New Hampshire. The map should be included by FirstLight in its study of "informal sites" that could be used to support more recreation on the river. (To access that map, contact Clem Clay, Connecticut River Program Director, at The Trust for Public Land in Amherst, Mass.; Clem.Clay@tpl.org.)

3.6.3 Whitewater Boating Evaluation:

The mechanisms of a controlled-flow whitewater evaluation are widely known and have been used on many rivers. We believe the keys to successful evaluations include working together with NGOs to obtain the right mix of paddlers in the right mix of craft, having controlled flows that provide a good range of conditions, and using good evaluation survey forms with the boaters. Members of the AMC, New England FLOW, and American Whitewater have participated in several successful controlled-flow studies during FERC relicensings on other New England rivers for over 20 years. We look forward to working with FirstLight's consultants as they get closer to the study.

Since we know very little about this whitewater reach below the Turners Falls Dam, we expect to study some measured flows during the IFIM study, and during natural spill events. This information might help us determine the appropriate volume for evaluation flows.

It is imperative that flows are measured accurately, rather than being estimated. Any sloppiness can create problems after the license is issued. We understand that sometimes it is difficult with large hydropower gates to exactly measure flows. Again, we look forward to working closely with the consultant to achieve good information.

3.6.4 Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boats:

During the scoping sessions and following meetings we have complained repeatedly about the lack of a walking trail for portaging around the Turners Falls Dam. FERC also directed that a study address “the feasibility of incorporating a self-service portage (i.e., a path that does not require shuttle service).” We believe the portage trail project belongs in this study.

3.6.7 Recreation Study at Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use:

At the Northfield Mountain meeting on June 11, questions were raised about maintaining, and improving, the level of educational benefits provided for the public at Northfield Mountain. Ken Hogan of FERC has responded to that question.

Whether or not FERC requires any particular educational benefit, we want to suggest that educational programs are important to schools and other educational institutions in the region and should be included in this study. We wonder if site visits for educational purposes have been tracked and it would be beneficial to know if the level of activity at Northfield Mountain has diminished in recent years.

Note on a study not done. FirstLight has declined requests to do a contingent valuation study of whitewater in the Turners Falls bypass reach. Representatives of FirstLight responded that contingent valuation studies are not accurate.

The important point is that contingent valuation studies seek to put two competing social “goods” on an equal footing. They do this by assessing “value”—that is, the value of an activity for society and what may be lost if the activity is prevented from occurring. Value is different from revenues, in the business sense. A tobacco company may make a lot of money, but that does not necessarily give it a value in society.

In contingent valuation studies at hydropower dams, we have one activity that can easily express itself in dollars—hydroelectric generation. Such generation comes from the public’s river water run through turbines. Competing activities may draw water away from those turbines, and reduce company revenues. How are we to compare the value of a sturgeon in the Connecticut River below the Turners Falls Dam, or the value of thousands of shad that migrate upriver and

frequently fail to get through such hydropower dams? How can we value the recreation generated by putting river water back into the natural stream bed for whitewater recreation? How do we compare the beauty of a natural river with the lost revenues when a bypass reach takes some water from the turbines? Comparing such activities as fish, recreation, and beauty using revenues and dollars earned works against the fish, the boaters, and the public. Contingent valuation was a technique designed to compare those activities on an equal footing.

We don't do that anymore with fisheries, but at one time it was done. Rather than dealing with dollar revenues, the term "value" was used. Contingent valuation places a value on different activities based on the social goods produced. The sturgeon and shad in the river have a social value. Recreation in the natural stream bed has a value. Beauty has a value. Flipping a switch and having the lights turn on has a social value. Contingent valuation studies are how these things are put in the same framework so they can be compared.

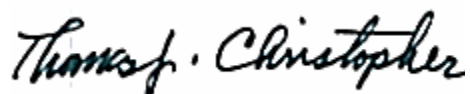
We understand that FirstLight may wish to avoid such comparisons. There's a chance that they feel the outcome would not favor them because social value is diminished when a company charges a profit to provide electricity. But that's the nature of the world.

We cannot force FirstLight to do a contingent valuation study, or FERC to order one, but this metric is clearly relevant in determining value. Lacking a study of comparative social values, we do not want to hear FirstLight arguing during the mitigation phase of relicensing they cannot provide one thing or another because it would cost them too much money. That argument goes out the window with the rejection of contingent valuation studies.

Conclusion:

New England FLOW respectively requests that FERC accept these comments and direct the licensee to revise its proposed study plans to address the concerns raised. Thank you for considering these comments.

Respectfully submitted this 10th day of July, 2013



Thomas J. Christopher, Secretary/Director
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Lancaster, Massachusetts 01523

**UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION**

FirstLight Power Resources

Turners Falls Project No.
1889-081
Northfield Mountain Pumped Storage
Project No. 2485-063

**APPALACHIAN MOUNTAIN CLUB, VERMONT RIVER
CONSERVANCY, AND THE FRIENDS OF THE CONNECTICUT RIVER
PADDLERS' TRAIL'S
COMMENTS ON UPDATED PROPOSED STUDY PLANS
FOR THE TURNERS FALLS HYDROELECTRIC PROJECT, FERC
PROJECT NO.1889-081, AND THE NORTHFIELD MOUNTAIN
PUMPED STORAGE PROJECT, FERC PROJECT NO. 2485-063.**

Since 1876, the Appalachian Mountain Club (AMC) has promoted the protection, enjoyment, and understanding of the mountains, forests, waters, and trails of the Appalachian region. The AMC is the largest conservation and recreation organization in the Northeast with more than 90,000 members, many of whom live within three hours of the Connecticut River and would enjoy this section as a daylong or longer trip or as a whitewater opportunity.

The Vermont River Conservancy protects public access, wildlife habitat, clean waters, scenic natural beauty and ecological integrity by conserving undeveloped land along rivers, lakes and wetlands of Vermont.

The Friends of the Connecticut River Paddlers' Trail is dedicated to building and stewarding primitive campsites, access points, and portage trails along the Connecticut River. The organization manages over 30 campsites and 70 access points that reach from the Connecticut River's headwaters south to the Massachusetts border. Efforts are underway to expand the paddlers' trail into Massachusetts and Connecticut.

Representatives of the Appalachian Mountain Club attended face-to-face sessions held by FirstLight at its Northfield Mountain facility to discuss the proposed study plans. We reference our comments made at those meetings.

We want to compliment FirstLight for selecting qualified consultants to administer these studies. The consultants acknowledged our suggestions at the face-to-face meetings and displayed a good knowledge of the river.

Our comments below are intended to help them gather more and better data from their surveys and research.

Summary of comments:

In this filing, we emphasize that FirstLight, along with its survey of area residents and visitors, should also survey non-users of the river. The survey should assess visitors' impressions of existing facilities, as well as learning why others may have been pushed away by a lack of recreation facilities, by facilities that are not suited to their forms of recreation, or because of undesirable river conditions, and so forth. We suggest that more sophisticated and contemporary survey techniques be used by the applicant, including more qualitative forms such as focus groups. We also make what we consider important comments about the non-existent portage trail around the Turners Falls Dam, educational benefits at Northfield Mountain, the whitewater boating study in the bypass reach, and about the failure of FirstLight to do a contingent valuation study.

Comments on specific studies:

3.6.1 Recreation Use/User Contact Survey.

3.6.4, Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boats.

3.6.7, Recreation Study and Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use.

At the face-to-face session, it was suggested by several stakeholders that surveys should ask why people do NOT use the Connecticut River. Surveying an audience that does NOT use the river might reveal deficiencies in the applicant's recreation plan and facilities.

TRC Senior Consultant Sarah Verville, who advises FirstLight, commented that mail surveys are expensive and "don't give good information." That's not accurate. Mail surveys don't have to involve hundreds of thousands of mailings. And the data obtained by mail and other kinds of modern surveys is just as accurate as the kind of survey FirstLight has proposed.

This is one of those cases where the applicant may have a conflict of interest in proposing and designing a user survey. If the survey indicates that people in the area find the recreation facilities are inadequate, then FERC may require the applicant to spend money to improve the facilities. The conflict is exposed when the applicant proposes to avoid negative survey information, as is the case here.

Barton Cove, the facility just upriver from the Turners Falls Dam, can serve as an example. The put-in at Barton Cove has a two-lane concrete boat ramp, a short metal dock during the summer, and parking for trailers. If you go to this put-in, the trailers in the parking lot reveal who uses the facility—power boaters who haul their craft around on trailers. If you just survey them with contact questionnaires, they are likely to be fairly satisfied with the facility. But who is not there? Car-top boaters, self-propelled boaters—such as canoeists, kayakers, sailors, and rowers who find that concrete boat ramps damage their equipment—among others. If you check out the ramps at the boat houses on the Charles River in Boston, you would notice they are made of wood, which does not damage the wooden or fiberglass hulls of rowing shells and small sail boats.

The user surveys proposed would provide data from people who already decided this particular facility meets their needs—or else they wouldn't be there. It reifies the position of the power company that what they provide is adequate. Surveying people who find the facilities don't meet their needs is more in line with the purposes that we believe FERC has in mind here.

Imagine for a moment that FirstLight were trying to verify the mythology that dolphins rescue sailors who fall overboard by towing them to land. They might start by surveying sailors at the beach. They would find that dolphins have a good reputation. If FirstLight failed to survey sailors who were hauled the other way by dolphins, they would miss the point.

The point here, we believe, is to provide data concerning whether or not FirstLight is meeting its obligations to the public in terms of recreation facilities. They should survey the public that avoids using their facilities along with those who use them.

FirstLight's consultants described a narrow survey plan that is reminiscent of older, less accurate survey methods before there was an Internet or contemporary surveying techniques. The costs of surveying non-users need not be large. It was suggested that FirstLight could tap into the mailing lists of NGOs participating in the relicensing process, such as the AMC that has thousands of members in the area and has a recreation plan for the Connecticut River Blueway. Membership in the AMC is so large and diverse that about the only bias present is an appreciation for the outdoors, which in this case would be a positive benefit. It was also suggested that FirstLight do selected mailings, and that they engage in a broader range of survey techniques that produce greater accuracy, such as focus group interviews. Ken Hogan of FERC commented that it is common in FERC

processes to look at NGOs and municipalities that have recreation plans or development plans in the region.

We recommend user surveys for these three studies be reconsidered from the beginning, expanded to reach a larger audience including non-users, and that more sophisticated survey techniques be included. There's no point in spending the projected \$215,000 for studies 3.6.1, 3.6.4, and 3.6.7 when a simple academic evaluation of the survey techniques would indicate the money was wasted. FERC could simply order the task done in a proper manner. It's easier to do it right the first time.

(We note here for the record that TransCanada plans to survey non-users for similar studies it is conducting. That point was made by Ms. Verville and John Howard of GDF/Suez and FirstLight at the TransCanada study meeting on June 6, 2013, in White River Junction, Vermont.)

Since we consider the current study to be fatally flawed in several respects, we have not evaluated the proposed survey instruments that would be handed out at random sites to users. We look forward to providing feedback on surveys that are more property designed.

3.6.2 Recreation Facilities Inventory and Assessment.

Most of this work was done previously. The information that has appeared so far in the PAD is inadequate because it lists, as part of the inventory, facilities that are not owned or operated by FirstLight. The applicant seems to be taking credit for facilities developed and maintained by others, and that are not in their control over the proposed period of the license. We recommend this inventory assessment focus on the facilities that are owned and maintained by FirstLight, especially put-ins, take-outs, trails, developed and primitive campsites, and facilities for non-motorized boats.

The inventory should assess FirstLight's land base and identify what parcels could serve as new primitive campsites or, where deemed necessary, river access locations. The Trust for Public Land has developed a map of potential campsites for non-motorized boaters on the Connecticut River in Massachusetts. The map was created as part of the effort to expand the Connecticut River Paddlers' Trail into Massachusetts and Connecticut. The map generally follows the Paddlers' Trail standard of one campsite per five river miles, which is the recommended frequency. FirstLight facilities are clearly inadequate by this standard and far worse than the frequency of campsites operated by TransCanada in Vermont and New Hampshire. The map should be included by FirstLight in its study of "informal sites" that could be used to support more recreation on the river. (To access that map,

contact Clem Clay, Connecticut River Program Director, at The Trust for Public Land in Amherst, Mass.; Clem.Clay@tpl.org.)

3.6.3 Whitewater Boating Evaluation.

The mechanisms of a controlled-flow whitewater evaluation are widely known and have been used on many rivers. We believe that the keys to successful evaluations include working together with NGOs to obtain the right mix of paddlers in the right mix of craft, having controlled flows that provide a good range of conditions, and using good evaluation survey forms with the boaters. Members of the AMC, New England FLOW, and American Whitewater have participated in several successful controlled-flow studies during FERC relicensings on other New England rivers for more than 20 years. We look forward to working with FirstLight's consultants as they get closer to the study.

Since we know very little about this whitewater reach below the Turners Falls Dam, we expect to study some measured flows during the IFIM study, and during natural spill events. This information might help us determine the appropriate size for evaluation flows.

It is imperative that flows are measured accurately, rather than being estimated. Any sloppiness can create problems after the license is issued. We understand that sometimes it is difficult with large hydropower gates to exactly measure flows. Again, we look forward to working closely with the consultant to achieve good information.

3.6.4 Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boats

During the scoping sessions and following meetings, we have mentioned repeatedly the lack of a walking trail for portaging around the Turners Falls Dam. FERC also directed that a study address "the feasibility of incorporating a self-service portage (i.e., a path that does not require shuttle service)." We believe the portage trail project belongs in this study.

3.6.7 Recreation Study at Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use

At the Northfield Mountain meeting on June 11, questions were raised about maintaining, and improving, the level of educational benefits provided for the public at Northfield Mountain. Ken Hogan of FERC has responded to that question.

Whether or not FERC requires any particular educational benefit, we want to suggest that educational programs are important to schools and other

educational institutions in the region and should be included in this study. It would be beneficial to know the level of activity at Northfield Mountain, and the degree to which such programs have been decreased in recent years.

Note on a study not done. FirstLight has declined requests to do a contingent valuation study of whitewater in the Turners Falls bypass reach. Representatives of FirstLight responded that contingent valuation studies are not accurate.

The important point is that contingent valuation studies seek to put two competing social “goods” on an equal footing. They do this by assessing “value”—that is, the value of an activity for society and what may be lost if the activity is prevented from occurring. Value is different from revenues, in the business sense. A tobacco company may make a lot of money, but that does not necessarily give it a value in society.

In contingent valuation studies at hydropower dams, we have one activity that can easily express itself in dollars—hydroelectric generation. Such generation comes from the public’s river water run through turbines. Competing activities may draw water away from those turbines, and reduce company revenues. How are we to compare the value of a sturgeon in the Connecticut River below the Turners Falls Dam, or the value of thousands of shad that migrate upriver and frequently fail to get through such hydropower dams? How can we value the recreation generated by putting river water back into the natural stream bed for whitewater recreation? How do we compare the beauty of a natural river with the lost revenues when a bypass reach takes some water from the turbines? Comparing things such as fish, recreation, and beauty with company revenues works against the fish, the boaters, and the public. Contingent valuation was a technique designed to compare those activities on an equal footing.

We don’t do that anymore with fisheries, but at one time it was done. Rather than dealing with dollar revenues, the term “value” was used. Contingent valuation places a value on different activities based on the social goods produced. The sturgeon and shad in the river have a social value. Recreation in the natural stream bed has a value. Beauty has a value. Flipping a switch and having the lights turn on has a social value. Contingent valuation studies are how these things are put in the same framework so they can be compared.

We understand that FirstLight may wish to avoid such comparisons. There’s a chance that they feel the outcome would not favor them because social value is diminished when a company charges a profit to provide electricity.

We cannot force FirstLight to do a contingent valuation study, or FERC to order one, but this metric is clearly relevant in determining value. Lacking a study of comparative social values, we do not want to hear FirstLight arguing during the mitigation phase of relicensing that they cannot provide one thing or another because it would cost them too much money. That argument goes out the window with the rejection of contingent valuation studies.

Conclusion

The Appalachian Mountain Club respectfully requests that FERC accept these comments and direct the licensee to revise its proposed study plans to address the concerns raised. Thank you for considering these comments.

Respectfully submitted this 10th day of July, 2013,

Norman Sims
Appalachian Mountain Club
16 Linden Ave.
Greenfield, MA 01301



CONNECTICUT RIVER WATERSHED COUNCIL

The River Connects Us

15 Bank Row, Greenfield, MA 01301 crwc@ctriver.org www.ctriver.org

July 15, 2013

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Northfield Mountain Pumped Storage Project No. 2485-063
Turners Falls Project No. 1889-081
Comments on the June 28, 2013 updated Proposed Study Plan

Dear Secretary Bose,

The Connecticut River Watershed Council, Inc. (CRWC) is a nonprofit citizen group that was established in 1952 to advocate for the protection, restoration, and sustainable use of the Connecticut River and its four-state watershed. The interests and goals represented by CRWC include, but are not limited to, improving water quality; enhancing habitat for fish and other aquatic biota; safeguarding and improving wildlife habitat; protecting threatened and endangered species; protecting wetlands; preserving undeveloped shore lands; enhancing public recreation and promoting recreational safety; protecting aesthetic values; protecting archeological, cultural, and historical resources; fostering sustainable economic development, energy production, and preserving the local tax base along the Connecticut River and its tributaries.

CRWC submitted comments on FirstLight's Pre-application Document (PAD), FERC's Scoping Document 1 (SD 1), and 26 study requests in our letter dated March 1, 2013. We reviewed the Proposed Study Plan (PSP) filed with FERC on April 15, 2013, and attended all of the meetings that have been held to discuss the draft study plans. We have now reviewed the updated PSP dated June 28, 2013, and all of our comments below refer to the updated PSP unless otherwise specified.

Many changes have been made to the updated PSP in response to comments provided at the stakeholder meetings. We appreciate the changes and improvement that have been made so far. We have a set of general comments and extensive comments on each of the proposed and three of the rejected studies, which are all below.

General comments:

PME is not defined in the list of acronyms.

Throughout the document, there are places where it says that "stakeholders" will be consulted, and other places where it says "resource agencies" will be consulted. We are not sure if the two

terms are being used interchangeably in this context. If not, then there are many places where groups like CRWC would also want to be consulted along with resource agencies.

During the May 21, 2013 meeting, we said that having a grid of the schedules of all the studies or all the fisheries studies would be extremely helpful. No such grid has been provided in the updated PSP, but having one for the revised PSP is essential so that we can tell if any of the schedules for studies that require certain flows or operational control are at odds with one another.

The “Proposed Plan to Avoid/Minimize Entrainment of Silt during Future Upper Reservoir Drawdowns” that was required by FERC after the 2010 U.S. Environmental Protection Agency and Massachusetts Department of Environmental Protection (MassDEP) enforcement order should be wrapped into the proposed study plan and timetable. It is important that we have the results of the sediment management plan in the same time frame as the other studies.

In all of the study schedules, it would be good to see when stakeholders will see an initial draft of the study results, aside from a generic reference to the ILP schedule in FERC’s Scoping Document 1 (SD1).

3.1.1 2013 Full River Reconnaissance Study

Introductory comments on this study

As an active member of the Connecticut River Streambank Erosion Committee (CRSEC) we are familiar with the Full River Reconnaissance (FRR) process. CRWC and many other members of CRSEC have long felt that the FRR methodology had weak areas, and we felt that John Field’s 2007 “Fluvial Geomorphology Study of the Turners Falls Pool on the Connecticut River Between Turners Falls MA and Vernon VT” offered many good suggestions on how to improve the FRR. We felt the 2008 FRR was particularly flawed, and complaints and critiques have already been laid out in excruciating detail in the FERC docket at that time.

While we understood why the 2013 FRR would be wrapped into the study plan schedule, we were surprised to see the FRR as a study described in the PSP dated April 15. After all, other compliance studies that are of interest in some of the proposed relicensing studies, such as the annual fish ladder results or the sediment management plan, were not brought in as studies in the PSP. Now that the FRR is part of the PSP, we recommend that any task that is outside of the scope of a typical FRR be put into a different study, either 3.1.2 or a third erosion-related study. For example, Task 5 is an evaluation of all riverbank stabilization projects done since 1996. This should perhaps separated out into its own study, unless FirstLight intends to do this analysis as part of every FRR in the future.

We have long asked for a QAPP to be written for the FRR methodology, and we are glad that it will be part of the 2013 FRR. We reviewed a draft of the QAPP in December 2012, and CRSEC provided comments to FirstLight in early February of 2013 (CRWC contributed to this effort). The QAPP, to my knowledge, was not updated much for the April 15 filing, and has not been updated as of the June 28 filing. The review of the QAPP now falls in a 2-week window in late August, and we feel that this is an inadequate amount of time when rolled into review of all the other studies. The QAPP review and acceptance should be allowed to fall under a separate time line.

Many changes and improvements have been made to the updated PSP since the April 15 version in response to comments at the May 15 and June 14 meetings. We still have several problems with the FRR methodology, however.

Task 1a: Identify and Define Current Riverbank Features and Characteristics

Field (2007) recommended on page 46 of his report, section 9.3b Monitoring of erosion #2, “The mapping of erosion sites as conducted during previous full river reconnaissance efforts (NEE, 2005) should be modified to include the types of erosion present (e.g., undercut banks, topples, slides, slumps, flows), other features indicative of erosion (e.g., tension cracks, exposed roots, leaning trees), and the stage of erosion present (Figure 30).” [More details are provided in this recommendation that involves preserving elements of previous studies to enable year-to-year comparisons.] We are disappointed that the field data logging worksheet, Table 3.1-1 and the riverbank characterization matrix, Table 3.1-2 continues to be extremely flawed. Erosion stage and features indicative of erosion are ignored. The coding of each segment that results from using the Table 3.1-2 matrix is extremely confusing and meaningless. In Table 3.1-1, the erosion **types** listed include two categories that were identified as being **stages** by Field in 2007. In addition, as FRCOG has aptly pointed out in their comment letter, many of the observations are of proxies for erosion, such as amount of vegetation, bank height and slope, etc.

In response to comments at the June 14 meeting, the updated PSP now includes a Table 1 that compares Field’s stages of erosion with the matrix of riverbank features and characteristics. This table highlights some of the problems with the matrix: the matrix definition of Field’s “notching or undercutting” and “secondary notching or undercutting” is the same, as is the matrix definition of Field’s “slide or topple” and “flows (disaggregated slide).” Looking at Field’s diagram’s these are four distinct stages, not two that are equivalent.

Task 3: Land-use mapping.

The updated PSP says that the plans will be developed using MassGIS data layers of land use. We looked at MassGIS online, and found reference to a MacConnell land use classification scheme using 21 categories, but we also found that the land use (2005) MassGIS data layer (<http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/lus2005.html>) with the following 40 categories. We would like confirmation which list will be used for this and the land use study, and whether or not the 2005 land use data layer is the one that will be used. The concern heard at the meeting was that active grazing on riparian land was of interest. This may not be captured in even the most detailed land use codes, since “pasture” can be hayfields with no animals or grazing lands.

LAND USE CODE DEFINITIONS

<u>Land Use Code</u>	<u>Land Use Description</u>	<u>Detailed Definition</u>
1	Cropland	Generally tilled land used to grow row crops. Boundaries follow the shape of the fields and include associated buildings (e.g., barns). This category also includes turf farms that grow sod.
2	Pasture	Fields and associated facilities (barns and other outbuildings) used for animal grazing and for the growing of grasses for hay.
3	Forest	Areas where tree canopy covers at least 50% of the land. Both coniferous and deciduous forests belong to this class.

4	Non-Forested Wetland	DEP Wetlands (1:12,000) WETCODEs 4, 7, 8, 12, 23, 18, 20, and 21.
5	Mining	Includes sand and gravel pits, mines and quarries. The boundaries extend to the edges of the site's activities, including on-site machinery, parking lots, roads and buildings.
6	Open Land	Vacant land, idle agriculture, rock outcrops, and barren areas. Vacant land is not maintained for any evident purpose and it does not support large plant growth.
7	Participation Recreation	Facilities used by the public for active recreation. Includes ball fields, tennis courts, basketball courts, athletic tracks, ski areas, playgrounds, and bike paths plus associated parking lots. Primary and secondary school recreational facilities are in this category, but university stadiums and arenas are considered Spectator Recreation. Recreation facilities not open to the public such as those belonging to private residences are mostly labeled with the associated residential land use class not participation recreation. However, some private facilities may also be mapped.
8	Spectator Recreation	University and professional stadiums designed for spectators as well as zoos, amusement parks, drive-in theaters, fairgrounds, race tracks and associated facilities and parking lots.
9	Water-Based Recreation	Swimming pools, water parks, developed freshwater and saltwater sandy beach areas and associated parking lots. Also included are scenic areas overlooking lakes or other water bodies, which may or may not include access to the water (such as a boat launch). Water-based recreation facilities related to universities are in this class. Private pools owned by individual residences are usually included in the Residential category. Marinas are separated into code 29.
10	Multi-Family Residential	Duplexes (usually with two front doors, two entrance pathways, and sometimes two driveways), apartment buildings, condominium complexes, including buildings and maintained lawns. Note: This category was difficult to assess via photo interpretation, particularly in highly urban areas.
11	High Density Residential	Housing on smaller than 1/4 acre lots. See notes below for details on Residential interpretation.
12	Medium Density Residential	Housing on 1/4 - 1/2 acre lots. See notes below for details on Residential interpretation.
13	Low Density Residential	Housing on 1/2 - 1 acre lots. See notes below for details on Residential interpretation.
14	Saltwater Wetland	DEP Wetlands (1:12,000) WETCODEs 11 and 27.
15	Commercial	Malls, shopping centers and larger strip commercial areas, plus neighborhood stores and medical offices (not hospitals). Lawn and garden centers that do not produce or grow the product are also considered commercial.
16	Industrial	Light and heavy industry, including buildings, equipment and parking areas.

17	Transitional	Open areas in the process of being developed from one land use to another (if the future land use is at all uncertain). Formerly identified as "Urban Open".
18	Transportation	Airports (including landing strips, hangars, parking areas and related facilities), railroads and rail stations, and divided highways (related facilities would include rest areas, highway maintenance areas, storage areas, and on/off ramps). Also includes docks, warehouses, and related land-based storage facilities, and terminal freight and storage facilities. Roads and bridges less than 200 feet in width that are the center of two differing land use classes will have the land use classes meet at the center line of the road (i.e., these roads/bridges themselves will not be separated into this class).
19	Waste Disposal	Landfills, dumps, and water and sewage treatment facilities such as pump houses, and associated parking lots. Capped landfills that have been converted to other uses are coded with their present land use.
20	Water	DEP Wetlands (1:12,000) WETCODEs 9 and 22.
23	Cranberry bog	Both active and recently inactive cranberry bogs and the sandy areas adjacent to the bogs that are used in the growing process. Impervious features associated with cranberry bogs such as parking lots and machinery are included. Modified from DEP Wetlands (1:12,000) WETCODE 5.
24	Powerline/Utility	Powerline and other maintained public utility corridors and associated facilities, including power plants and their parking areas.
25	Saltwater Sandy Beach	DEP Wetlands (1:12,000) WETCODEs 1, 2, 3, 6, 10, 13, 17 and 19
26	Golf Course	Includes the greenways, sand traps, water bodies within the course, associated buildings and parking lots. Large forest patches within the course greater than 1 acre are classified as Forest (class 3). Does not include driving ranges or miniature golf courses.
29	Marina	Include parking lots and associated facilities but not docks (in class 18)
31	Urban Public/Institutional	Lands comprising schools, churches, colleges, hospitals, museums, prisons, town halls or court houses, police and fire stations, including parking lots, dormitories, and university housing. Also may include public open green spaces like town commons.
34	Cemetery	Includes the gravestones, monuments, parking lots, road networks and associated buildings.
35	Orchard	Fruit farms and associated facilities.
36	Nursery	Greenhouses and associated buildings as well as any surrounding maintained lawn. Christmas tree (small conifer) farms are also classified as Nurseries.
37	Forested Wetland	DEP Wetlands (1:12,000) WETCODEs 14, 15, 16, 24, 25 and 26.

38	Very Low Density Residential	Housing on > 1 acre lots and very remote, rural housing. See notes below for details on Residential interpretation.
39	Junkyard	Includes the storage of car, metal, machinery and other debris as well as associated buildings as a business.
40	Brushland/Successional	Predominantly (> 25%) shrub cover, and some immature trees not large or dense enough to be classified as forest. It also includes areas that are more permanently shrubby, such as heath areas, wild blueberries or mountain laurel.

Study Schedule.

The updated PSP indicates that FirstLight is seeking permission from FERC to file the FRR in September 2014, approximately six months later than it normally would. FirstLight has filed a separate letter to FERC requesting permission to do this. CRWC is not in favor of pushing back the due date for the FRR for the following reasons 1) the FRR's main purpose is license compliance, 2) the FRR is intended to generate a schedule and list of sites for riverbank restoration – the 2008 lacked such a component and so CRSEC would like to proceed with meetings and discussions about future projects as soon as possible, 3) we think seeing the FRR before the report for study 3.1.2 makes logical sense because the second study should build on the first, and 4) why lump the review of the FRR with the review of all other interim reports for other studies when the FRR has its own schedule that allows for a staggered, and more thoughtful, review?

3.1.2 Northfield Mountain/Turners Falls Operations Impact on Sediment Transport

Introductory comments on this study

Although many changes and improvements have been made to the updated version of 3.1.2 since the April 15 version in response to comments at the May 15 and June 14 meetings, we still find many parts of this study problematic and confusingly organized, potentially leading to \$500,000-worth of studies that will have meaningless or erroneous results. In general, the three updated TransCanada erosion studies are laid out more clearly and more logically than this study. While we wish we had more time to provide even more detailed comments, we in general feel that the erosion studies in the updated TransCanada PSP are a better model for looking at the processes of erosion.

The 2007 Field Report recommended for future work under 9.3a Understanding the causes of erosion (#4 on page 46) “A more thorough understanding of beach formation and the processes that lead to bank stabilization is needed. A remote sensing technique should be used to map the location and width of beaches in the Turners Falls pool. LIDAR could be an effective method of doing this if the flight occurs during low pool levels.” Recommendation #7 was “determine if narrow beaches correspond to the areas of highest shear stress as predicted by the hydraulic model.”

In CRWC's study request 2, we requested further investigation of beach formation as part of a determination of sediment deposition in the study area. We discussed beach formation at the

May 15 meeting and we were told that the recreation study will ask about beaches, sediment filling in, and locations of areas affected. We disagree that this topic is best covered in a recreational survey, and moreover, the draft surveys provided as part of Study 3.6.1 (the recreational use survey) in the updated PSP do not ask any questions related to beach formation. TransCanada has recently completed LiDAR surveys all the way down to the Holyoke Dam and the data in their impoundments will be used in TransCanada's Study 3. FirstLight could likely obtain/purchase the LiDAR data from TransCanada to include a beach formation analysis in this study.

Task 2: Geomorphic Understanding of Connecticut River

The wording in this section is confusing – "...this task would entail... it would include background... " Are you doing the task or not? If so, it "will" entail and "will" include.

We believe the Field 2007 report already accomplishes Task 2. The end product of Task 2, as stated on page 3-27 of the updated PSP, is a summary of the principal potential causes of riverbank erosion that occur within a river corridor, including natural processes and anthropogenic causes. That is exactly what the Field 2007 report contained, and we believe that it was competently done.

There are, however, erosion monitoring recommendations from the 2007 Field report that likely lie outside the scope of a typical Full River Reconnaissance, and should be done in this study. For example, Field's 2007 recommendation #9 in Section 9.b Monitoring of Erosion was "An attempt should be made to overlay the 1961 aerial photographs with a current flight and to create a topographic map from the 1961 flight. The feasibility of this effort has been confirmed by Eastern Topographics, Inc. This effort will identify the previous extent of the low bench (Figure 7a-b) and identify areas of the most significant bank recession in the past 45 years." Recommendation #10 in the 2007 Field report was "Portions of the 1971 ground surveys by Ainsworth and Associates, Inc. of Greenfield MA should be resurveyed to identify changes in bank position since the opening of the Northfield Mountain Pumped Storage Project."

CRWC made these same recommendations in our Proposed Study 2. At the study plan meetings we continued to discuss the need for this analysis, which we believe to be useful for the purpose of anticipating future project effects during the next license, and potentially analyzing mitigation measures and natural river processes over time. FirstLight has rejected studying historic riverbank conditions because they don't want to do a pre-raising of the dam comparison. However, in another study, page 3-182, task 3 of Fish Assemblage study says, "Comparisons will be made with historical records," looking at a study from the early 1970's before and after Northfield Mountain began operations. TransCanada's Study 1 is titled "Historical Riverbank Position and Erosion Study," and the rationale for doing this study is that it "will facilitate conclusions as to the association and effect of project operations on active erosion at various locations within or areas affected by the three projects." FERC indicated at the June 14 meeting that they are interested in a trend analysis going back in time. We continue to recommend including a comparison of riverbank position over time for the purposes of moving forward with a new license.

Task 3: Install Proposed Water Level Monitors in Turners Falls Impoundment.

A map showing the water level monitor locations would be extremely helpful. In lieu of that, the table below has the location in miles upstream of the dam, as well as comments.

CRWC comments on existing and proposed water level recorders

Water Level Recorder	Distance from TF Dam (miles)	Comments
Turners Falls Dam Existing Gage	-	Existing hourly gage
TF Boat Barrier Line	0.3	Existing hourly gage
Need for a gage	2.1-5.5	Need a proposed gage between the TF boat barrier line and the tailrace, upstream of the Narrows or French King Gorge. Figure 3.2.2-2 shows a dramatic grade change at and upstream of the gorge. The tailrace site has its own set of dynamics that might not be representative of upstream of the gorge.
Northfield Tailrace	6.5	Existing hourly gage
3,500 ft upstream of Northfield Tailrace	~7.2	Proposed 15-minute interval gage. Not sure how location (3,500 ft upstream of tailrace) was chosen. CFD for tailrace study covers 1 km.
Upstream of Schell Bridge, 8.5 miles upstream of Northfield tailrace	15	Proposed 15-minute interval gage. We aren't sure why the Route 10 bridge wasn't used so that the data from 2012 could be expanded, but otherwise the location seems fine.
Just below Stebbins Island	~20.5	Proposed 15-minute interval gage. We don't see the value in having two gages here, or even one. We can't recall any discussions at the meeting that would have prompted this decision. However, we do see that TransCanada's erosion study has been modified to continue down to Stebbins Island, so perhaps FirstLight wishes to collect data related to TransCanada's study and/or potential conclusions.
Just above Stebbins Island	~20.5	Proposed 15-minute interval gage. See comment above; we recommend deleting one or both of these sites and adding one between French King Gorge and the Northfield Mountain tailrace.

Figure 4.3.1.3-7 of the PAD shows the annual elevation curves for the four existing hourly gages. Note how there is a large difference between the curve for the Turners Falls dam vs. the curve for the boat barrier line, which is only 0.3 miles upstream of the dam. Looking at the graphs for each month in 4.3.1.3-8 through 4.3.1.3-19 in the PAD, there are some months that the line for the Northfield tailrace follows closely with that of the boat barrier, and some months when the two lines are very different. CRWC therefore feels that at least one additional water level recorder between the boat barrier line and the Northfield tailrace is warranted, to understand better the dynamics in this section of the impoundment. Figure 3.2.2-2 of the updated PSP shows an elevation drop at the gorge, and this should be a point of interest that we would want to have gages at, preferably upstream and downstream, or at a minimum just upstream.

Installation of the water level recorders between August 2013 and November 2013 is not an adequate amount of time for the recorders to be out. If year-round recording is not possible (with Vermont Yankee operating, ice is not an issue except at Barton Cove), then a full season of data is needed to adequately characterize river fluctuations during different parts of the year. The recorders are being used for several studies, and a full season is imperative. Looking at the elevation curves for the four existing water level recorders for each month in 4.3.1.3-8 through 4.3.1.3-19 in the PAD, there are some months, such as April and May, when the four lines are vastly different than one another, and these will be missed under the current proposal. If data is needed in 2013 to inform other studies, data can certainly be collected as proposed in 2013, and then in 2014 collect a full year or full season of data. If differences in results necessitate and update with the hydraulic study, then that can be done.

Task 3: Evaluation of Water Elevation and Flow Data.

This task and the previous task are both numbered “Task 3.”

General: On page 3-25, the updated PSP says that for the purposes of this study the four existing gages are called “long-term monitors” and the two gages monitored in 2012 are termed “short-term monitors.” The proposed monitors are called proposed water level monitors.

Task 3a and 3d. Hydrographs of Turners Falls Impoundment Elevations vs. Flow

3a is for the long-term and short-term (2012) monitors. We aren’t sure what the end product will be as described. We think that for each water level monitor, there will be a single graph showing each year’s hydrograph super-imposed onto the same sheet of paper. This would make a total of six graphs. Is that correct?

3d is for the proposed monitors. Couldn’t this be one task with two components? The way these sub-tasks are organized is very confusing. Each graph will show the hydrograph for a proposed monitor, and will also show the Vernon discharge and the Montague gage data. If there are 4 proposed monitors, we think this means 4 graphs, but it is a little confusing.

What we would like to see as another task related to 3a and 3d is a single hydrograph showing the period of time that the proposed recorders will run, with hydrograph lines for the 4 long term monitors and for the proposed monitors all on one graph. This would give us one sense of locational variability over the study period.

Tasks 3c and 3e: Evaluation of Maximum Daily Fluctuation of Turners Falls Impoundment Elevations on a Monthly (and Annual) Basis

3c is for the long-term and short-term (2012) monitors. This task proposes to make monthly and annual “delta” duration curves for 1) the period of record for each recorder (from 2000 on), 2) for 2010 alone – this is the year that Northfield Mountain was shut down between May and November, and 3) for times that the Turners Falls dam is not spilling. We think the delta duration curves will provide useful information and we recommend this stays in the study plan, but duration curves don’t show seasonal, weekly, or other kinds of patterns, so we would also like to see a graph of the delta over time, as in tasks 3a and 3d, but it won’t be a hydrograph it will be a delta graph. This could be done by month or season, so that variations would not be lost. This could be done for the long-term monitors only, for a subset of years and for 2010 separately.

3e is for the proposed monitors. See comments above for 3c.

Task 3f: Analysis of Flow and WSEL Data to Correlate Project Operations and WSEL Fluctuations.

First bullet. We think using mean daily flows will miss the peak flows and fluctuations. We would prefer hourly data used, although one would need to think about what the time gap is between the West Deerfield gage and the Montague City gage. The end result of using hourly data would essentially be a hydrograph for flows just upstream of the Turners Falls Dam, something we currently don't have. There is an old USGS discontinued gage somewhere in this vicinity; perhaps that data could be obtained if that is of any value.

Second bullet. The subtracted hydrograph suggested in the above bullet should be plotted on this graph.

Second bullet: Don't just concentrate on high flows here, but all flows low and high.

In general, **we want to know when water levels change, what is the ramping rate?** That would be relevant for the Odonate study and other habitat studies.

Task 5c: Evaluation of Round 1 Field Evaluation

Transects are buried in this subtask, whereas it is an entire study for TransCanada.

During the June 14 meeting, I asked for stratigraphic descriptions of the bank material, and Bob Simons said it would be done during the transect surveys, but I don't see that there is any mention of stratigraphy in the updated PSP.

Task 6: Causes of Erosion

This section lists 9 potential causes of erosion (two of which overlap: land management practices and anthropogenic influences to the riparian zone), and then describes how just 3-4 of these will be analyzed (land management is called "spatial analysis," and the studies that look at riparian land management are not referenced here). Therefore, this task seems incomplete and detracts from the study proposal's credibility.

We believe it will be impossible to parse out some of the causes of erosion. For example, is erosion at the toe of the slope due to water level fluctuations, hydraulic sheer stress, boat and wind wavings, ice or debris. Moreover, it is our opinion that boat wakes are an indirect effect of project operation/existence. In the Massachusetts section of the Connecticut River, the two areas that are heavily used for motor boating are the Holyoke impoundment and the Turners Falls impoundment. No doubt, motor boating would not be as prevalent without the existence of those two dams.

The resulting analysis in this task has the feeling of being highly subjective and therefore we feel that there will be lots of money spent on questionable results.

Task 7: Report

The updated PSP has 9 bullets giving the subject headings of the sections in the final report, with no details about the ways that the data will be analyzed or presented. TransCanada's updated Study 2 (Riverbank Transect Study) includes the following details about deliverables, and we recommend this level of detail in the FirstLight study plans:

"The work products provided as part of this study will include:

- 1) A GIS shapefile of monitoring sites and table of site characteristics;*
- 2) drafted overlaid topographic cross sections showing changes at each site through time;*

- 3) *bar graphs showing estimated volumes of soil loss through time and segregated by bank features (e.g., composition, slope, height); and*
- 4) *line graphs showing variations in water stage through time overlaid with bar graphs showing volume of soil loss during the time between survey events;”*

Likewise, TransCanada’s deliverables for Study 3, Riverbank Erosion Study, contains the following details about deliverables that we think provides stakeholders with a better sense of how the data will be logically used and presented:

“The work products to be completed as part of this study will include:

- 1) *An annotated bibliography of local studies and published literature describing how a particular document relates to one or more of the study goals;*
- 2) *tables and figures documenting and illustrating how the character of the watershed (e.g., drainage area), valley (e.g., width), and channel (e.g., meander dimensions) vary in a downstream direction;*
- 3) *maps showing long-term trends in channel migration and bank erosion;*
- 4) *bathymetric contour maps and/or cross sections showing how the depth of the river varies across the river at selected sites;*
- 5) *surficial geology maps of the Connecticut River valley bottom within the study area presented on 7.5’ topographic quadrangles;*
- 6) *GIS shapefiles and summary tables of channel conditions for more than 300 miles of shoreline;*
- 7) *figures and tables of the stratigraphic and soil descriptions of bank sediments;*
- 8) *topographic cross sections and plan maps illustrating important bank and channel conditions;*
- 9) *maps and cross sections illustrating how flow stage, velocity, and shear stress vary with discharge for various points along the river based on hydraulic modeling results; and*
- 10) *an interim and final study report synthesizing the above deliverables into a narrative that addresses the study goals and issues raised in various study requests.”*

TransCanada’s erosion study deliverables section indicates that an interim study report will be prepared after a first year of study for stakeholders to review and comment. A draft final report will be prepared after year two, and stakeholder comments will be included in a final study report. We like this idea. There appears to be no interim or draft reports that will be filed by FirstLight, and no stakeholder review and comment.

3.2.1 Water Quality Monitoring Study

TransCanada’s study 6 proposes weekly water samples collected at the forebays of Wilder, Bellows Falls, and Wilder Dams between June 1 and September 30, and tested for nitrate/nitrite, total nitrogen, total phosphorus, total Kjeldahl nitrogen, and Chlorophyll-a. CRWC recommends the same testing at the forebay of the Turners Falls dam for the following reasons:

- Comparing across sites would be interesting, to detect any trends at the four dams under relicensing
- FERC has expressed an interest in looking at cumulative effects, and nutrient loading via sediment transport is one cumulative effect worth investigating.
- As NMFS noted in their study request document, soil erosion contributes to nutrient loading. Long Island Sound is impaired for dissolved oxygen caused by nutrient loading. The states of CT, MA, NH, and VT, along with EPA and NEIWPC have been working

on updating the 2001 TMDL to reduce nitrogen loading. PME measures at the hydro projects to minimize soil losses from erosion will help in this effort, but having actual water quality data will also allow government agencies to ascertain current loading values, which may be impacted by project operations, among other things.

CRWC requested sediment analysis in Barton Cove to be tested for metals and PCBs in CRWC study request 6. FirstLight's rationale for not doing this is that they analyzed samples in 2010 after the sediment dumping EPA enforcement action in 2010. However, that data represents a single day (August 26, 2010) from sediment inside the tunnel, older sediment dug when they first drained the reservoir, sediment near the tailrace, and across the river on the bank. These locations are not representative of Barton Cove and represent only a single day. River level fluctuations may increase the available mercury in fish at reservoirs, and possibly impounded areas like Barton Cove. See the study proposal for Niagara Power Project (No. 2216) regarding for background information on the mercury issue:

<http://niagara.nypa.gov/ALP%20working%20documents/finalreports/IS28.pdf>

3.2.2 Hydraulic Study of Turners Falls Impoundment, Bypass Reach and below Cabot Station

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 14, 2013 at Northfield Mountain ("the meeting").

- On page 3-49, boat wakes are listed as a source of water level fluctuations in the Turners Falls impoundment and below Cabot Station. Boat wakes are temporary waves caused by the passage of watercraft. For the purposes of a hydraulic model, boat wakes have no effect on the amount of water in the river at any time, the velocity of water going downstream, or the cross-section of the river bed that contains water. CRWC recommends deleting these two bullets.
- CRWC recommends adding "Operation of Northfield Mountain Pumped Storage Project (pumping or generating)" to the list of sources of water level fluctuations below Cabot station on page 3-49.
- This study should include a hydraulic analysis of the Turners Falls canal, since upstream and downstream passage goes through the canal.

Task 2: installation of water level recorders.

Please refer to our comments from study 3.1.2 on water level recorders. Please note that the details and information in the updated PSP for study 3.1.2 and here in 3.2.2 are not the same.

Task 7: unsteady flow model. Matrix of proposed model runs, tables 3.2.2-3 and -4.

Explain what "max gen" vs. "min gen" means for each facility shown. For example, in table 3.2.2-4, does "Turners Falls" mean Cabot and No. 1? Does "max" mean Cabot is running full strength and "min" means No. 1 is operating? If not, what?

Explain why there needs to be separate scenarios for Holyoke and Holyoke pond level.

Scenarios in Table 3.2.2-4 don't factor in everything that is coming downstream into the reach below Cabot. Based on our understanding of Section 3.3.2 of the PAD, when natural routed flows are above 15,938 cfs (the capacity of Cabot and No. 1 together), which happens 28% of the

time, the dam spills water. This amount of spill would be impacted by whether or not Northfield Mountain is pumping, generating, or off. At flows less than 1,433 cfs (3% of the time), No. 1 station operates as roughly run of river and this flow amount would also be impacted by what is happening at Northfield Mountain. Therefore, we think that the run matrix for below Cabot needs to take into account the various operational states at Northfield Mountain.

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

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on April 16 and May 8, 2013 at Northfield Mountain and June 20 conference call meeting (“the meetings”).

In study reaches and transect selection and study schedule sections, modify revised dates of site visits accordingly, since the July ones were postponed due to stakeholders being busy writing comments on the updated PSP.

Existing Information and Need for Additional Information

Ensuring that flows in the bypass reach and below Cabot Station are conducive to reproduction and survival of the federally endangered shortnose sturgeon (SNS) is a key element of this study. It is therefore not clear why this section leaves out any mention of SNS, whereas CRWC’s study requests 11 and 12 and NOAA’s study request #2, for example contained a summary of existing information that would be relevant here. Information from Boyd Kynard and Micah Keefer’s research should be summarized here, along with what we know about flows and sites. According to Boyd Kynard (personal communication, July 12, 2013), his research shows SNS may prefer the Rock Dam site for spawning, but flows experienced under current operations are do not make that site favorable.

3.3.2 Evaluate Upstream and Downstream Passage of Adult American Shad

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 21, 2013 at Northfield Mountain (“the meeting”).

- Task 3: At the meeting, we asked that details for mobile tracking methods be fleshed out, but the updated version has no details about how often mobile tracking will take place, or where.
- Task 4: Ted Castro-Santos pointed out at the meeting that failure to pass can also lead to mortality. Perhaps a distinction needs to be made in this task that you will be assessing “direct mortality,” and that “indirect mortality” is also a factor. Please specify whether or not indirect mortality will be evaluated. We do see a benefit to an analysis of some kind.
- The updated study schedule on page 3-120 seems reasonable. CRWC is interested in having the Conte Lab studies be posted so that the public can review them, as discussed at the meeting. However, it is our opinion that Task 1 should have already been completed as part of the PAD (a request for information went out over a year ago), or at least in the months following the PAD.

Shad telemetry locations are shown in Figure 3.3.2-1 through 3.3.2-4. There have been several changes from the locations shown in the PowerPoint presentation (online at northfieldrelicensing.com) for the meeting.

- It was noted during the meeting that shad are probably spawning in the canal. The canal itself does not have any receivers other than the Cabot station forebay. For upstream migration, if you get a reading for a fish at the Cabot station forebay but not at the gatehouse ladder, do you assume it has spawned or do you assume mortality? Likewise for an opposite situation for downstream migration. Is there a need for an additional receiver in the canal?
- A recommendation was made at the meeting to install multiple PIT tag readers at the Cabot fish ladder. If more than one is recommended, perhaps Table 3.3.2-1 could indicate so.
- In order to be able to evaluate downstream passage route selection, and pond fluctuations on upstream and downstream passage, more receivers are needed just upstream of the Turners Falls dam. The updated draft moves the one just upstream of the dam to a spot near a set of old bridge abutments upstream. Fluctuations of the pond at the top end of the gatehouse ladder has been mentioned as a possible problem for fish migration, and there are no receivers that would allow for that evaluation.
- At the meeting, Ted Castro-Santos recommended 6 receivers in the vicinity of the Northfield Mountain Intake. The updated draft, however, still proposes only 3 receivers.
- A PIT tag reader should be installed at the Northfield Mountain intake/discharge pipe or at the entrance to the upper reservoir to evaluate entrainment mortality.
- Why is the northernmost extent of the study at Northfield Mount Hermon and not somewhere closer to the Vernon Dam?

3.3.3 Evaluate Downstream Passage of Juvenile American Shad

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 4, 2013 at Northfield Mountain (“the meeting”).

Task 1.

- Second paragraph refers to “pumpback mode” which is a term not used before. Please define.
- Last paragraph, page 3-131: Receivers are to be set up above and below the TF Dam to determine spillage survival. How is survival going to be determined using radio receivers? In task 3 it is explained that fish will be recovered from the tailrace, examined for injuries and held for 48 hours to determine latent mortality. We think a similar method should be used for spillage survival, and downstream bypass survival. Otherwise, how will we evaluate whether or not going through the turbines is better or worse, and also evaluate whether changes need to be made to downstream passage options. We also think there should be a control group for both.

Task 2.

- We aren’t sure why the paragraph describing the “proof of trial concept” to tagging juvenile shad, the numbers used, and methods used, that was present in the April 15 PSP has now been removed.

Study Schedule.

- During the meeting, Kleinschmidt expressed worry that tagging would not be possible for juvenile shad. We wonder, then, if 2013 should be used as a trial period, during which radio and balloon tags could be inserted and tested to see if the study plan is viable. If not, then the licensee will have time to develop an alternative plan.

3.3.4 Evaluate Upstream Passage of American eel

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 4, 2013 at Northfield Mountain (“the meeting”).

Task 1:

- Why has the Cabot station log sluice survey site been deleted?
- Specify whether eels will be released at the point of capture or not.

Task 2:

- USGS Conte Anadromous Fish lab researcher Alex Haro (written comments distributed at the meeting) recommended adding the Cabot Station Spillway near north abutment as a survey site, and that has not been added.
- The updated PSP describes the temporary traps as being 6 feet long and 1 foot wide. I believe we talked about making the traps 6 feet long and 3 feet wide. Is 1 foot wide enough to have the 2 different substrates used side by side as the new paragraph says? Please describe climbing substrate types.
- Alex Haro had pointed out that it is not specified whether Cabot or Spillway fishway attraction flows will be operated during the period when fishways are not operational. How will the traps be run when the fishways are operational?

3.3.5 Evaluate Downstream Passage of American eel

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 4, 2013 at Northfield Mountain (“the meeting”).

Task 1

- We talked at the meeting about providing a table of a range of operating conditions here, but no table or details about the operating conditions have been provided.
- USGS Conte Anadromous Fish lab researcher Alex Haro (written comments distributed at the meeting) recommended 15-20 discreet ground truth events. The draft says 12-18, and so we’d recommend that the mid to upper end of this range be used.
- Alex recommended the hydroacoustic study take place for more than one year because of year-to-year variability. Only one year of study is proposed, perhaps due to the expense. Is there an equivalent method for this study that is less costly and could be used for more than one year? What is TC doing?

Task 2b:

- Alex Haro recommended adding a site above the Holyoke Dam and downstream of the Route 116 bridge to confirm viability of non-killed eels. No such site has been added.
- This draft has also not incorporated Alex Haro's recommendation that spill morality be considered and estimated, and that a metric for delay be developed. CRWC thinks these two additional issues are important.

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

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain ("the meeting").

- Task 2: Examination of known spawning areas downstream of Turners Falls Dam. During the meeting, we discussed adding the canal to this survey. FirstLight says that some spawning occurs in the canal, and they said they would possibly add it to this study. CRWC recommends that all spawning areas associated with the project area, including in the canal, be studied.

3.3.7 Fish Entrainment and Turbine Passage Mortality Study

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 4, 2013 at Northfield Mountain ("the meeting").

- Task 1: Not sure how qualitative scale of entrainment potential will translate to estimating impacts on fish numbers.
- Alex Haro says careful attention needs to be paid to error around estimates for metrics in desktop and field analysis.
- Task 3. We would prefer more actual mortality data of all life stages.

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

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 21, 2013 at Northfield Mountain ("the meeting").

- Wish to understand the dynamics at the Station No. 1 outfall for upstream migrants and the dynamics just upstream of the Turners Falls dam (at gatehouse and when spilling) for downstream migrants. This study won't look at that.
- John Warner of the USFWS asked at the meeting whether model would be able to pick up near-rack velocities. There was general agreement among the agencies that they are going to want to see the results of this study for the flows at the rack. CRWC doesn't see how this discussion was addressed in the updated PSP.

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.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 21, 2013 at Northfield Mountain (“the meeting”).

- CRWC suggests a revision to the fifth goal and objective: Assess flow issues related to pumping and generation, including potential local flow reversal, to impact migrating fish, bank erosion, and paddling.
- Under existing information, and relevant to Task 1, there should be a reference to the *Consent Order and Restoration Plan for Removal of Silt/Sediment* filed by FirstLight to FERC on September 13, 2010. The final attachment to the restoration plan included bathymetric information and a plan for the section of river downstream of the intake/tailrace.
- Given the sediment dumping in 2010 and then Hurricane Irene in 2011, CRWC recommends field spot checks of the 2006 HydroTerra bathymetry study before that study is relied upon for the model.
- Task 3: How will field-collected velocity profiles be obtained?
- Task 5: At the meeting, we discussed adding a description of the deliverables here, but nothing has been added. Ralph Abele, in particular, recommended adding a flow conditions table as one of the items in the report.

3.3.10 Assess Operational Impacts on Emergence of State-Listed Odonates in the Connecticut River.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain (“the meeting”).

- Task 4 says that water level data will be used to identify the zones along each transect that have low, moderate, to high inundation frequency. The water level loggers that are not permanent and are only hourly will only be run August to November, 2013 and not the study months of June through August. This is one more reason why the loggers should be out for more than one season.
- Will the water level analysis be able to show how quickly the river levels increase and/or decrease and the typical range of changes along the banks for the months of the study?
- Task 5 or 6 should reference the boat wake assessment from study 3.1.2 to discuss possible impacts from water level fluctuations exacerbated by boat wakes.

3.3.11 Fish Assemblage Assessment.

Despite the lack of highlighting on the pages, several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain (“the meeting”).

- Task 1 wording and text in the methodology paragraph above has changed, leaving out many details about how sample locations will be determined. The reference to Kiraly in the April 15 version is gone. It is not clear why these details about methodology are gone; if anything, partners wanted more details. Discussions at the meeting recommended AFS standard methods, but those are not obviously included.
- Task 2: Boat electrofishing. Not clear if this will take place in day and night. During the meeting, it was recommended that night electrofishing be included in order to capture bass and catfish.
- We are glad to see the inclusion of fishing methods for deep and shallow waters. Not included is eel pots, which were recommended by Mass Division of Fisheries and Wildlife during the meeting.
- Task 3: Melissa Grader asked for length, weight, size class to be listed in the report, but there is no mention that these details will be included in the final report. We would like to see details included and summarized in the report.
- The April 15 version of the PSP had a Figure 3.3.11-3 showing the stratum boundary for fish assemblage sampling and a Table 3.3.11-2 with the numbers and description of strata. In the updated PSP, the strata are not defined, and one can't evaluate if Melissa Grader's recommendation that the upper boundary of strata 1 be moved to the Vernon dam was incorporated into the study plan or not.

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.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 21, 2013 at Northfield Mountain ("the meeting").

Task 3:

- In the second paragraph, we had discussed that the random locations be stratified random locations at the meeting, but that recommendation was not captured in the updated draft.
- Water quality samples for suspended sediment should be collected during discharge events.

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

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain ("the meeting").

- Task 1: Please define what an "event" is.
- At the meeting, Ken Sprankle from the USFWS had said that quantification of habitat density is desired. I don't see how this comment was incorporated into the updated PSP.

3.3.14 Aquatic Habitat Mapping of Turners Falls Impoundment.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain (“the meeting”).

- It is not clear how the zone of reservoir elevation will be determined, or how the maps were created in Figure 3.3.14-1. We only have one year of data at the Route 10 bridge. The reservoir fluctuation range cited (176 to 185 ft msl) is relevant for the Turners Falls dam, not all locations along the entire pool.
- Task 1b: It is not clear what data will be collected at each transect or vertical.

3.3.15 Assessment of Adult Sea Lamprey Spawning within the Turners Falls Project and Northfield Mountain Project Area.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain (“the meeting”).

- Most of the changes discussed at the meeting have been incorporated into the updated version, as far as I can tell. At the meeting, Lael Will from VT Fish and Wildlife mentioned that TransCanada was proposing to cap the lamprey nests to determine if there is viable hatching. We’d be interested to know rationale for not doing that here.

3.3.16 Habitat Assessment, Surveys, and Modeling of Suitable Habitat for State-listed Mussel Species in the CT River below Cabot Station.

Minimal changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain (“the meeting”). At the meeting, people were not sure of the extent of the project effect into the lower Deerfield River or the presence of mussels in the lower Deerfield. The updated PSP doesn’t reference any schedule for resolving that question or decision that may or may not have been made. CRWC has no further comment on this study.

3.3.17 Assess the Impacts of Project Operations of the Turners Falls Project and Northfield Mountain Project on Tributary and Backwater Area Access and Habitat.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain (“the meeting”).

- I don’t think we discussed this during the meeting, but in task 1 it defines low pond as 176 feet msl, or as close to practical. This represents the level at the Turners Falls Dam and is the bottom end of the range the license allows (176 to 185 msl at or near the dam). Low discharge in the Connecticut River is defined as a gage height of < 8 feet at Montague. This gage height translates to roughly 7,000 cfs, a level that Figure 4.3.1.2-12 in the PAD says is exceeded 60% of the time. We are not clear how this level represents a low flow level, and we wonder if it would be better defined by the FirstLight gage at Vernon, because the Montague gage incorporates peaking flows from the Deerfield River. At river flows 7,000

cfs and less, the PAD says on page 3-25 that FirstLight tries to maintain the pool height minimum of 180.5. It is good to look at the minimum level allowed in the license, but it might be worth considering the current practice and those effects. Either way, we don't know what the river levels are like closer to the tailrace when Northfield Mountain is pumping water out of the pond at this level.

- We recommend putting in at least one, but preferably several, loggers in the tributaries to assist with the visual observations. Fourmile Brook is tributary we would recommend. Fall River should also have its own logger, since this one is in the bypass channel and natural flows in the Connecticut River have little bearing on the amount of water in the bypass, unless the dam is spilling.
- I am assuming FirstLight has confirmed that there are no “setback areas” in this impoundment as there are in the Vernon impoundment and elsewhere, which we discussed during the meeting, but I don't see any mention of this determination.

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

Despite the lack of highlighting on the pages, several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 22, 2013 at Northfield Mountain (“the meeting”).

- Under methodology, it says that FirstLight believes that the 2011 survey methods are adequate, with minor modifications. The minor modifications that FirstLight proposes are not specified.
- Task 1. FirstLight proposes to segment the canal into seven zones as was done in the 2011 survey. I believe at the meeting, meeting participants said that the wider zones, such as 3 and 4 should be broken in half because there are some areas that are dry and some that are wider.
- The systematic traverse is not defined, but it seems worth evaluating whether scientific survey methods that involve random transects or random plots of a certain size would yield better results. We are trying to survey large and small things, so systematic traversing might miss things.
- Task 2 is to identify and *assess* potential measures. It appears from here and in the schedule that there is no true assessment of the installed measures in 2015, although I think it is implied that success is how wetted the area remains. We recommend a second round of survey as in Task 1, including temperature, dissolved oxygen, and turbidity measurements for the areas that do remain wetted after installation of PMEs.
- Sediment dredging? How often does it occur, how would affect surveys and PME measures? Boyd mentioned an area that had lots of amocetes that no longer do since the 2010 sediment debacle. Raise any of that?
- Water quality sampling for suspended solids should be done downstream of the Cabot discharge during canal draining and refill/resumption of operation.

3.3.19 Evaluate the Use of an Ultrasound Array to Facilitate Upstream Movement to Turners Falls Dam by Avoiding Cabot Station Tailrace.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 21, 2013 at Northfield Mountain (“the meeting”).

- Task 1: The frequency of the array should be documented.
- Task 1: “Telemetry methods like those proposed in Study No. 3.3.2 will be utilized.” How many fish will be tagged, or how will you calculate how many fish you need to tag to have viable results? Ted Castro-Santos suggested using a power analysis.
- Task 1: It may be useful to install more radio receivers or PIT tag readers in the bypass channel for this study as opposed to Study 3.3.2, because in this case how the fish behave in the bypass channel will be of interest.

3.4.1 Baseline Study of Terrestrial Wildlife and Botanical Resources at the Turners Falls Impoundment, the Bypass Reach, and below Cabot Station within the Project Boundary.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain (“the meeting”).

- The study area is still not well defined. Under methodology on page 3-248, it states that a field survey of the “shoreline” will be conducted. Under Task 2, it says that field surveys will be conducted “in the Project area.” Is it the project area, or is it a shoreline survey? If shoreline only, what distance from the waterline will be surveyed?
- Under methodology on page 3-248, it states that the study will include a survey below Cabot station “to the downstream extent of the Project boundary.” The Powerpoint slides from the June 5 meeting say that the survey will be conducted downstream “to Sunderland MA.” Which is it? Again, the study area is not well defined.
- Will FirstLight properties like the Barton Cove campground area and peninsula be surveyed in full, or only the shoreline? There are some interesting plants on this peninsula. If areas like this will be surveyed, will the transect methodology change?
- During the meeting, FirstLight consultants said that potential vernal pools would be identified in this study, but there is no mention of that in the updated PSP.
- Not sure if the methods described are also ideal for bird surveys.
- Task 3: No details are provided as to the content of the final report, the data that will be reported.
- Is there any value to nocturnal surveys?

3.4.2 Effects of Northfield Mountain Project-related Land Management Practices and Recreation Use on Terrestrial Habitats.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain (“the meeting”).

- The study area is defined under methodology on page 3-255 as the lands around Project facilities and recreational areas on Northfield Mountain. We assume this means Project lands to the east of Route 63. Will surveys be done on project lands to the west of Route 63? Our question from 3.4.2 about whether surveys will be done of project lands owned by FirstLight that are not along the shoreline (Bennett Meadow, Barton Cove campground, for example) will holds.
- Task 3: What kind of data on plants will be collected? No details given.
- Task 6: No details are provided as to the content of the final report, the data that will be reported. The FERC representative/consultant at the meeting recommended that plant information include details on seed dispersal and germination in the report. The updated PSP doesn’t indicate whether this information will be provided.

3.5.1 Baseline Inventory of Wetland, Riparian, and Littoral Habitat on the Turners Falls Impoundment, and Assessment of Operational Impacts on Special-status Species.

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 5, 2013 at Northfield Mountain (“the meeting”).

- An attempt should be made to eliminate overlap between this study and study 3.4.1, or perhaps the two studies should be merged. Otherwise, it is very confusing.
- The second bullet under Study Area should reference the width of the shoreline surveyed – same as the impoundment (200 ft) or not?
- Tasks 3 and 4 do not provide any details on the data that will be collected during the plant surveys.
- Task 3 should contain the same text about landowner permission that was added to page 3-248 of study 3.4.1.
- Task 6: It is not clear how a water level fluctuation assessment that focuses on puritan tiger beetle habitat fits into a plant survey study with no geographic overlap. This task should be moved to another study, such as 3.4.1, or pulled out as its own study.
- Task 8: No details are provided as to the content of the final report, the data that will be reported.

3.6.1 Recreation Use/User Survey

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 11, 2013 at Northfield Mountain (“the meeting”).

Page 3-276 under third paragraph of the General Description, it describes a mail survey targeted to “adjacent residential landowners.” Page 3-279, paragraph above Task 3, it describes a mail

survey mailed in the spring to “residential abutters.” Because there are some river residents who don’t own the land their house sits on (FirstLight owns the land under several seasonal camps), it makes sense to take the word “landowner” out of this study. Those river residents should be sent a survey.

Task 1: Study Preparation

CRWC recommends, in addition to obtaining copies of recreation plans from the Towns of Northfield, Gill, Erving, Montague, and Greenfield, that FirstLight talk to recreation departments in the towns that have them and recreation/open space committees in smaller towns. We also recommend discussions with the MA Department of Conservation and Recreation for their sense of user type, number, and issues associated with the state-run boat ramps and state-owned or – protected conservation land along the river. Additionally, we recommend contacting the MA Environmental Police and local police to talk to them about the various issues regarding recreational use that they observe in the Turners Falls impoundment, bypass, and downstream of the river. For example, I have heard anecdotal stories of the Barton Cove boat ramp being too crowded, people parking along Route 2, and cars getting ticketed.

We are glad to see that FirstLight is planning to hold an additional meeting with stakeholders to review and obtain comments on the proposed survey instruments. We recommend that such a meeting be scheduled very soon because summer schedules are filling up fast.

We understand that a FirstLight consultant plans to attend a July 17 Connecticut River Paddlers Trail meeting, and we encourage future communication between FirstLight and this group down the line for this and other recreational studies.

If any statistics have been kept by Northfield Mountain about attendance such as on the Quinnetucket, campsites used, kayaks rented, and the former shuttle service, these should be obtained and also presented in the final report for the previous 10 years.

Task 2: Field Work

The user survey is to take place year-round, which is appropriate.

Pressure tube counters are to be placed at “high use facilities” within the Project.

Calibration counts are to be done 2 hours per site during each calibration day at each of the 20 formal Project recreation facility listed in study 3.6.2. How many days do you need for statistical purposes>

Spot counts are to be conducted five days per month at all 20 formal Project recreation facilities listed in study 3.6.2. TransCanada is proposing to do surveys nine days per month but during a shorter season. FirstLight will work with state agencies and private groups to determine use at their facilities.

A user contact survey will be administrated during the calibration and spot count site visits. Additional information is needed about project sample size goals for the user survey. It is

unclear how the proposed methods assure sufficient sample size is obtained. Does the proposed method ensure that sampling over one year only will provide a representative assessment of user uses? Comments on the survey questions are below.

A Northfield Mountain trail user survey will be used during the calibration and spot count site visits at Northfield Mountain. It is unclear how the proposed methods assure sufficient sample size is obtained. Does the proposed method ensure that sampling over one year only will provide a representative assessment of user uses? Comments on the survey questions are below.

A mail survey will be mailed in the spring to residential abutters. Additional information is needed about project sample size goals for the user survey. Comments on the survey questions are below.

General comments about Task 2

FERC's study request #6 dated March 1, 2013 said in their proposed methodology #3 that methods should include on-site visitor intercept surveys at formal and informal public recreation areas at the project reservoirs, tailraces, and riverine areas, including the Turners Falls bypassed reach. Study 3.6.2 in the updated PSP only looks at formal public recreation areas. We suggest that the Turners Falls canal should also be added to this list of informal site locations. For example, if you drive along the lower canal near the Cabot Woods Fishing Access parking area, you will often see people birdwatching with spotting scopes looking at the ducks, geese, mergansers, and other birds that congregate in the lower canal. In that same location, people put fishing poles out into the canal; under the current proposal, neither of these uses of project lands would ever be surveyed.

The surveys as presently designed to not get at those people who are not using facility for whatever reason. TransCanada's surveys do ask questions about why their facilities are not being used.

The proposed user survey only surveys those already using amenities. There needs to be a robust proposal for assessing the unmet demand by those not currently using the site.

The updated PSP does not adequately meet the goal for determining demand at recreation sites, which is the first objective listed on page 3-277.

During discussions at the meeting, stakeholders consistently requested multiple survey vehicles to capture users and non-users from the greater community as part of this study. At the meeting, we discussed mail surveys, internet surveys, and the like, but those were all rejected by FirstLight. The out-of-hand rejection on page 3-276 of using electronic means to survey is not warranted. Electronic survey technologies exist that allow for statistically meaningful survey results. FirstLight should take a closer look at this and also coordinate with local and regional recreation organizations to successfully assess the potential for increased use with better access and improved recreation opportunities.

CRWC also suggested adding focus groups into the mix, because users arriving at a boat ramp, for example, may be rushed and not focused on all the issues that they might think of in a different setting. This might be one way of surveying the greater community, or river non-users.

Given the reliance on the results of this study for other studies, such as 3.6.4 Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boats and 3.6.6 Assessment of Effects of Project Operations on Recreation and Land Use, we recommend that the user survey be given out at the Sunderland boat ramp and the river abutters mail survey should be mailed out to all abutters downstream of the Project down to the Sunderland bridge (Route 116).

Task 4: Report Writing

No details are provided as to what the report will contain or how the data will be presented.

If any statistics have been kept by Northfield Mountain about attendance such as on the Quinnetucket boat tour, campsites used, kayaks rented, and the former shuttle service, these should be obtained and also presented in the final report for the previous 10 years.

Figure 3.6.1-1: Draft Recreational User Survey:

- A script that the surveyor will say to each user should be at the top of the survey.
- Weather categories and a place for air temperature should be added to the survey.
- Question 1: If someone answers yes, does the survey continue?
- Question 5: Follow up question to this could be what activities have you done on other visits.
- Question 8 should include fishway viewing, birding/wildlife viewing, rowing, swimming from a boat, swimming from shore, and multi-day float trips. The list should be organized better to group types of activities for easier viewing and choosing. There should be space for writing something in “other.”
- It might be useful to collect more information about the survey responder: age, gender, etc.
- There should be more questions related to river fluctuation on this survey. Questions should ask whether river fluctuation affected launching and boating, swimming, fishing from shore, accessing shore, scenic quality of shore.
- FERC’s study request #6 in methods under #4 said that “surveys of fisherman and hunters should include additional pertinent information related to game and harvest.” No such questions are in the draft survey.
- Please refer to our comments for study 3.6.4 regarding the survey questions.
- Please refer to our comments for study 3.6.6. regarding the survey questions.
- Please refer to our comments for study 3.6.7. regarding the survey questions.
- Portage, other services such as rentals, shuttles, etc.

Figure 3.6.1-2: Northfield Mountain Trail User Survey:

- A script that the surveyor will say to each user should be at the top of the survey.
- Please refer to our comments for study 3.6.7. regarding the survey questions.
- The first question here should be same as question 1 in the user survey.

- No questions relate to user experiences at the Northfield Mountain Mountaintop Observation Area, which is one of the 20 formal recreation sites, and is potentially part of study 3.6.7.

Figure 3.6.1-3: Residential Abutters Survey:

- There should be an introductory paragraph to the recipient of this survey describing the purpose of the survey.
- Question 2: What is the meaning of “regular access?” Regular could be once a year on the same date every year, or every day.
- Question 2 is also confusing with regard to the purpose of the question and whether it is related to access via rights of way. Camp owners often access their camps via rights of way through private lands of abutters. Issues and potential conflicts exist regarding one party giving visitors permission to access the rights of way, or land owners not maintaining rights of way and camp owners needing access through other properties, etc. Questions may be refined to get more information about some of these issues to the extent that they are related to Project lands and Project land usage.
- Question 4 should be the same list as on the user survey.
- There should be a question asking if the person has a dock associated with their residence and how many boats are docked to it, and the kind of boats.
- Questions should ask about beach formation, river level fluctuations, use or overuse of the river, conflicts between river users, how long they have been living along the river, what the strengths and weaknesses are to the facilities and to the river.
- Question 7: How does an open-ended question like #7 get used in a survey report or survey statistics. Will reviewers have access to each survey response to read these answers?
- There are no questions related to river level fluctuations, a subject about which we are sure abutters will have much to say and the most hands-on knowledge. Suggested questions are as follows:
 - As a land abutter/camp owner what impacts on recreation have you experienced in regard to the fluctuation of the river level?
 - What other impacts have you experienced that might not be associated with recreation?
 - Are there specific days/times when the fluctuation of the river has completely denied your ability to recreate?
 - Have you experienced any physical tangible loss because of fluctuation? (if so, what?...be specific)
- A question should ask whether land use is impacted by project operations to help inform study 3.6.6.

3.6.2 Recreation Facilities Inventory and Assessment

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 11, 2013 at Northfield Mountain (“the meeting”).

There are a number of shortcomings to the standardized survey form, listed below. We were told that these surveys have already been completed, but it might be necessary to go back and re-do some portions.

Figure 3.6.2-2 Standardized Survey Form

- Access: whether or not the access or dock is open to the public should be noted. For example, riverview picnic area has a dock for the Quinnetucket, but I don't think it's open to the public for river access.
- Parking lots: The number of spaces for regular car spaces should be differentiated from # of trailer spaces. For example, the state boat ramp at Barton Cove has no parking spaces for regular cars that bring canoes and kayaks on top of their vehicle; all spaces are for trailers only.
- Campground/campsite: the season that this facility is open should be noted
- There is no space for noting the condition of parking spaces, camp sites, docks, or boat launch facilities.
- There should be much greater detail on the site condition, ADA compliance, and user impact in a numeric ranking format.

3.6.3 Whitewater Boating Evaluation

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 11, 2013 at Northfield Mountain ("the meeting").

- It is not explained how flows will be measured or estimated through the bypass reach during each test run.
- Task 5: No details are provided as to the content of the study report.
- Otherwise, all comments from the meeting seem to have been incorporated.

3.6.4 Assessment of Day Use and Overnight Facilities Associated with Non-Motorized Boats

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 11, 2013 at Northfield Mountain ("the meeting").

Study objectives:

The first bullet has been revised, based on comments at the meeting, to include facilities in the Project area and along both sides of the shoreline down to the Sunderland Bridge. The Study Plan should instead be revised to define the study area as the following: within the Project boundary, plus downstream areas that include the shoreline of the Connecticut River downstream to the Sunderland bridge and the shoreline of the lower Deerfield River from the Route 5/10 bridge to the confluence with the Connecticut River.

The second bullet should be revised to say "Determine if an alternate walkable portage trail around the Turners Falls dam is feasible." Based on comments submitted thus far and comments spoken at the scoping meetings in late January, there is already an established need for an alternate portage.

The last bullet says that one of the study objectives is to determine if the seasons of operation are consistent with actual river use. How will this be determined? The "Standardized Survey Form" (Figure 3.6.2-2 in the updated PSP) that is part of Study 3.6.2 does not appear to gather data

about the dates that a particular day or overnight facility is open to the public. The Draft Recreation User Survey (Figure 3.6.1-1 in the updated PSP) has no questions about user satisfaction for times of year that facilities are not open. The only ask about the user's experience the day of the survey. For example, the Barton Cove campground closes after Labor Day weekend. The surveys as written now would not capture anyone's thoughts about whether there is a demand for camping into the fall.

CRWC's requested study #26 was for the feasibility of a new portage route around Turners Falls Dam and improved river access point downstream of Turners Falls canal. We would like to see a desktop and on-the-ground review of a replacement or modification to the Poplar Street access, and we feel that analyzing whether there is a need for this is not necessary, given the existing consensus among users that this site is inadequate. This element of the study should be explicitly laid out in a revised study plan.

Task 1: Literature Review

CRWC recommends adding two maps to be included on the list of useful resources. "Inland Guides" produced by KM Digital Productions (www.kmdigiprod.com) has produced a "Recreational Guide to the Connecticut River" that is a fold-out map. There is a map that covers Vernon, VT to Turners Falls, MA, and a map that covers Turners Falls, MA to Hatfield, MA. These excellent maps are on sale at the CRWC office or can be obtained through the KM Digital Productions website or any number of commercial outlets.

The updated PSP says in the third paragraph of this section that data from the Recreation Use/User Contact Survey will be reviewed to assess the need for new or improved facilities to accommodate non-motorized boating use at the Projects. "Projects" should be revised to say "study area." Relying on the user contact survey for assessing the need for new or improved facilities, however, is problematic for two reasons: 1) other than question 14: does this recreation facility serve your interests, there are no questions in the draft user survey designed to provide useful information for study 3.6.4, and 2) the user survey will be given out to people at the 20 formal recreation use facilities within the project boundary, therefore there will be no assessment of the adequacy or need for facilities downstream of the Project.

Task 2: Field Work

CRWC recommends a stakeholder working group meeting in the middle of this task, to go over Task 1 results and visit sites. We see value and efficiency to group discussion in the middle of this task.

3.6.5 Land Use Inventory

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 12, 2013 at Northfield Mountain ("the meeting").

Task 1: Literature and Aerial Photography Review

It is not clear what aerial photography will be used in this task – is this going to be aerial imagery available from Google Earth or MassGIS or something that FirstLight plans to generate using new flight information?

Will this study use the MassGIS 2005 land use data layer? See the picture created below using MassGIS's OLIVER online mapping tool, and the data layer is described online at <http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/lus2005.html>.

Since so much information useful for this study is readily available from MassGIS, it seems that aerial photography would be used in conjunction with these data layers.

Land Use 2005 Turners Falls Dam area

http://maps.massgis.state.ma.us/temp/OL_MORIS_print/1373642392.11...



Task 2: Development and Application of Land Use Designations

Task 3 (Land use mapping) of study 3.1.1, the Full River Reconnaissance, also looks at land use along the Connecticut River. Based on discussions during the meeting for study 3.6.5, it was my understanding that the two efforts would be essentially be done as one. Therefore, the description of Task 2 for study 3.6.5 should be made more consistent with the description of Task 3 in study 3.1.1. The updated PSP for study 3.6.5 lists seven land use types. The updated PSP for study 3.1.1 says that the plans will be developed using MassGIS data layers of land use. Please see our comments in study 3.1.1 regarding the number of land use categories that are intended to be used, but MassGIS uses more than seven land use types.

Task 3: Map and Summary Development

A list of proposed maps should be included in the revised PSP.

One of the maps should show land uses with lands owned or flowage rights owned by FirstLight clearly identified.

As noted on page 3-315 under Existing Information, the Licensee has granted permission to others for Non Project use of Project lands. Two of these uses, docks and water withdrawals that were granted through FirstLight, may not show up on a land use map, and CRWC recommends that a table and/or map be provided in this task that indicates the location, size of docks, and amount of water withdrawn daily or annually.

3.6.6 Assessment of Effects of Project Operation on Recreation and Land Use

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 12, 2013 at Northfield Mountain (“the meeting”).

Task 1: Data compilation

If the Recreation Use/User Contact Survey is to help inform this study, then the survey questions for river users and river abutters need to be designed to be more informative than the single question currently in the updated PSP user survey. The river abutter survey currently has no questions geared towards river level fluctuations or whether land use on their property is affected by project operation, which is a big issue (see photos on next page). The surveys will also need to be conducted at river access points and mailed to river abutters downstream of the Turners Falls canal to the Sunderland bridge, such as the rowing program at Deerfield Academy and river users at the Sunderland boat ramp.



Photos: An example river abutter’s experience with daily river fluctuations during July of 2011.

The updated PSP on the top of page 3-318 says that FirstLight will review historic and existing water level fluctuation information, and this paragraph should refer to water level recorder data and river flow and fluctuation data that will be part of Task 3 of study 3.1.2 and Task 2 of 3.2.2.

Task 3: Report development

Details should be provided as to the content of the report and the ways data will be presented.

3.6.7 Recreation Study at Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 11, 2013 at Northfield Mountain (“the meeting”).

Task 1: Review of Existing Information

Public education programs offered at the visitor’s center has been added to this task, which involves using the Recreation Use and User Contact Survey to identify opinions of current recreation/education users at Northfield Mountain. This change is in response to one of our questions during the meeting, and we appreciate the inclusion in the updated PSP. However, neither the river user nor the trail user survey questionnaire in study 3.6.1 is currently geared to attendees of most of the educational programs. The proposed forms should either be modified, or a survey questionnaire should be developed specific for the educational program users at Northfield Mountain.

If Northfield Mountain keeps records of attendance numbers of their educational and school programs, the number of programs offered, and attendance numbers should be provided for the past 10 years. The types of programs and staffing it takes to run them should also be described.

Task 4: Report development

No details have been provided about the content of the report or the ways that data will be presented.

3.7.1 Phase 1A Archaeological Survey

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 12, 2013 at Northfield Mountain (“the meeting”).

- Task 1: The study plan meeting was held on June 12, not on June 14, as stated in the updated PSP.
 - There was considerable discussion at the meeting as to whether FirstLight should also conduct a Phase 1B study as part of this study. I thought the consensus was to do a comprehensive phase 1 survey, but the updated PSP does not seem to reflect this.
 - Doug Harris from the Narragansett tribe mentioned petroglyphs below the water mark that are covered below Vernon Dam during the discussion for study 3.6.5 Land Use inventory, and we are wondering if this kind of historical resource is covered in this study or any other.
-

3.7.2 Reconnaissance-Level Historic Structures Survey

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on June 12, 2013 at Northfield Mountain (“the meeting”).

- The definition of “structure” in the context of this study needs to be a bit better defined.
- We support the Nolumbeka Project’s request for a traditional cultural property study.

3.8.1 Evaluate the Impact of Current and Potential Future Modes of Operation on Flow, Water Elevation, and Hydropower Generation

Several changes have been made to this updated version to address comments discussed at the study plan meeting held on May 14, 2013 at Northfield Mountain (“the meeting”).

- Task 5: Stakeholders and/or FERC asked for a full list of the other studies that will be informed by this study.
- Task 6: No details are provided about how the results of model runs will be presented in a report.
- During the meeting, it was noted that this study will not look at ramping rates because it relies on an hourly time step. Ramping rates at Northfield Mountain and Turners Falls have the potential to affect habitat, water quality, and recreation use. Will the flow study do that? We need to have a way to evaluate ramping rates.

4.2.2 Climate Change and Continued Project Operations

This study was rejected by FirstLight and discussed during the May 14, 2013 stakeholder meeting.

Both FirstLight and seemingly FERC have rejected the call for a study to determine the impact of climate change on project operations and the facilities themselves because they claim that such a study would not lead to license conditions. CRWC rejects that analysis. There are two main concerns about not conducting CRWC Study Request 5. They are:

- A) the effects of warming temperature on the water and
- B) the impacts of higher than normal flows on the facilities themselves.

Understanding each concern could lead to appropriate license conditions.

A) River water temperatures have been rising on a historic basis (Paul Jacobson, Charles Fredette and Nels Barrett, American Fisheries Society Monograph 9, 2004 and NOAA National Climate Center, Northeast 12 month average temperate for the period 1896 through 2012). There should be a clear understanding of the effects of the reservoirs at the projects on whether or not they are exacerbating the documented temperature increase. There is no way to establish any mitigation measures to protect aquatic life without the base information on the effects of climate change combined with the effects of the reservoirs on water temperature.

B) Climate change means more frequent events of more intense weather. Heavier rain when it comes will create unusual higher flows. In winter the potential for higher snow pack combined with quicker melting and the possibility of heavy rain events could create flooding conditions even beyond what is modeled at this time under FERC emergency preparedness requirements. CRWC understands that the three projects are run of the river so our concern is not about storing water. CRWC knows that the dams will pass what water they can. Our concern here is that these intense higher flows will increase wear and tear on all three facilities. Increased damages or wear and tear on the facilities caused by more high flow events will have an impact on the economic analysis FERC must perform on the applications.

Recommendation: FirstLight should be required to conduct a study based on CRWC Study Request 5. In particular, the study should rely on 30-50 year temperature increase models that incorporate thermal loading from the reservoirs. The other key element would be to anticipate how climate change predictions would affect management of high flow events at Turners Falls Dam and evaluate if changes to the dam or canal flow control structures would mitigate adverse impacts on the facility.

4.5.1 Contingent Valuation Study

This study was rejected by FirstLight and discussed during the June 11, 2013 stakeholder meeting.

One of the underlying tenets in the FERC relicensing process is that under the National Environmental Protection Act, power production is no longer the sole focus of FERC. The value of activities like recreation have their own and competing value with power production.

A contingent valuation study was called for by AMC, NE Flow and American Whitewater. FirstLight has declined so far to conduct such a study. The point of a contingent valuation study is that it seeks to put two competing social goods on an equal footing, in this case recreation and power production. These economic studies assess the value of an activity for society and what may be lost if the activity is prevented from occurring. FirstLight can put a value on the power they produce but without an economic figure of the recreation value, there is nothing to put on the other side of the balance scale. FERC cannot balance the two values in this case, as they should, because one value has not been determined.

This lack of balance is not limited to on-water activities alone. Those who do not boat but instead bird, hike, ski and wildlife watch face limited access to the river. If you do not boat, and depending where you reside, you may not be able to experience New England's greatest river at all. Most land along the river is privately owned so foot or motorized access to the river is limited to whom does one know who owns land along the river. As part of this relicensing process the question will be asked, what can FirstLight do about opening up the river for all types of river related recreation? The question cannot be answered without serious study of the economic value of those non-water river related outdoor activities.

Recommendation: FERC should require FirstLight to conduct an economic impact study on the value of a wide gamut of outdoor recreation activities including the value of whitewater opportunities.

4.7.1 Feasibility of Converting Northfield Mountain Pumped Storage Facility to a Closed-loop or Partially Closed-loop System

This study was rejected by FirstLight and discussed during the May 15, 2013 stakeholder meeting.

FirstLight's rationale for rejecting this study request was that 1) a feasibility study of this nature would be expensive and detailed enough that it would be comparable to that required for a major new project or license amendment, and 2) FERC has stated elsewhere that it doesn't have the authority to require a license applicant to construct and operate an entirely different project from the one it has proposed, and FirstLight feels that a closed loop system would be the equivalent to a different project.

FERC wrote on page 6 of their Scoping Document 2 (SD2) "Construction of a new lower reservoir would likely have significant impacts on the environment and high cost. Therefore, we will not commit to conducting a detailed analysis of such an alternative until we better understand the environmental effects of the existing project."

We agree that converting the project to a closed-loop system – if it ever happened-- might be very expensive and would likely have its own set of substantial environmental impacts. We don't agree, however, that the level of detail necessary to look into the feasibility of a closed-loop system at this stage in the process would be the equivalent to designing and applying for an entirely new project.

And while we don't know all the environmental impacts of Northfield Mountain Pumped Storage Project, we do know that the impacts on the Connecticut River over the last 40 years have been large:

- river fluctuations contributed to dramatic erosion; in some places the bank has eroded back 30 feet over the past four decades,
- an unknown number of fish and other aquatic organisms, larvae, and eggs have been and continue to be killed in the turbines,
- recreational use is impacted by large daily river fluctuations,
- and migrating fish may be getting confused by the pumping and discharging of a large enough amount of water that equals the flow of the Connecticut River in the summertime.

New pumped storage facilities being designed today are more commonly closed-loop systems in order to avoid the environmental impacts, and therefore mitigation costs, as explained on page 3-12 of Electric Power Research Institute's (EPRI's) 2013 Technical Report titled "Quantifying the Value of Hydropower in the Electric Grid – Final Report" Online at

http://www1.eere.energy.gov/water/pdfs/epri_value_hydropower_electric_grid.pdf

Design New Pumped Storage Plants to Minimize Environmental Impact

The last potential method related to technology is to design new pumped storage plants such as low profile or closed loop, which minimize environmental impacts and therefore could save time in licensing. Currently, licensing for new pumped storage plants represents a significant amount of project time and cost. One recent trend is for pumped storage plants to be built "off-channel," adjacent to existing river systems--called "closed-loop" plants. Of the current FERC filings, more than half are closed-loop. These facilities tend to have fewer environmental impacts and therefore have reduced licensing times and often more opportunity with decreased hydrological constraints. The shortened licensing time leads to more time in operations and less upfront cost, which could ultimately result in an increased lifetime value from the facility. This increased operation time for closed-loop plants was not monetized as part of this study, but further research should be done to quantify the potential value compared to open-loop plants. <emphasis ours>

Running Northfield Mountain using the Connecticut River as the lower reservoir has its own set of large monetary costs. The erosion control projects have cost the company in the order of \$1 million dollars annually for the past 15 years. The May 2010 planned maintenance outage that clogged the works with sediment must have cost tens or hundreds of millions of dollars to get the project up and running again, and that doesn't take into account the loss of revenue from no power generation for seven months or the loss of one life. The proposed studies in the updated PSP that are related to Northfield Mountain's effects on the Connecticut River will cost at least over \$1 million of the \$3.6-4.8 million total study costs listed in the updated PSP. Mitigation costs in the next license are currently unknown, but may prove to be expensive.

In the case of the Turners Falls annual drawdown, there has never been a formal study of the ecological effects of this practice, yet proposed the April 15 version of study 3.3.18 "Impacts of the Turners Falls Canal Drawdown on Fish Migration and Aquatic Organisms," didn't propose any further study, and went right to developing mitigation options. As with that, it is time to take a look at what other options might be possible besides using the Connecticut River as a lower reservoir. A feasibility study for a closed-loop system is a good first start.

We appreciate the opportunity to provide comments on the updated PSP.
Sincerely,



Andrea Donlon
River Steward



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July 15, 2013

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

**Subject: Turners Falls Hydroelectric Project, FERC Project No. 1889
Northfield Mountain Pumped Storage Project, FERC Project No. 2485
Comments on Proposed Study Plan**

Dear Secretary Bose:

Pursuant to the Federal Energy Regulatory Commission's (Commission or FERC) regulations 18 C.F.R. § 5.12, The Nature Conservancy (TNC) is providing comment on FirstLight Hydro Generating Company's (FirstLight) Proposed Study Plan (PSP) for the relicensing of the Turners Falls Hydroelectric Project (FERC No. 1889) and the Northfield Mountain Pumped Storage Project (FERC No. 2485), filed on April 15, 2013, and the Updated Proposed Study Plan, filed by FirstLight on June 28, 2013. Unless specifically noted, all comments in this letter are in reference to the June 28, 2013 Updated PSP.

Between May 14, 2013 and June 14, 2013, representatives of TNC's Connecticut River Program attended several meetings held by FirstLight to discuss the content and further development of the PSP. Overall, we find that the concerns and comments that we raised at these meetings were addressed in the Updated PSP. The comments provided below include some brief requests for clarification and further refinement, as well as a few substantial comments with regard to some of the more extensive changes that were made in the Updated PSP. Our comments are based on a review of the April 15, 2013 original PSP, the June 28, 2013 Updated PSP, and discussions that took place at meetings held between May 14 and June 14 2013.

The comments that follow are organized by the numbering and study titles given in the June 28, 2013 Updated PSP.

3.2 Water Resources

3.2.2 Hydraulic Study of Tuners Falls Impoundment, Bypass Reach and below Cabot Station

Methodology (18 CFR § 5.11(b)(1), (d)(5)-(6))

Task 8: Report

On page 3-58, FirstLight presents the proposed content of the report for the hydraulic study. We request that the following specific components be included in the report or provided upon request:

- The HEC-RAS files necessary to run the models and reproduce the results, including the geometry files, plan files, flow files, and project files (i.e., file extensions .f, .g, .O, .p, .prj, and .r);
- The associated GIS files with topographic data for the valley and stream cross sections; and
- A brief summary of the approach taken to calibrate the model including the data used and assumptions made.

3.3 Fish and Aquatic Resources

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

Methodology (18 CFR § 5.11(b)(1), (d)(5)-(6))

Task 1: Consult with Agencies and Interested Stakeholders to Determine Study Area, Study Reaches, and Habitat Suitability Index Curves

Freshwater mussels

Overall, we find that FirstLight has made efforts to accommodate the interests of TNC and of the agencies and other participants with regard to freshwater mussel habitat. In the June 28 Updated PSP, substantial content has been added to address these interests. However, we are requesting that a few additional points of clarity be added.

The footnote on page 3-72 states: “FirstLight proposes to adapt empirical data collected within Reach 4 during mussel survey work...to develop HSI criteria specific to yellow lampmussel if this species is found there in sufficient abundance. These criteria can then be applied retroactively...” High caution should be observed if using habitat data from a regulated river

system, unless there is documentation of a successfully reproducing and persistent population. Count data (relative abundance) alone may not be adequate for this determination, but the presence of multiple sizes or age classes could potentially indicate continued successful reproduction over many years. Conversely, lack of adequate representation among age classes could indicate lack of successful reproduction, and thus potentially insufficient habitat availability. Therefore, we suggest that “sufficient age or size structure” be used in addition to “sufficient abundance” as a qualifier to using collected empirical data for development of habitat suitability criteria.

The presence of host fish also does not necessarily indicate a successfully reproducing or persistent population. Whereas it represents an important part of a mussel’s life history requirements and should be included, host fish should not be used as a surrogate if habitat suitability is intended to reflect the habitat necessary for a species to reproduce and persist. If used alone, it should be indicated that it does not fully represent freshwater mussel habitat suitability. However, it is possible that multiple habitat requirements for mussels may be included within one or more habitat guilds, if guilds are included among the habitat criteria that are evaluated.

Task 4: Habitat Modeling (Reaches 1-4)

In previous comments to FirstLight, we recommended the inclusion of spatial maps that depict weighted usable area (WUA) across cells and over a range of flow values (Figure A) for all sites for which 1D analysis is conducted. We recognize the excessiveness of doing this for all habitat criteria of all life history stages and species being evaluated in this study. However, there is still high value in understanding how spatial habitat patterns change over a range of flow. As a compromise, we suggest the inclusion of these spatial maps at least for the habitat guild criteria (i.e., shallow-fast, shallow-slow, deep-fast habitats). This would give a basic understanding of the dynamic spatial patterns of habitat in the study area without excessive effort.

Study Schedule (18 CFR § 5.11(b)(2) and (c))

The Commission should note that the site visits scheduled for July 2013 were postponed, to be rescheduled for a later date in August or September.

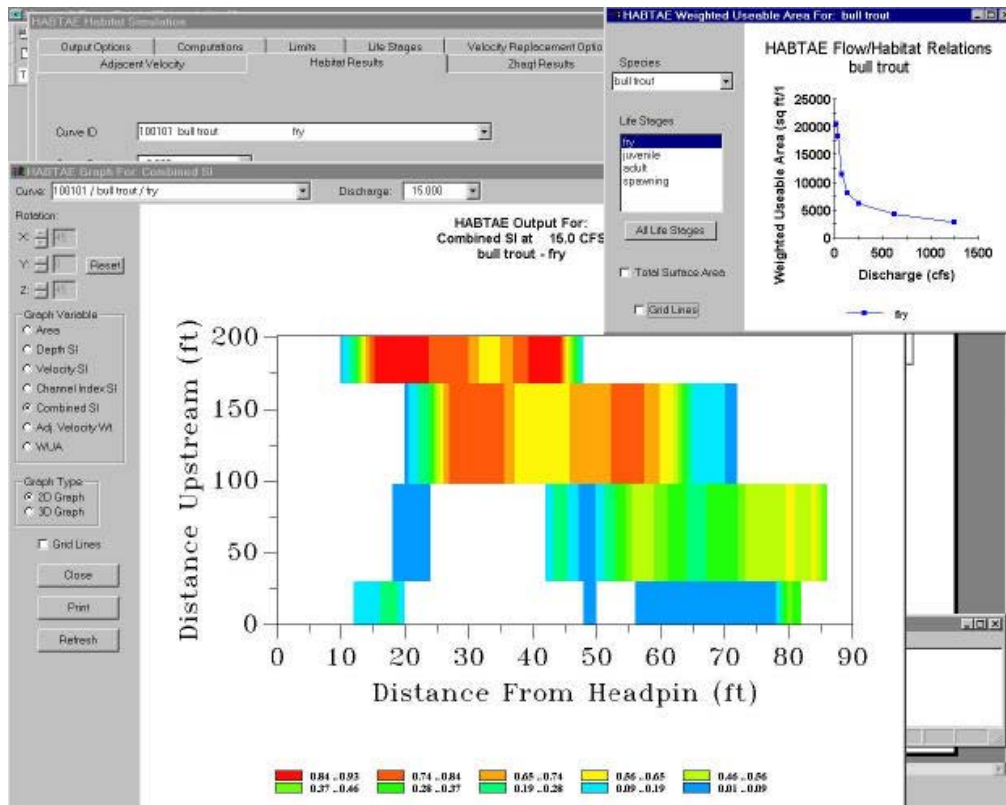


Figure A: Example of a spatial map that may be created using PHABSIM (from Milhous and Waddle 2012).

3.3.11 Fish Assemblage Assessment

General Description of Proposed Study

In the last sentence of the second paragraph of the general study description, FirstLight states, “The proposed study will include a statistically rigorous and comprehensive stratified-random design similar to what has been used successfully on large rivers [with] a high degree of spatial heterogeneity.” Whereas they cited Kiraly (2012) in the original April 15, 2013 PSP, in the June 28, 2013 updated PSP, they removed this citation, but failed to justify how their proposed study design still represents a “statistically rigorous and comprehensive stratified-random design... used successfully on large rivers...” No mention of a stratified-random design occurs again in the rest of the document; the only additional mention of random sampling is on p. 3-181, where it states that additional sites will be randomly selected, but without any additional detail. We strongly support the use of a “statistically rigorous and comprehensive stratified-random design,” as it removes bias from the collected data, allows for clear interpretation of results, and provides the best information for making decisions. However, FirstLight needs to clearly indicate how their study design meets this level of quality.

Existing Information and Need for Additional Information (18 CFR § 5.11(d)(3))

In the last paragraph of this section (p. 3-180), FirstLight provides a justification for the minimum number of fish ($n = 150$) that will be collected in each sampled reach. As stated in the PSP, "...a minimum of 150 fish per reach would ensure that most species within a reach were captured..." It should be noted that this justification applies to the level of effort needed to measure species richness (the number of species collected), but does not speak to the level of effort needed to estimate species abundance (the number of individuals collected).

Methodology (18 CFR § 5.11(b)(1), (d)(5)-(6))

In the first paragraph of the study methodology on page 3-180, FirstLight indicates that the geographic scope of the study could change based on potential impact to shortnose sturgeon. We recommend that before changing the geographic scope, alternative sampling gears that do not impact shortnose sturgeon should be considered for use in areas of concern. Changing the geographic scope of the study would substantially diminish the value of the study, and limit the ability to evaluate the full scope of project effects.

The information provided describing site, station, and sample selection is vague, and needs additional clarity, as sampling design is critical to drawing meaningful conclusions from study results. Improper sample selection and replication can lead to an inability to use the collected data. In the general study description, FirstLight mentions that the study design is "stratified-random," but fails to make this clear in the methodology. We strongly support such a study design, as it promotes robust data and clear interpretation of results. However, the claims of such a study design need to be clearly supported.

On p. 3-180, the PSP states: "The study area will be divided into stations based on habitat type; multiple methods of fish capture will be used in each station." These methods are unclear, and the following questions should be addressed:

- What are the habitat types?
- What is the spatial extent of each station?
- Will the stations be continuous or non-continuous within the study area?
- If non-continuous, how will they be selected?
- How many samples will be collected with each gear type?
- How will these sample locations be selected in each station?
- Will all gear types be used in each station?

Task 1: Sampling Location Selection

On p. 3-181, the text states, “Prior to field sampling, stations to be sampled will be selected to ensure all habitat types are adequately represented. Alternative sampling locations will also be identified by habitat in case a sampling station is inaccessible.” Again, it is not clear how stations or alternative sampling locations will be selected, or at what the spatial scale the station/location sampling will occur.

As presented, the study design does not support a “statistically rigorous and comprehensive stratified-random design.” However, we strongly support the use of such a study design, and encourage its development. We support the use of FirstLight’s aquatic mesohabitat assessment (FirstLight 2012) to define the habitat types. For a robust, stratified-random design, we suggest that the stations be chosen randomly and proportionally by habitat type. Ideally, this should be done separately for each gear type, so that there are an equivalent number of boat electrofishing, seine, and gill net samples, each selected randomly and independently, and there should be at least three randomly-selected samples of each gear type at each station. This prevents anomalous samples, allows for site-level statistical evaluation, and is standard scientific field design (Eberhardt and Thomas 1991, Krebs 1998). Alternately, and depending on the scale of the samples and stations, different gear types could be considered independent replicates. In this case, each gear type would need to be employed at each randomly-selected station.

Because the development of field study design is critical to the ability to use study results, we strongly recommend the inclusion of agency and other stakeholder representatives in the development of the field design for this study.

Task 2: Fish Capture

In discussions over the Fish Assemblage Study (Study 10) of the PSP for TransCanada’s Wilder, Bellows Falls, and Vernon hydropower facilities, there was concern regarding the potential extent of mortality associated with 24-hour gill net sets. In the TransCanada study, these have been limited to 2-hour sets to reduce mortality. We suggest that similar methods be employed in this study.

In fisheries management, relative abundance is typically measured as the number of individuals collected (or catch) per unit effort (CPUE), as it is here, and is assumed to be directly proportional to the total population size (Ney 1999). Gear biases (the tendency of gear to select for some species more than others) substantially violate this assumption, which is why inclusion of multiple gear types is important (if a study objective is to document species abundance, as it is for this study). In their described study methodology, FirstLight has ensured that they will

include multiple gear types in their study design, but their methods suggest that alternate gear types will only be used in locations where boat electrofishing is not effective. Whereas this is a valid reason, it is important that different gear types are not simply included as a last resort, but are an integral part of the study design in order to reduce bias of relative abundance estimates. The recommendations presented for study design under “Task 1” could address these limitations and biases.

Task 3: Data Analysis and Reporting

FirstLight proposes to calculate catch per unit effort (CPUE) for each species, station, and sampling technique. In general, if CPUE is calculated separately across species, stations, or sampling techniques, the premise is that values of different species, stations, or sampling techniques could be compared. In order for this to be true, stations or samples within stations must be sampled randomly, and sampling techniques must either also be employed randomly or must be included at each station (depending on the scale of the stations/samples). Otherwise, it is not possible to compare samples and draw any inference concerning differences or similarities among them (Eberhardt and Thomas 1991, Krebs 1998). As mentioned in the general description, it is possible that FirstLight intends for the study design to follow a stratified-random study design, but if so, at present this is unclear.

We also ask that FirstLight make the raw data available in digital format so that agency representatives and other interested parties may conduct additional analyses beyond what is done within the scope of this study.

Thank you for this opportunity to provide comment on FirstLight’s Proposed Study Plan. If you have any questions regarding the preceding comments, please contact Katie Kennedy at the Nature Conservancy’s Connecticut River Program office (413-586-2349 or kkennedy@tnc.org).

Sincerely,



Kimberly A. Lutz
Director, Connecticut River Program
The Nature Conservancy



Kathryn D. Mickett Kennedy
Applied River Scientist
Connecticut River Program
The Nature Conservancy

Literature Cited

- Eberhardt, L.L., and J. M. Thomas. 1991. Designing environmental field studies. *Ecological Monographs* 61:53-73.
- FirstLight (FirstLight Hydro Generating Company). 2012. Aquatic mesohabitat assessment and mapping. Northfield, MA: Author
- Kiraly, I.A. 2012. Characterizing fish assemblage structure in the Penobscot River prior to dam removal. M.S. Thesis. University of Maine, Orono, ME.
- Krebs, C.J. 1998. *Ecological methodology*, 2nd edition. Benjamin Cummings, Menlo Park, California.
- Milhous, R.T., and T.J. Waddle. 2012. *Physical Habitat Simulation (PHABSIM) Software for Windows (v.1.5.1)*. Fort Collins, CO: USGS Fort Collins Science Center.
- Ney, J. J. 1999. Practical use of biological statistics. Pages 167-191 in C. C. Kohler and W. A. Hubert, editors. *Inland fisheries management in North America*, 2nd edition. American Fisheries Society, Bethesda, Maryland.



DEERFIELD RIVER CHAPTER

10 Old Stage Road
Wendell, MA 01379

July 15, 2013

Updated Study Plan Comments
FERC Nos. 1889 and 2485

Kimberly D. Bose, Secretary
FERC
888 First Street, NE
Washington, DC 20426

Dear Secretary Bose,

Following are Trout Unlimited's comments concerning FirstLight's updated study plans dated June 28, 2013.

General Comments

At multiple meetings with FirstLight, FirstLight's consultants, stakeholders and FERC staff the lack of details in the initial study plans was cited as a problem and that specificity was required in subsequent plans to ensure that all parties knew what each plan would involve before the study began. Most of the study plans reviewed below still lack detail which gives concern as to nature of the plans to be filed with the FERC in August and with the ability of FirstLight to satisfactorily complete and report the studies.

Specific study plans:

3.3.1 Conduct Instream Flow Habitat Assessment in the Bypass Reach and below Cabot Station

Project Nexus

The river immediately below the Cabot Station is not a shortnose sturgeon overwintering area.

Task 1: Consult with Agencies and Interested Stakeholders to Determine Study Area, Study Reaches, and Habitat Suitability Index Curves

The July site visit is canceled.

Study Reaches and Transect Selection

The description of reach 1 states that from the dam to below the Fall River the bypass reach is wider than other reaches and that it narrows just upstream of Station No. 1 tailrace. The reach narrows a little over a quarter mile downstream of the dam.

Lengths of reaches 3, 4 and 5 should be included in the description.

Habitat Suitability Index Criteria

Figure 3.3.1-4 shows seven shad spawning locations. Study plan 3.3.6 states that there are fifteen previously identified shad spawning locations. All locations should be plotted.

Table 3.3.1-1 should include juvenile and adult shortnose sturgeon habitat as well as overwintering in reach 4 and all should be included in reach 5. Sea Lamprey spawning, incubation, and zone of passage should be added to Reaches 1 and 2.

Burbot (*Lota lota*) may be able to be included in a guild but their specific life history may require HSI criteria. This species is not addressed in the study plan. It is a state species of special concern and has been identified as inhabiting the bypass reach.

In addition to using HSI criteria for host species of fish for an evaluation of mussel habitat, the model should develop a measure of shear stress for the bypass reach.

As the locations of shad spawning are significant, transects in the IFIM study should be located at each spawning location in reaches 3, 4 and 5. If after the shad spawning survey is completed, there are additional spawning locations identified a transect should also be placed at each location.

3.3.2 Evaluate Upstream and Downstream Passage of Adult American Shad

This study plan is inadequate. It does not contain specifics, relying on later analysis of telemetry data from 2011 and 2012 studies and further consultation with the stakeholders to develop a plan. During meetings with FirstLight, FirstLight's consultants, FERC staff, and stakeholders after the initial study plans were filed, it was made abundantly clear that more specificity was needed in many of the study plans, including this one.

A detailed study plan should be developed for filing with the FERC by August 12, 2013.

Study Goals and Objectives

The last bullet should include time of passage, or no passage, in the canal in addition to passage rates, routes, and Cabot fish bypass effectiveness.

Methodology

A detailed study plan should be developed by August 12th which can be amended or added to subsequent to the analysis of 2011 and 2012 telemetry data. As currently written the study plan is a plan to develop a study plan. If analysis of telemetry data from 2011 and 2012 indicate that changes to the plan are appropriate a revised study plan can be coordinated with the stakeholders and filed at the FERC.

Task 1: Review Existing Information

Again, FirstLight proposes to develop a study plan after filing the final study plan in August and after the FERC issues a Study Plan Determination. Study plans have been described as a contract between the licensee and the stakeholders. A study plan details specifically what the licensee will do, when it will be done, and how it will be done. A study plan is developed after the FERC Study Plan Determination leaves little or no recourse to stakeholders if the licensee's plan is not acceptable.

The study plan states that substantial data has already been collected at the Turners Fall Project from multiple years of passage assessments. It can, and should be, used to inform the current study plan. It is highly unlikely that the 2011 and 2012 telemetry data will rewrite the record of passage at the project. As noted before, if new information is available it can be incorporated into a modified plan.

Task 2: Develop Study Design

Again, this is a plan to develop a plan which is exactly the title of this task. It is suppose to be the plan. The goals and objectives of the study are listed. The plan should be the specific means by which those goals and objectives will be met.

Task 3: Evaluation of Route Selection and Delay

The study plan lacks detail. It should include:

- Description of radio and PIT tags (size, life expectancy, pulse interval, frequencies, mortality identification, and any additional features to be incorporated, etc.)
- Description of fish capture, handling, tagging, and transport methods
- Description of release locations
- Number of fish to be tagged and intervals of tagging
- Location of telemetry antennas and receivers and description of receivers and antenna arrays
 - This should include identifying how multiple frequencies will be detected simultaneously
- Location of PIT antennas
- Location of video cameras
- Description of bypass flows to be tested and the intervals and duration of each flows release
- Where and how frequently water temperatures will be taken.

Manual tracking should be more frequent than twice a week. From the Holyoke dam to Cabot station is over thirty miles of river. From the Turners Falls dam to the Vernon dam is nearly twenty miles. The lower reach should be tracked at least two times per week and from Turners Falls to above the Northfield project at least three times per week as there are far fewer fixed telemetry locations to identify Northfield Mountain project effects.

Task 4: Evaluation of Mortality

No description of the mortality sensor tags, name of the manufacturer, or how the tag works is provided. The statement that the tags "... will give researchers an indication of passage induced mortality." states that project induced mortality will not be definitively assessed. The specifics of the tags and information on how the mortality sensor work and will be programmed should be provided. Information about prior use of the mortality tags and their efficacy should be provided.

Mortality of tagged fish should be assessed at all telemetry locations and during mobile tracking and not just at the tailraces of Cabot Station and Station #1 and the spillway.

Task 5: Reporting

All data used to develop the report should be provided to the stakeholders in a digital form including all telemetry, PIT tag, and manual tracking data.

Study Schedule

Lifting at the Holyoke project begins April 1 if river conditions permit.

The study plan recommends that a second year of study be conditioned based on the results of the 2014 study. How the results of those studies would determine the need for a second year of study is not described. A specific set of criteria should be listed that FirstLight feels would justify not doing a second year of study.

Study Plan Recommendations

The study should be done in 2014 and 2015. Evaluation of a single year of river conditions is not sufficient to understand fish movement and behavior in a complex river environment. Environmental conditions vary year to year in any river and a one year study cannot capture this variation.

Number of fish to tag:

To achieve a sufficient number of fish for evaluation of:

- multiple flows in the bypass reach, the effectiveness of the spillway ladder entrance under different spill conditions,
- how the operations of the Northfield Mountain Project affect shad moving both up- and downstream,
- assess downstream passage routes with different levels of spill,
- determine shad behavior in the canal while outmigrating,

- assess the effectiveness of the current downstream passage facilities at the Cabot Station, and
- assess mortality of shad passing through the Cabot Station and Station #1,

will require a tagging at least 300 shad for release at Holyoke and 100 for release above the Turners Falls dam.

The large number of fish released at Holyoke is to ensure that sufficient fish approach the Cabot station. A drop-back rate of 40% or greater (common with telemetry tagging of American shad), coupled with shad that move upriver but spawn below the Cabot Station, will significantly reduce the number of fish approaching the Turners Falls project. Poor passage at the Cabot, Spillway and Gatehouse ladders will further reduce shad available for evaluation of Northfield Mountain project impacts and assessment of downstream passage necessitates the release of additional fish above the Turners Falls dam.

After TransCanada tags their first fish, telemetry receivers should be set to detect outmigrating shad from the TransCanada telemetry study. This will increase the number of down running shad that can be evaluated for route selection.

Telemetry stations:

Red Cliffe Canoe Club – full river width

Sunderland Route 116 Bridge – full river width

Montague Wastewater – full river width

Deerfield River Confluence – full river width

Cabot Station Tailrace

- Radio telemetry antenna coverage of the full tailrace
- Radio telemetry antenna coverage of the area immediately in front of the fishway entrance
- Below the Cabot Station – full river width

Cabot Station Forebay

- Radio telemetry antenna at Conte fish passage building
- Radio telemetry antenna at Cabot forebay – general area

PIT antenna and radio telemetry dropper at bypass entrance

Cabot Fish Ladder

- PIT antenna and radio telemetry dropper at entrance
- PIT antenna and radio telemetry dropper at exit

Radio telemetry antenna to detect fish within the tailrace

Rawson Island

North and south channel

Station #1 Forebay

Station #1 Tailrace

- Radio telemetry to identify fish in close proximity to the tailrace

Radio telemetry upriver of Station 1 to identify when fish pass the station

Spillway Ladder

- PIT antenna and radio telemetry dropper at entrance
- PIT antenna halfway between entrance and first turn pool
- PIT antennas at turn pool exits
- PIT antenna halfway up straight section below counting window

PIT antenna and radio telemetry dropper at exit

Below Turners Falls Dam – full river width to detect fish approaching dam
Gatehouse Entrance

- PIT antenna and radio telemetry dropper at new entrance
- PIT antenna at first vertical slot
- PIT antenna at last vertical slot

PIT antenna and radio telemetry dropper at viewing window

Upstream end of canal – antenna for fish entering the canal from upstream

Turners Falls Impoundment

NMPSS Gill Bank – full river width

NMPSS Intake

- Area antenna
- Dropper antennas at entrance to ensure full depth coverage

NMPSS Upper reservoir

Shearer Farm – full river width

Northfield Mount Herman Boathouse – full river width

Receivers:

All receivers should be able to detect all frequencies and codes simultaneously. Between fish tagged for FirstLight and TransCanada there will likely be over 500 tagged fish on multiple channels. Cycling through frequencies and antennas is likely to miss fish with the probability of missed detections increasing with the number of fish tagged.

To better enable removal of spurious codes and to facilitate data analysis, all detections should be logged individually.

Video camera locations:

- Entrance to the spillway ladder
- Spillway ladder viewing window
- Entrance to the Cabot ladder
- Cabot ladder viewing window
- Gatehouse ladder viewing window

Bypass flows:

Three test flows – 2,500, 4,400 and 6,300 cfs during the sturgeon spawning season

Two test flows after spawning – the lower flow would cover and provide flow over the gravel bar downstream of the tailrace and any other area where sturgeon eggs or larvae may be located; the other flow would be between the lower flow and 2,500 cfs.

Each of the three bypass flows during the sturgeon spawning period should be done for three days each (4 replicates = 36 days) alternating between flows after each three day period. After sturgeon spawning, the two lower flows should alternate for four days each until the end of the passage season.

Reporting:

The report should include:

- * Release numbers, locations and dates

- * Fish vitals (length and sex)
- * River temperature at Northfield, canal, bypass, and below Cabot Station
- * Details of all manual tracking detections
- * Movement times for all fish radio telemetry and PIT antenna – station to station
- * Graphic description of movements of all fish

Turners Falls

- Upstream passage efficiency (proportion of fish passing upstream of the dam) for:
 - Fish detected at the Montague Waste Water Treatment Plant (MWWTP)
 - Fish in the tailrace at Cabot Station
 - Fish detected at the base of the Turners Falls dam
- Fishway attraction effectiveness – proportion of fish entering each of the three fishways that pass the fishway
- Behavior of fish that do not pass the project
- Number of forays fish made into each fishway
 - Successful and unsuccessful
- Number of forays upstream from MWWTP
- Number of forays into the bypass reach at each flow
- Analysis of how project operations affect upstream movement and entry into fishways
- Graphic description of the movement of each fish

Downstream:

- Approach route and route of passage
- Analysis of delay at each barrier (gatehouse, station #1, Cabot Station, and dam)
- Proportion of fish that use:
 - Bypass, Cabot Station, Station #1, or pass over the dam in spill
 - Survival of fish using each route
- Overall successful project passage
- Graphic description of the movement of each fish

Northfield Mountain:

- Number of fish within the Northfield zone of influence
- Number of fish entrained
- Delay at the Northfield project
- Description of movement patterns in the vicinity of Northfield Mountain
- Number of fish detected at stations upstream of Northfield

Should insufficient data be collected in 2014 to determine downstream mortality of adult shad, a directed mortality study (Hi-Z tags) should be performed in 2015.

3.3.3 Evaluate Downstream Passage of Juvenile Shad

Task 1: Evaluate Timing of Downstream Migratory Movements

In addition to the hours of pumping, the hour before pumping at Northfield Mountain should be evaluated to assess fish within the zone of pumping influence prior to the start of pumping.

Task 2: Evaluate Route of Passage Choice, Delay and Spill Survival

Additional detail of the receivers, the location and description of antennas, tags, and the manufacturer of tags is needed.

Fish should be released far enough upstream that they can select the ‘normal’ approach to the project so as not to bias the results. Fish released upriver of Barton Cove are constricted at two locations prior to reaching the dam which should be sufficient for them to select a normal approach to the dam.

Sample sizes for the releases should be determined for the filing in August. If fewer fish are available, the release numbers should be discussed with all stakeholders when that information becomes available.

A schedule for spill releases should be provided in the final study plan. This should ensure that all bascule and Taintor gates are tested. Testing of route selection should not be done during the canal shutdown as the only choice of route selection is spill. It is important to know which route fish chose when both generation and spill are occurring in able to assess overall project survival.

Neither Task nor 2 addresses the goal of determining the rate of entrainment at the Northfield Mountain project. Task 1 will hopefully identify the number of juvenile shad entrained at the Northfield Mountain project but it cannot determine the rate of entrainment. The rate of entrainment is the number of fish entrained divided by the population passing the project. Hydroacoustics, assuming complete and accurate data, will only provide the numerator of the equation.

The rate of entrainment can be achieved by releasing radio tagged fish above the Northfield Mountain project and monitoring the proportion of those fish entrained.

Task 4: Reporting

The report should include a graphical illustration of the movement of each fish. It should report the volume of spill at each gate throughout the testing period. Spill data for the period of out migration should be summarized for the full period of digital records so that an analysis of spill potential can be included in an overall project passage analysis. All data used to develop the report should be provided to the stakeholders in a digital form.

Study Plan Recommendations:

Survival of fish passing over the bascule and through the tainter gates should be evaluated with the Hi-Z Turb’N tags. The landing zone for each of the bascule gates is different which will result in different rates of survival. Twenty five fish should be released over each bascule gate and twenty-five fish through a tainter gate

Evaluate the hydroacoustic data at the Northfield Mountain project the hour before pumping.

A telemetry study of entrainment at the Northfield Mountain project is needed. As noted above, it is not possible to determine the rate of entrainment with the current study plan. Radio tagged fish should be released above the Northfield Mountain project. Fish should be released two river bends upstream of the Northfield project to allow them time to move downstream in a normal manner.

Telemetry stations:

Shearer Farm – full river width

NMPSS Intake

- Area antenna
- Dropper antennas at entrance to ensure full depth coverage

NMPSS Upper reservoir

NMPSS Gill Bank – full river width

Turners Falls Impoundment – full river width at boat buoys.

Gatehouse

- Upstream
- Downstream/canal

Dam

- Across and above bascule gates
- Across and above tainter gates

Below the dam – full river width

Station #1 – full river width

Station #1 forebay

Canal

- Conte fish passage building
- Cabot station forebay
- Cabot bypass – multiple droppers, one receiver

Cabot station tailrace

Montague Waste Water Treatment Plant – full river width

Receivers:

All receivers should be able to detect all frequencies and codes simultaneously. Both FirstLight and TransCanada will be tagging juvenile shad during the fall. Information at FirstLight projects can be augmented by collecting data from fish tagged by TransCanada. Cycling through frequencies and antennas is likely to miss fish with the probability of missed detections increasing with the number of fish tagged.

To better enable removal of spurious codes and to facilitate data analysis, all detections should be logged individually.

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

Study Goals and Objectives

The first objective is to identify eel concentrations where they occur in the project area. The first bullet limits locating concentrations to pools and wetted structures.

Project Nexus

The investigation should be the entire project area including the downstream passage discharge

Task 1: Systematic Surveys

The discharge of the downstream passage (log sluice) should be included in the survey areas. It passes 200 cfs continuously from June 1 to November 15 for passage of American shad. The volume and plunging nature of the flow will likely attract eels moving upstream along the bank.

The Cabot fishway should be evaluated with the addition of some attraction water. Should eels be attracted to the fishway it would be a secure location to deploy a trap in a location (tailrace) to which eels will likely be attracted. Without attraction water it is unlikely that many eels will enter the fishway.

If the spillway fishway attraction water system is not used to provide minimum flow after the upstream passage season the stilling basin should be evaluated with attraction water.

The entrance to the spillway ladder and the lower pools of the fishway should be surveyed.

Task 2: Trap Collections

Stakeholders should be consulted in determining additional trap locations beyond the three listed.

Eel ramps should be covered with plywood to prevent avian predation.

Traps should be checked the day after periods of rain or other events that would precipitate eel movement to prevent overcrowding and mortality.

Study Plan Recommendations:

Surveys of eel concentrations should be done in 2015 as conditions in the field may change, the number of eels present will likely change, and the conditions that stimulate eels to move upstream are episodic. By surveying a second year the likelihood of surveying when eels are migrating is increased.

The eel ramps are described as being 12 inches wide. This is insufficient width to accommodate two substrates. Each substrate should be at least 12 inches wide. Substrate selection should be described for use by smaller and larger eels.

Length and weight data should be collected for all eels captured in 2015. Environmental conditions should also be recorded including: water temperature, turbidity, moon phase, discharge, station operations, etc.

Location and number of eel ramps should be determined in consultation with the stakeholders.

3.3.5 Evaluate Downstream Passage of American Eel

Task 1: Evaluate Timing of Downstream Migratory Movements

In addition to the hours of pumping, the hour before pumping at Northfield Mountain should be evaluated to assess fish within the zone of pumping influence prior to the start of pumping.

Task 2a: Northfield Mountain Route Selection

Antennas should be located up- and downstream of the project as well as at the intake.

The sample size should be included in the Study Plan filing due August 12, 2013. It is not anticipated that additional information that would inform the decision will be available after that date and prior to the study.

A release schedule with times of day/night should be proposed. While it may be advantageous to release eels prior to conditions that might initiate movement, waiting for these conditions should not be permitted to delay tagging and release. In a similar study at the Muddy Run Pumped Storage Station on the Susquehanna River, tagged eels that were detected at the station, moved from the release site 1 mile above the station to the station in less than 3 days. All eels were detected moving from the release site in less than 10 days.

Fish should be released far enough upstream that they can select the ‘normal’ approach to the project so as not to bias the results.

Task 2b: Turners Falls Route Selection Study

Similar to Task 2a, a release schedule for times of day/night should be proposed.

Specific locations for telemetry should be listed in the August 12 filing.

The specifics of the tags and information on how the mortality sensor work and will be programmed should be provided.

Fish should be released far enough upstream that they can select the ‘normal’ approach to the project so as not to bias the results.

Task 3: Data management and Analysis

The report should include a graphical illustration of the movement of each fish. All data used to develop the report should be provided to the stakeholders in a digital form.

Task 4: Turbine Survival

HI-Z Turb’N tags should be used to assess mortality of eels passing in spill. Eels can be expected to use spill for passage during high water periods utilized for outmigration.

Study Plan Recommendations:

The study should continue until all eels have been determined to pass the Turners Falls project, died or until water temperature reaches 5° C.

Releases above the Northfield Mountain project and project operations should ensure, as much as possible, that eels encounter as many pump combinations as possible, including all four units pumping.

For the Northfield Mountain project fish should be released two river bends upstream of the project to allow them time to move downstream in a normal manner. At the Turners Falls project fish released upriver of Barton Cove are constricted at two locations prior to reaching the dam which should be sufficient for them to select a normal approach to the dam.

Evaluate with the intake area of the Northfield Mountain project with hydroacoustics the hour before pumping.

Survival of fish passing over the bascule and through the tainter gates should be evaluated with the Hi-Z Turb’N tags. The landing zone for each of the bascule gates is different which will result in different rates of survival. Twenty five fish should be released over each bascule gate and twenty-five fish through a tainter gate.

At least 75 eels should be released above the Northfield Mountain project to ensure a reasonable number passing the project during the different pumping scenarios. An additional 50 eels should be released above the Turners Falls project to determine route of passage past that project.

Telemetry stations:

Shearer Farm – full river width

NMPSS Intake

- Area antenna
- Dropper antennas at entrance to ensure full depth coverage

NMPSS Upper reservoir

NMPSS Gill Bank – full river width

Turners Falls Impoundment – full river width at boat buoys.

Gatehouse

- Upstream
- Downstream/canal

Dam

- Across and above bascule gates
- Across and above tainter gates

Below the dam – full river width

Station #1 – full river width

Station #1 forebay

Canal

- Conte fish passage building
- Cabot station forebay
- Cabot bypass – multiple droppers, one receiver

Cabot station tailrace

Montague Waste Water Treatment Plant – full river width

Receivers:

All receivers should be able to detect all frequencies and codes simultaneously. Both FirstLight and TransCanada will be tagging American eels during the fall. Information at FirstLight projects can be augmented by collecting data from fish tagged by TransCanada. Cycling through frequencies and antennas is likely to miss fish with the probability of missed detections increasing with the number of fish tagged.

To better enable removal of spurious codes and to facilitate data analysis, all detections should be logged individually.

Reporting

There is no task for reporting.

The report should include:

- * Release numbers, locations and dates
- * Fish vitals (length, weight, and morphometric criteria)
- * River temperature at Northfield, canal, bypass and below Cabot Station
- * Route selection
- * All detections of fish
- * Behavior of fish that do not pass the project
- * Delay of fish: location and time
- * Survival of fish passing each project facility
- * Overall project passage effectiveness
- * Analysis of how project operations affect upstream movement and entry into fishways
- * Graphic description of the movement of each fish

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

Study Goals and Objectives

The Route 116 bridge is in Sunderland.

The last bullet has change quantify to verify. The objective should be verify and quantify spawning activity. Task 2 Phase 1 (pg 3-152) states specifically that spawning "... will be observed and **quantified** by counting splashes ..."

Project Nexus

The location of the fifteen known spawning areas should be better described to differentiate the first five areas from the other ten. There are two locations that describe the upstream boundary for the five locations in the first sentence of the second paragraph.

Task 1: Development of a Detailed Study Schedule

There does not appear to be any information in this section concerning development of a schedule which is the title of this task.

Data from the review of project operations at the Cabot Station and the USGS gage locations should be provided to the stakeholders in a digital format. Similarly, the water level data derived from the hydraulic model should be provided to the stakeholders in a manner that is comparable to the discharge data and the known and potential spawning areas.

The section on dewatered areas and deploying ichthyoplankton nets seems out of place either as a part of a schedule or review of historic or model data.

Task 2: Examination of Known Spawning Areas Downstream of Turners Falls Dam

The first sentence states that the field surveys will be based on information from Task 1. Task 1 is either development of a schedule or a review of historic operation data and water level changes from the hydraulic model. It is not clear how either will inform field surveys.

The last sentence in the first paragraph says that surveys "... below Cabot Station will concentrate on **the** five known spawning locations downstream of the Deerfield River confluence ...". As there are 15 known spawning locations below the project, the specific five areas should be better described along with a justification for selecting these locations. Figure 3.3.1-4 shows two locations upstream of the Deerfield River Confluence. An explanation as to why the locations were not selected for study should be provided as they would seem to be the ones most likely to be affected by project operations.

Additionally this sentence, which identifies the specific locations for evaluation, contradicts the first sentence in the paragraph, which states that the field surveys will be conducted based on the information gathered in Task 1.

In Phase 1 the observation and quantification of spawning is, on the one hand, stated to occur for a 15-minute interval and, on the other, the time spent observing will be determined by the survey crew. It is also stated that the survey crew will observe all known spawning locations. As there are fifteen previously identified locations and potentially others, the number of areas to be observed in a single night should be better defined.

As spawning is not equally distributed over the period from sunset to 01:00h, the survey design should vary the time of night that each site is observed.

The evaluation of impacts of flow fluctuation should not be limited to locations that may become dewatered. [By definition and area that is dewatered will be unsuitable for spawning] The impact of flow fluctuations will, most likely, be observed at locations closer to the project.

Flow manipulations are stated to be done over a range of expected seasonal flow fluctuations and it is also stated that several discharge manipulations **may be** investigated. These are contradictory statements. Several discharge manipulations **will be** investigated.

The baseline rate of spawning should be spawning immediately before the flow changes. To determine if flow fluctuations alter spawning, the field crew should observe and count spawning splashes before the flow changes, during the change, and after the change has occurred. Spawning could be altered during both increases and decreases in flow. Both should be observed.

Deploying ichthyoplankton nets below suspected spawning sites as a means of assessing the occurrence of spawning does not seem to be particularly useful regardless of the likelihood of dewatering. Shad spawning sites can better be identified by observation of splashing. If an egg deposition site is dewatered, egg survival is assumed to be zero without evidence to the contrary.

Task 4: Examination of Identified Spawning Areas Upstream of Turners Falls Dam

Two projects can affect spawning in the reach from the Turners Falls dam to the Vernon Station. If spawning occurs within the zone of influence of the Northfield Mountain project, evaluation of project effects is possible by FirstLight. If spawning is upriver of Northfield Mountain, Vernon will be the project most likely to create flow fluctuations. As FirstLight does not operate the Vernon project it is unlikely that the manipulations described in Phase 2 can be done as the plan suggests.

Study Schedule

Bullet one – the IFIM for reaches 4 and 5 will not be done in 2013.

Field survey locations can be preliminarily selected prior to the spawning season but these should be selected in consultation with the stakeholders after the initial field identification of spawning sites. Changes in river conditions since 1977 may have altered spawning locations previously identified and new locations may exist.

Study Plan Recommendations

Site selection for Phase 2 should include the site closest to the project with a reasonable degree of spawning frequency and two sites downstream where fluctuations from the most extreme peaking are moderate. Sites to be selected with stakeholders based upon initial observations.

Egg netting below spawning sites before and after flow change.

Temperature should be recorded continuously at the upper and lower most spawning sites selected for manipulation evaluation.

Year 1:

- Identify all spawning locations below Cabot Station and above Route 116 using Layzer and Kuzsmeskis as initial guides.
 - Telemetered fish can be used to assist spawning locations as well as be included in the manual tracking shad database for study 3.3.2
- Select three sites for flow manipulation evaluation
 - Close to Cabot Station
 - Two downstream
 - Specific sites to be determined with stakeholder
- Evaluate sites at multiple levels of flow fluctuation
 - Initial evaluation at the site closest to the station with the greatest fluctuation
 - Observe and collect data before, during and after manipulation
 - Identify effect: spawning frequency, location, etc.
 - Evaluate both increases and decreases in flow
- Identify spawning locations upstream of the Turners Falls dam
- Observe changes in spawning if flow changes occur

Year 2:

- If year one study identifies flow fluctuations as causing alteration in spawning behavior and spawning is identified in the zone of influence of Northfield Mountain, develop study plan for manipulation of flows from Northfield Mountain and observe and evaluate the effects of those manipulations
- Repeat year one study below Cabot if year one study is incomplete
 - One example of an incomplete study would be if an effect of flow change was identified at the uppermost site but the effect of similar changes at the lower sites was not able to be evaluated.

3.3.7 Fish Entrainment and Turbine Passage Mortality Study

Task 3: Estimate of Turbine Mortality

As noted in comments for Study Plans 3.3.3 and 3.3.5, entrainment rates, to be determined with a telemetry study for both juvenile shad and American eels, will be needed to estimate entrainment loss..

Task 4: Reporting

A long term history of pumping (number of units per hour) should be provided by month for April through November should be provided in tabular form similar to Tables 2.3-1 and 2.3-2 in the Exelon Muddy Run RSP 3.3 for eels or shad (FERC # 2355).

The list of sections in the table of contents for the report is noted as ‘tentative’. As this is supposed to be the plan, the list, that **will** be included in the report, should be defined.

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

Existing Information and the Need for Additional Information

Spill data for the period of sturgeon spawning and incubation 2013 should be available for analysis.

For 5 years of the ten years surveyed between 1993 and 2007, adult sturgeon were present at the Rock Dam prior to leaving the Rock Dam and spawning at Cabot Station. During the five years sturgeon were present, the mean number of adults was 10.4 (range, 3 – 25) (pers. com. M. Kieffer and B. Kynard).

Methodology

In this section the evaluation will be conducted in the fall. In the Study Schedule section it will be conducted in the summer.

Task 1: Preliminary Study: Analysis of Existing Data

The results of the analysis of historic gate opening data should be presented to all stakeholders. All stakeholders should be consulted to determine if further study is needed. As impacts of gate openings have been documented to release large quantities of debris and sediment during the sturgeon spawning and incubation period it is likely that the full study will need to be completed.

The analysis of gate openings should include emergency openings so that the frequency and magnitude of these events is understood regardless of the ability to alter the timing of emergency events.

The causes of emergency gate openings and the reasons for non-emergency openings should be included in the analysis of gate openings.

Task 2: Scenario Development

The spillage scenarios should be done for the three bypass flows to be tested in the shad telemetry study (3.3.2).

As the purpose of the study is to evaluate the effect of spill on sturgeon spawning and rearing, the highest spill discharge (emergency or non-emergency) combined with the low bypass and generation flows should be included in the spillage scenarios.

Task 3: Field Verification of Conditions

As the number of strata has not yet been determined, the number of velocity measurement locations should be stated as locations per strata. There should be at least 4 locations per strata.

Velocity measurements should be made for 60 seconds or until the velocity reading stabilizes.

Soak time for the sediment samplers should be determined in collaboration with all stakeholders.

Sediment size should be sampled to determine size (modified Wentworth) and ratio of sizes in addition to a visual inspection and a general categorization.

Task 4: Data Analysis and Reporting

Emergency protocols should be included in both the initial analysis and the final report.

A final report will be completed if river conditions are suitable for study in 2014. There is no description of how the report will be completed if conditions are not suitable in 2014.

Study Schedule

In this section the evaluation will be conducted in the summer. In the Methodology section it will be conducted in the fall.

3.3.15 Assessment of Adult Sea Lamprey Spawning within the Turners Falls Project and Northfield Mountain Project Area

Study Goals and Objectives

The goals and objectives listed in the study plan do not address the first goal and objective in the NOAA study request which was to "...determine whether the operations of the Projects are affecting the success of this activity [spawning] to occur."

Task 1: Field Data Collection

It is unclear what will be the extent of delineation of suitable areas for lamprey spawning, how lamprey redds will be located, and what reaches of the river will be searched for redds.

The proposed methodology for evaluating redd success is inadequate. It is unclear if there is a definition of success in this plan by which the lack of success could be measured.

The plan notes that the subsample will be divided among different large scale locations. Some of the possible locations are stated but a total list is not provided. A complete list with a plan for how each location will be evaluated is needed. The bypass reach is not affected by peaking and it may be possible to use it as a reference for redds affected by peaking flows.

Spawning success cannot be documented merely by the presence of redds or of the condition of redds prior to and after peaking events. Rather, it should be documented with an evaluation of eggs in redds. Redds in areas that are highly impacted by peaking flows should be compared to redds in low impact areas to determine if eggs are present in redds. Similar or a significant difference in the frequency of redds with eggs in the high and low impact areas would be an indicator of spawning success.

Similarly the difference in alteration of redds after a peaking event between the high and low peaking impact areas would be an indication of impacts by the project.

Task 2: Data Analysis

Data entry and mapping are insufficient data analysis to explain the influence of project operations.

Study Plan Recommendations

Since 2000, 20.5% of sea lamprey passed at Holyoke have passed the Gatehouse fishway with a maximum passage of 56.8% in 2008. Fifty lamprey should be radio tagged at the Holyoke fishlift to assist in location of suitable spawning habitat. Tagging fifty lamprey should ensure a sufficient number of lamprey below the Turners Falls dam. As lower than 5% of lamprey passed Gatehouse in 2011, an additional twenty lamprey should be tagged at the Gatehouse fishway to ensure a sufficient above the dam.

Tagged lamprey will provide specific redd locations and the ability to determine in real time the impact of flow alterations.

Data collection should include

- Mean column velocity at the redd site
- Embeddedness
- Water depth

- Presence or absence of eggs in redds

An evaluation of nest abandonment should be made after a high water event only for redds that had sea lamprey present immediately before the high water event.

Tags should be compatible with shad telemetry equipment.

Mobil tracking used to locate lamprey.

Determine discharge/stage during observations.

The 'before and after' events should be statistically evaluated.

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

Task 1: Conduct Aquatic Organism Survey of Canal During 2014 Drawdown

The method of systematically traversing each of the zones to be surveyed should be described. Based upon the 2011 survey report which is referenced as being, with minor modifications, adequate to meet this studies objective, the technique of surveying could best be described as 'walked around and looked'.

The plan describes the wetted area in zone 7 as appearing to provide adequate flow and depth to support aquatic species over the short term. This report should verify that supposition.

If areas other than zones 2-4 have ammocetes or mussels, those numbers should be evaluated with sub-sampling and total counts estimated based upon the subsample.

The method of random sampling should be described.

A definitive number of samples in each area of concentration of mussels or ammocetes should be provided. "Up to 10 randomly selected 1-m by 1-m quadrates..." is insufficiently specific to ensure that the survey is properly conducted.

A description of how the pools and wetted areas will be mapped should be provided.

Study Plan Recommendations

Temperature in zone 7 should be logged on an hourly basis at each end of the zone prior to, throughout the drawdown period, and while the canal is being refilled.

Dissolved oxygen should be measured in zone 7 after the canal is initially drained, mid-way through the drawdown, and at the end of the last day of the drawdown.

Depending on where the Keith Drainage Tunnel is located (no location description is provided) temperature and dissolved oxygen should also be measured downstream of the tunnel as well as at the upper and lower end of zone 7.

The frequency of drawdowns should be listed as a potential measure of mitigation in Task 2.

As the pools change over time, additional surveys of the size, water temperature and dissolved oxygen in pools in zones 1 to 6 should be made at least two times in addition to the initial survey. One survey should be the last day prior to refilling.

3.3.19 Evaluate the Use of an Ultrasound Array to Facilitate Upstream Movement to Turners Falls Dam by Avoiding Cabot Station Tailrace

General Description of Proposed Study

In this section and in the Study Schedule section, the study is predicated on the results of prior studies (shad telemetry and the bypass IFIM). How the results of those studies would influence conducting this study is not described. Specific criteria should be described.

It is highly unlikely that all shad under all conditions in 2014 will move directly past the Cabot Station to the dam. As such it will be necessary to conduct the ultrasound study in 2015. As the shad telemetry study should/will be done in 2015 it will be possible to conduct the ultrasound study in 2015 in conjunction with fish tagged for study 3.3.2.

Task 1: Ultrasound Deployment

This section describes a plan to develop a plan as opposed to providing an actual plan. As noted several times above, this is not adequate.

FirstLight should provide:

- Details on the equipment to be used and how it will be deployed
- A proposed schedule for utilizing the ultrasound array.
- Intensity of ultrasound
- A description and a graphic of the expected field of ensonification
- The period of time over which the ensonification will occur
- A schedule for ensonification
- Flows in the bypass during the trials

Task2: Reporting

This section does no more than state that data will be analyzed and a report will be provided. Specifics should be provided as to the method of determining successful or unsuccessful deterrence away from the Cabot Station and subsequent movement if movement occurs.

Study Plan Recommendations

The array should be tested in an on/off manner beginning with the arrival of telemetered shad at the Cabot Station.

Testing should occur with two hour on and three or more hour off segments two times during the day beginning after 9:00 and before 11:00 to ensure that sufficient shad are present in the tailrace when the first and last 'on' tests begin.

Alternative testing schedules may be appropriate after initial trials. Any change in the testing schedule should be done only after consultation with the stakeholders. After the first week of testing an interim report should be provided to the stakeholders describing the results of the ensonification including: the behavior of fish when the ultrasound is turned on, the movement of the fish up- or downriver, how long fish remain away from the tailrace if they do move away, etc.

Testing should occur three days per week for at least four weeks.

Hydroacoustics should be employed to assess how the population of fish responds to ultrasound. This will allow evaluation of a larger population of fish than the telemetry fish or video monitoring (below).

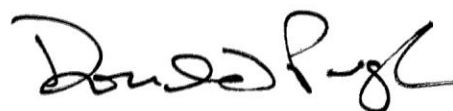
Video monitoring should be installed at the entrance to the Cabot fishway both inside the fishway and outside the entrance. This will provide data on fish that are not radio tagged. Telemetry data will be used to determine the direction that the fish move after the array is turned on.

Telemetry locations:

The telemetry locations described in the Study Plan Recommendations for Study Plan 3.3.2 should be sufficient to evaluate movement in the area of the Cabot Station. They will detect fish approaching the station, fish in the general tailrace area, fish in the immediate vicinity of the Cabot fishway entrance, and fish moving upstream past Rawson Island. Movement of fish after ensonification either upstream or downstream will be detected as will the lack of movement away from the tailrace.

Thank you for the opportunity to comment on the proposed study plans. I can be reached at the above address, don.pugh@yahoo.com, or at 978 544 7438 if there are any questions.

Sincerely,



Donald Pugh



July 15, 2013

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Northfield Mountain Pumped Storage Project, FERC No. 2485-063
Turners Falls Project, FERC No. 1889-081

Comments on the Updated Proposed Study Plan (PSP) submitted by FirstLight June 28, 2013.

Section 3.1 Geology and Soils

Section 3.1.1 *2013 Full River Reconnaissance Study*

Section 3.1.2 *Northfield Mountain/Turners Falls Operations Impact on Existing Erosion and Potential Bank Instability*

Section 4.0 Studies not Included in the PSP

4.1 Geology and Soils, 4.1.1 Study of Shoreline Erosion Caused by Northfield Mountain Pumped Storage Operations

Dear Secretary Bose:

The Franklin Regional Council of Governments (FRCOG) is the regional planning agency for Franklin County, Massachusetts. Two committees of the FRCOG, the Connecticut River Streambank Erosion Committee (CRSEC) and the Franklin Regional Planning Board (FRPB), have worked closely with the owner/operator of the Northfield Mountain and Turners Falls Projects for almost 20 years to develop and implement bank stabilization projects that address problems of significant streambank erosion occurring in the Turners Falls Pool on the Connecticut River (the Pool). This cooperative effort set aside differences over erosion causes and focused instead on working together to identify and achieve solutions that protect prime farmland, structures, and other natural resources. Given our long-standing concern with and close involvement with the erosion problems related to the operation of these two projects, we feel uniquely qualified to comment on the above-referenced proposed studies.



Overall, we are disappointed in the quality of the updated study plans for section 3.1 Geology and Soils submitted to FERC by FirstLight on June 28, 2013. We find the updated study plans unacceptable since the detailed comments and concerns expressed by stakeholders at the study plan meetings have been essentially disregarded. The Franklin County reach of the river deserves technically defensible and rigorous scientific investigations with clearly stated goals, objectives and deliverables. FirstLight has not provided a sound approach for these studies and has consistently used language that obfuscates and confuses in each of the three drafts provided to stakeholders. The studies proposed by FirstLight should have clearly stated goals and objectives, and methodologies that are detailed and well documented, scientifically valid and reproducible. How will the mandatory conditioning agencies and stakeholders have confidence in the collection and analysis of data that will be used to evaluate the potential impacts project operations have on the resources?

It appears that FirstLight's strategy is to diminish the importance of the erosion in the Turners Falls Pool by proposing studies that will gather little useful data to inform the relicensing process or to provide the mandatory conditioning agencies, particularly the MassDEP, with the data needed to issue a 401 Water Quality Certificate that is protective of water quality and wetland and riparian resources areas. Ongoing erosion in the Turners Falls Pool is having a significant impact on state and federal listed rare and endangered species that rely upon the river for habitat, as well as on archaeological resources that are lost to bank erosion and prime farmland that is sloughing off into the river. **Bank erosion is the overarching environmental problem and the one that impacts all the other resources listed in the Proposed Study Plan** – Water Resources; Fish and Aquatic Resources; Terrestrial Resources; Wetlands, Riparian and Littoral Habitat; Recreation and Land Use; Cultural Resources; and Developmental Resources. We urge FERC to require FirstLight to develop clear and scientifically defensible studies that will provide valid and useful data about the impacts of project operations on river bank stability and erosion in the Turners Falls Pool.

We have several specific comments on the Study Plan. Unfortunately, we are not able to adequately address all of our concerns with the Updated Proposed Study Plan (Plan) in this letter due to the short timeframe between receiving the updated Plan on June 28, 2013 and the decision by FERC not to extend the comment deadline by two weeks to July 30, 2013. To reinforce our concern regarding the inadequacy of the Plan, we have included several attachments to this letter, including excerpts from the *Fluvial Geomorphology Study of the Turners Falls Pool on the Connecticut River Between Turners Falls, MA and Vernon, VT*, prepared by Field Geology Services of Farmington, ME; we will reference this study as Field (2007). This study was commissioned by the licensee and undertaken to “understand the causes of bank erosion and identify the most appropriate methods for bank stabilization on this section of river.” We believe that Dr. Field's work is a comprehensive, well researched and scientifically-based document. To date, many of the recommendations in the study have not been implemented. Even more troubling is the fact that this study, its findings, conclusions and recommendations, has been completely ignored by the licensee in the formulation of their proposed Study Plans to gather information on the geology and soils of the Turners Falls Pool.

For ease of reference, our comments are organized according to the headings in the Updated Proposed Study Plan filed by the licensee on June 28, 2013.

3.1 Geology and Soils

3.1.1 2013 Full River Reconnaissance Study

In January 2013, the FERC suggested that the 2013 Full River Reconnaissance (FRR) could both inform the relicensing process and satisfy the compliance requirements under the current license. The Connecticut River Streambank Erosion Committee (CRSEC) agreed but stressed that 1) the 2013 FRR methodology and the Quality Assurance Project Plan (QAPP) still needed significant improvements and the CRSEC wanted to be involved in the process to refine these documents, and 2) tasks would need to be added to the 2013 FRR to gather data to inform relicensing. It was our understanding that the 2013 FRR would be significantly improved from its 2008 predecessor, and accordingly we supported including the FRR in the relicensing process.

Despite detailed, comprehensive comments on the 2008 FRR methodology and final report and the proposed QAPP for the 2013 FRR, which were submitted to both FERC and FirstLight, none has been addressed or included in the 2013 FRR methodology. The proposed methodology for the 2013 FRR is exactly the same as that used in 2008. The QAPP, which the licensee detached from the FRR study plan, is still not adequate. The references to “CRSEC input” in the study plan text are a misrepresentation of what actually happened during the development of the 2008 FRR methodology and the QAPP. As documented in previous correspondence to FERC, input from the CRSEC was neither actively sought nor seriously considered by FirstLight.

We assert that the 2013 FRR study plan is not adequate for compliance or relicensing purposes. Further, we respectfully reserve the right to contest the QAPP and the findings of the 2013 FRR as they relate to the current license and ongoing compliance issues.

Task 1: Document existing riverbank Features and Characteristics

Task 1a: Identify and Define Current Riverbank Features and Characteristics

Field (2007) noted that the erosion mapping from previous FRRs suggests that specific points on the bank can change from eroding to stable or vice versa regardless of whether the total amount of mapped erosion increases or decreases from year to year. Consequently, using changes in the overall totals of mapped erosion to understand how the patterns of erosion in the Turners Falls Pool are evolving is not adequate for relicensing data needs. Identifying where the erosion is occurring, the type of erosion and the stage or temporal sequence of erosion must be inventoried and understood before ascribing potential causal mechanisms as FirstLight is proposing to do in Study 3.1.2.

Field (2007) stated that an adequate discussion of the causes and management of erosion depends on *an understanding of the types, distribution, rates, and temporal sequence of erosion in the Turners Falls Pool*. The licensee’s proposal to evaluate the causes of erosion in Study 3.1.2 and the management of project and non-project related erosion is of primary concern to the FRCOG, as well as the mandatory

conditioning agencies and other stakeholders. Eroding banks degrade water quality, reduce habitat, and result in the loss of prime agricultural land.

Field (2007) stated that future efforts for monitoring erosion in the Turners Falls Pool must utilize a consistent, well documented technique for identifying erosion sites that is conducted in the early Spring or late Fall when bank exposures are least obscured by vegetation: *“such a technique should be based on the types of erosion observed and stage of erosion present not proxies for erosion or erosion susceptibility such as the amount of vegetation, percentage of exposed soil, bank height and slope, or soil type”*. [emphasis added]. Dr. Field suggested that the written and visual descriptions of erosion types presented in Tables 1 and 2 and described in Section 7.1 of his report could provide the basis for such an approach (see Field’s Tables 1 and 2 which are attached to this letter). However, FirstLight chose to ignore these recommendations and instead both the 2008 and 2013 FRR methodologies (Tables 3.1-1 and 3.1-2) **use all of the “proxies for erosion or erosion susceptibility” described by Field**. Furthermore, the rationale for the grouping of these characteristics (Table 3.1-2) is not explained, nor are citations provided for its origin.

Another fatal flaw in these tables is the use of the category “mass wasting” to characterize the extent of erosion. First, mass wasting describes the movement of material downslope under the influence of gravity. The term lumps three types of erosion - flow, slide and fall - and the term doesn’t describe what erosional stage is responsible for the mass movement of the bank material. Mass wasting is a generic term to describe a typically catastrophic event like a landslide or mudslide. It is a term that should be more accurately used (if at all) as a grouping of erosion types. To characterize the spatial extent of erosion, we should be gathering data on the linear and vertical extent of the specific types of erosion as identified by Field (2007), which can be quantified, rather than combining types of erosion into one category and using qualitative terms like “little/none”, “some” or “extensive” to describe the erosion. These qualitative terms are not valid due to their extreme subjectivity and should not be used at all in the relicensing studies to describe the erosion in the Turners Falls Pool. According to Field (2007), four of the erosion types described by Lawson (1985) are widely observed in the Turners Falls Pool: falls, topples, slides, and flows (Field (2007) Tables 1 and 2), which are attached to this letter. Dr. Field noted that these four erosion types rarely occur in isolation, but rather work in concert to remove bank material from the upper and lower slope. According to Dr. Field, visual observations of bank conditions at various places in the Turners Falls Pool permit the development of an idealized model that describes a sequence of events occurring through time at a single point (Field, Figure 30), which is attached.

The spatial or temporal extent of the erosion cannot be documented by the methods proposed for the 2013 FRR. Simply put, the type and stage of erosion should be documented according to Field (2007) and then maps could be generated that show, for example, the linear extent and location of all types and stages of erosion. Knowing this information is critical to any efforts to understand the causes of erosion. **Data that are proxies for erosion should not be used as data in the study to determine the causes of erosion**. For the reasons articulated above and because the language is confusing and no citations are provided for the provenance of the 2013 FRR methodology, we disagree with the statement in the updated Proposed Study Plan on page 3-7 that refers to the use of Tables 3.1-1 and 3.1-2 to log and characterize riverbank characteristics as a reliable method. The text we refer to follows:

Page 3-7 of the Updated Proposed Study Plan states: *“The grouping approach combines riverbank features and characteristics into key associations that can provide insight into which features and characteristics are associated with stability and which are associated with erosion. Statistical distributions of characteristics within each group can aid in further understanding erosion and stability issues such as which combination of features and characteristics trend towards stability, and which trend toward erosion. Such information and understanding can aid in the planning process in developing appropriate approaches in addressing erosion issues.”*

On page 3-8, it is stated that the 2008 and 2013 FRR methodologies include the six stages of erosion identified by Field (2007). We assert that this is a misrepresentation of what Dr. Field identified in his report. He provides definitions for each stage of erosion, along with a picture of a representative site in the Turners Falls Pool and a profile drawing. What is presented in the 2013 FRR methodology (Table 1 on page 3-8 of the Updated Proposed Study Plan) is not comparable to Field’s Figure 30. Further, these are stages of erosion as identified by Field (2007) not types of erosion as identified in the 2013 FRR methodology. The 2013 methodology does not identify the stages of erosion. In Appendix C of the proposed QAPP for the 2013 FRR, the types of erosion listed include: none, notching, overhanging bank, undercut toe, and slide. A representative picture is provided. No citations, descriptions, or line drawings are given for the source of these types of erosion. This list of the types of erosion includes only one of the four types of erosion listed by Field (2007) – slide. In fact, it appears that the 2013 FRR methodology has confused the type of erosion with the stage of erosion or perhaps lumped the two categories and picked only a few categories to include as representative of the conditions in the Turners Falls Pool.

More troubling is the Mass Wasting section of Appendix C of the QAPP, which contains pictures showing “little/none”, “some” and “extensive” mass wasting. We refer back to our concerns about using the term mass wasting to describe the extent of erosion because mass wasting is a term that refers to collectively to a group of different types of erosion. An examination of the pictures shows that a variety of different types and stages of erosion are occurring in these “representative” mass wasting pictures. This important information is lost when masked by a “little/none” category, for example. To illustrate this point, looking at the attached “little/none” mass wasting pictures, there is clear evidence of different types and stages of erosion as defined by Field (2007). Clearly, the 2008 and 2013 FRR methodologies have not incorporated Field’s (2007) recommendations.

In addition to completely revising the 2013 FRR methodology, there are two tasks that could be added to Study 3.1.1 to provide data that would be informative to the relicensing process. They are:

1. The photographic log of the riverbanks compiled during the fluvial geomorphology study (Field, 2007) should be updated during the 2013 FRR to provide a method for visually identifying and confirming the condition and location of eroding banks. Re-photographing the riverbanks periodically from the same locations will provide a means of identifying new erosion sites or, conversely, areas that are stabilizing. Unfortunately, this simple, relatively low cost recommendation was not implemented in the 2008 FRR or proposed for the 2013 FRR. A wealth of information can be easily gleaned from photographs and photographic logs that are updated over time.

2. Field (2007) recommended that the initial photographic log compiled during his study be compared with continuous digital image logs taken during 2001 and 2004 (NEE, 2005). We would add the continuous digital image logs taken for the 2008 FRR and the 2013 FRR to this list.

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

We are disappointed that this study does not specifically build upon the findings and recommendations in the Field (2007) report, which was commissioned by the licensee to understand the causes of bank erosion and identify the most appropriate methods for bank stabilization on this section of river. Dr. Field reviewed and summarized the previous work that had been done by the Army Corps of Engineers and others to understand the erosion occurring in the Turners Falls Pool. According to Field (2007), conditions in the Turners Falls Pool create a situation where the riverbanks are near the threshold of erosion. Further, Field (2007) notes:

“Minor natural or anthropogenic changes in the Turners Falls Pool, therefore, have the potential to cause significant changes in the extent and severity of bank erosion.” (page 37).

“The reported increase in erosion since the opening of the Northfield Mountain Pumped Storage Project (U.S. Army Corps, 1977), at a time when flood flow velocities have decreased due to the raising of the Turners Falls Dam and implementation of flood control projects upstream, suggests other factors may also be causing erosion in the Turners Falls Pool. Other observations inconsistent with natural flood flows being the sole cause of erosion is the higher incidence of erosion on the inside bends of meanders compared to outside bends (Table 3). Typically, flow velocities and erosion on unregulated rivers are greatest on the outside bends of meanders (U.S. Army Corps, 1979; Easterbrook, 1993). Furthermore, a comparison of mapped erosion sites (Appendix 5) with the hydraulic modeling (Appendix 4) reveal extensive areas of erosion where shear stresses and flood flow velocities are relatively low (Figure 18).” (page 39).

“The preponderance of bank erosion of floodplain sediments, where natural groundwater seeps are uncommon, indicate natural seepage forces are not a primary cause of erosion in the Turners Falls Pool. However, human management of river levels has potentially created additional seepage forces that have enhanced erosion where natural groundwater seeps are absent.” (page 40).

An important opportunity has been missed to build upon scientifically sound and well documented work. We urge FERC to require the Study Plan be revised to provide scientifically sound and defensible data.

Task 3: Install Proposed Water Level Monitors in Turners Falls Impoundment

In response to stakeholders’ concerns about having adequate data on the rate of change in the water surface elevation of the Turners Falls Pool during project operations and having greater coverage

throughout the length of the 22-mile impoundment, FirstLight is proposing to add four gages to the four existing gages. Only one of the four proposed new gages is listed as being located to provide information on water level changes due to the operation of the Northfield Mountain Pumped Storage project. Two of the new gages are located in VT, downstream of the Vernon Dam and the remaining new gage is located 8.5 miles upstream of the tailrace. The number of proposed new gages is not adequate to capture the changes in water elevation and the rate of change, in order to provide a suitable data set for the various tasks proposed to utilize the data (Tasks 3a-3f). The cost of installation of water level monitors is relatively low compared to the potential benefits of the data collected. We urge FERC to require the installation of more water level monitors at appropriate locations, including at the fixed recoverable transects and areas where the BSTEM analysis will be conducted (see below). In addition, it is not clear why data gathering is limited to August-November 2013. It would be important to understand water elevation changes and rate of change throughout the year, particularly during the spring freshet and summer months when electricity demand for air conditioning may require more “peaking” power from the pumped storage project.

Task 5: Field Study and Task 6: Causes of Erosion

The results and data gathered from the 2013 FRR are identified by FirstLight as a significant source of data for Study 3.1.2, specifically Task 5: Field Study and Task 6: Causes of Erosion and their associated sub-tasks. For the reasons articulated above, the 2013 FRR, as proposed, will not provide adequate and reliable data for Task 5 or Task 6.

Assuming that all relevant data has been gathered, that the spatial and temporal resolution of the data set is adequate, and that the appropriate Quality Assurance/Quality Control procedures have been followed during data collection, the crucial task of this study is Task 6: Causes of Erosion. The approach to determining the causes of erosion is presented in a “scatter shot” manner. There is no clear and well documented integrative methodology that ties the results of the sub-tasks together or describes how the results of each of the tasks build upon each other. The clearest methodology presented is the Bank-Stability and Toe-Erosion Model (BSTEM). It appears that the BSTEM approach is appropriate and may yield useful information. However, it is not clear from the text the number and the location of the proposed data collection points and whether the data collection points correspond to the proposed fixed recoverable transects, the 22 existing transects and/or other locations to be determined. We note that TransCanada has proposed installation of 64 data-loggers to provide a thorough picture of river conditions. Task 6 should be revised to present a clear, step-by-step methodology that includes appropriate citations and references to standard practices in the disciplines of fluvial geomorphology and geotechnical and soil evaluation.

4.0 Studies not Included in the PSP

4.1 Geology and Soils

4.1.1 Study of Shoreline Erosion Caused by Northfield Mountain Pumped Storage Operations

As a point of clarification, NOAA’s National Marine Fisheries (NMFS), a Federal resource agency, also requested this study (study request 6.14) in their comments filed on March 1, 2013. The goals and objectives of this study, as stated in FRCOG’s and NMFS’ study requests, would be to determine the environmental effects of the presence and operation of the licensed facilities on river bank stability,

shoreline habitat, agricultural farmland, wetland resources, bed substrate, and water quality in the Turners Falls impoundment.

FirstLight dismissed the Relevant Resource Management Goals (18 CFR Section 5.9(b)(2)) listed by FRCOG by stating that we, along with other stakeholders that requested the study, were not resource agencies. NMFS is a federal resource agency. The resource management goals listed by NMFS in their study request include:

“Our management goal is to ensure high quality habitat for migratory diadromous fish. Shortnose sturgeon, American shad and American eel all require suitable spawning, rearing, migratory and foraging habitat. Eroding banks and subsequent increases in turbidity and deposition of fine grained material onto bed substrates in the Turner’s Falls headpond, the bypass reach and downstream of the Turner’s Falls project reduces the quality of habitat for these species. Elevated levels of suspended sediment are associated with a diminution in water quality which also affects the quality of habitat encountered by *trust resource species*. [emphasis added]

In addition to habitat effects, soil erosion contributes to nutrient loading. In 2001, the U.S. EPA approved New York and Connecticut’s Long Island Sound (LIS) dissolved oxygen Total Maximum Daily Load. As a result, the New England Interstate Water Pollution Control Commission (NEIWPC) established the Connecticut River Workgroup and the Connecticut River Nitrogen Project. This project is a cooperative effort involving staff from NEIWPC, the states of Connecticut, Massachusetts, New Hampshire, and Vermont, and EPA's Region 1 and Long Island Sound (LIS) offices. All are working together to develop scientifically-defensible nitrogen load allocations, as well as an implementation strategy, for the Connecticut River Basin in Massachusetts, New Hampshire, and Vermont, which are consistent with Total Maximum Daily Load allocations established for LIS. Since its inception, the Connecticut River Workgroup has participated in a number of projects to better understand nitrogen loading, transport, and reductions in erosion.”

We are very concerned that FirstLight omitted the study requested by NMFS, FRCOG and other stakeholders. FERC should direct FirstLight to incorporate the tasks suggested by NMFS, FRCOG and other stakeholders into Proposed Study Plan 3.1.2. The argument that certain requested tasks should not be done because FERC uses current conditions as its baseline for evaluating project effects and alternatives is not valid from a scientific basis. The baseline conditions should bracket the timeframe for data analysis to the year Northfield Mountain pumped storage project came on-line to the present day. Current conditions, meaning what we see today, and future conditions under which the project will operate cannot be evaluated in any meaningful way without an appropriate context. We understand that TransCanada is assembling and reviewing historical data as part of their study plans related to understanding erosion in the upper reach of the river. We assert that a similar level of effort is required for the Turners Falls Pool. We are asking for a reasonable time period, a reasonable context within which collected data will be evaluated to assess the impacts of project operations in the Turners Falls Pool and cumulative impacts of all five projects on the river.

We are surprised that FirstLight would assert that it “is unclear how the requested data would inform potential PME measures.” (page 4-3). Understanding how project operations affect the river, its banks and other resources is critical to designing appropriate PME measures. Giving the erosion issue “short shrift” in the Study Plan process will ensure that inadequate and suspect data informs potential PME measures.

We request that FERC direct FirstLight to add the following tasks from NMFS’, FRCOG’s and other stakeholder’s study request – Study of Shoreline Erosion Caused by Northfield Mountain Pumped Storage Operations to FirstLight’s proposed study 3.1.2.

1. This study should determine the net soil loss in cubic yards between when Northfield Mountain project operations began and the present; a density estimate of the eroded material should also be provided. Provide an analysis of where the greatest loss has occurred, location of proximity to the tailrace, soil type, riparian land use, and vegetative cover in that area. Calculate nutrient loadings (nitrogen and phosphorus compounds) to the river system based on soil loss.
2. Obtain copies of the original survey plans for the project (Exhibit K), and complete a new survey using the same landmarks used previously. The Field (2007) report states on page 11 that the original survey plans of the river are still retained by Ainsworth and Associates, Inc. of Greenfield MA. Use pre-operation aerial photos and current aerial photos to complete a 10-foot topographic map of the section of river between Turners Falls Dam and Vernon Dam and the 200-foot buffer regulated under the Massachusetts Rivers Protection Act. The Field (2007) report on page 11 states that Eastern Topographics, Inc. determined that sufficient information is known about the 1961 aerial photos (e.g., height of airplane) to create a 10-foot topographic map of that time period, and that 1961 aerial photos could be accurately overlaid with recent aerial photos. Field (2007) states that this analysis would enable a more reliable determination of small-scale shifts in channel position and changes in bank height that may have resulted from the erosion of a low bench that previously existed along portions of the river and help identify areas of the most significant bank recession during the past 45 years. Among other things, create a single map showing areas of erosion and deposition, and also overlay the Field report’s hydraulic modeling analysis of the river channel.
3. Complete detailed surficial mapping (topographic map or LIDAR) to identify the various geomorphic surfaces, height of benches/terraces above the river level, and types of sediments underlying the surfaces. This will allow one to determine how erosion varies with geomorphic conditions. One could then normalize the amount of erosion to a specific type of bank material/geomorphic surface/terrace.

FirstLight’s reason for not conducting LIDAR, which they said was too expensive and other topographic data was available, is not valid for two key reasons. First, the data FirstLight proposes to use, the USGS 10 meter digital elevation model, does not have sufficient resolution to determine how erosion varies with geomorphic conditions. Second, TransCanada is using LIDAR for the northern reach of the river and consistent data is needed to enable FERC to evaluate both individual project impacts and cumulative impacts.

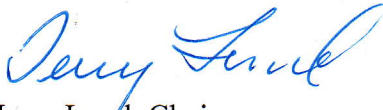
In closing, we would like to stress our disappointment that a feasibility study of a closed-loop system is not being required at this stage in the relicensing process since we believe a closed-loop system would eliminate many of the environmental problems associated with using the river as the lower reservoir.

Thank you for the opportunity to submit comments on FirstLight's Updated Proposed Study Plan. We regret that the short timeframe between receiving the Updated Proposed Study Plan (June 28, 2013) and the date the comments are due (July 15, 2013) does not provide us an opportunity to submit more detailed comments.

Sincerely,



Ann Banash, Chair
FRCOG Executive Committee



Jerry Lund, Chair
FRPB Executive Committee



Tom Miner, Chair
CRSEC

cc: Congressman James McGovern
Franklin County Legislative Delegation
Michael Gorski, Regional Administrator, MassDEP
Robert McCollum, MassDEP
Robert Kubit, MassDEP
Town of Erving
Town of Gill
Town of Montague
Town of Northfield

Attachments

Table 1: Typical types of slope movements on eroding banks. (Field, 2007)

Table 2: Types of erosion occurring in the Turners Falls Pool and their characteristics. (Field, 2007)

Figure 30: Model illustrating idealized sequence of erosion. (Field, 2007)

Table 1. Comparison of Field's Stage of erosion with matrix of riverbank features and characteristics (Updated Proposed Study Plan document submitted by FirstLight, June 28, 2013)

Excerpts from Draft Appendix C of Quality Assurance Project Plan for 2013 FRR (Appendix D of the Proposed Study Plan document submitted by FirstLight, April 15, 2013)

<u>Erosion Type</u>	<u>Description</u>
Falls	<ul style="list-style-type: none"> - Material mass detached from a steep slope and descends through the air to the base of slope - For the purposes of this study, also includes erosion resulting from transport of individual particles by water
Topples	<ul style="list-style-type: none"> - Large blocks of the slope undergo a forward rotation about a pivot point due to the force of gravity - Large trees undermined at the base enhance formation
Slides	<ul style="list-style-type: none"> - Sediments move downslope under the force of gravity along one or several discrete surfaces - Two forms occur: planar slips and rotational slumps - Slumps rotate down and out along a surface that is concave upward - Slips move along shallow planar surface without rotary motion
Lateral spreads	<ul style="list-style-type: none"> - Transitional form between slides and flows
Flows	<ul style="list-style-type: none"> - Sediment/water mixtures that are continuously deforming without distinct slip surfaces - Two forms occur depending on rate of movement: slow creep and rapid grain flows

Table 1: Typical types of slope movements on eroding banks.


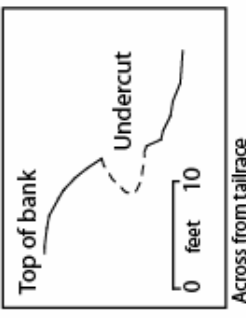
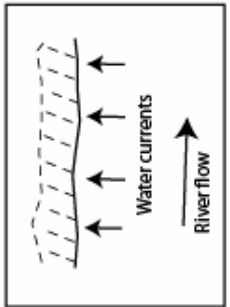

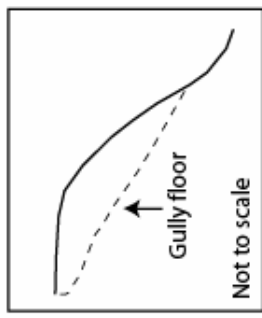
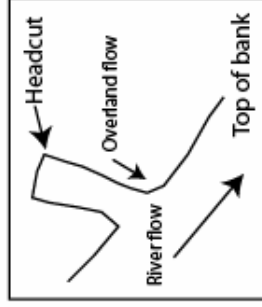

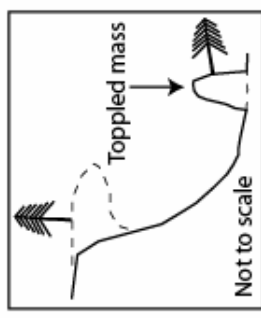
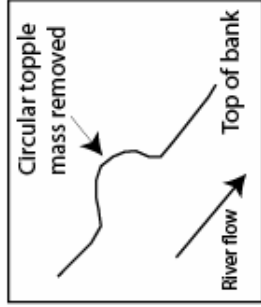
<u>Erosion type</u>	<u>Photo</u>	<u>Profile</u>	<u>Planview</u>	<u>Description</u>
<p>Falls - Undercuts</p>				<ul style="list-style-type: none"> - Undercutting - Notching and oversteepening at the toe of the slope
<p>- Gullies</p>				<ul style="list-style-type: none"> - Gullies formed by overland flow and groundwater seeps
<p>Topples</p>				<ul style="list-style-type: none"> - Vertical tension cracks at the top of slope - Trees lean away from bank - Toppled mass creates mound of soil at base of bank

Table 2: Types of erosion occurring in the Turners Falls Pool and their characteristics.

Erosion type	Photo	Profile	Planview	Description
<p>Slides</p> <ul style="list-style-type: none"> - Planar slip 				<ul style="list-style-type: none"> - Vertical tension cracks at top of slope - Top surface of slide mass has flatter slope than rest of bank (narrow bench) - Trees lean in towards bank - Trees can remain in growth position despite sliding
<ul style="list-style-type: none"> - Rotational slump 				<ul style="list-style-type: none"> - Vertical tension cracks at top of slope - Deeper seated than slips - Trees lean in towards bank - Arcuate failure surfaces
<p>Flows</p> <ul style="list-style-type: none"> - Grain flows 				<ul style="list-style-type: none"> - Colluvial deposits created by flows accumulate at base of slope to form concave up surfaces
<p>Creep</p>			<p>Not applicable</p>	<ul style="list-style-type: none"> - Tree trunks bent downslope at base

Table 2 (continued).



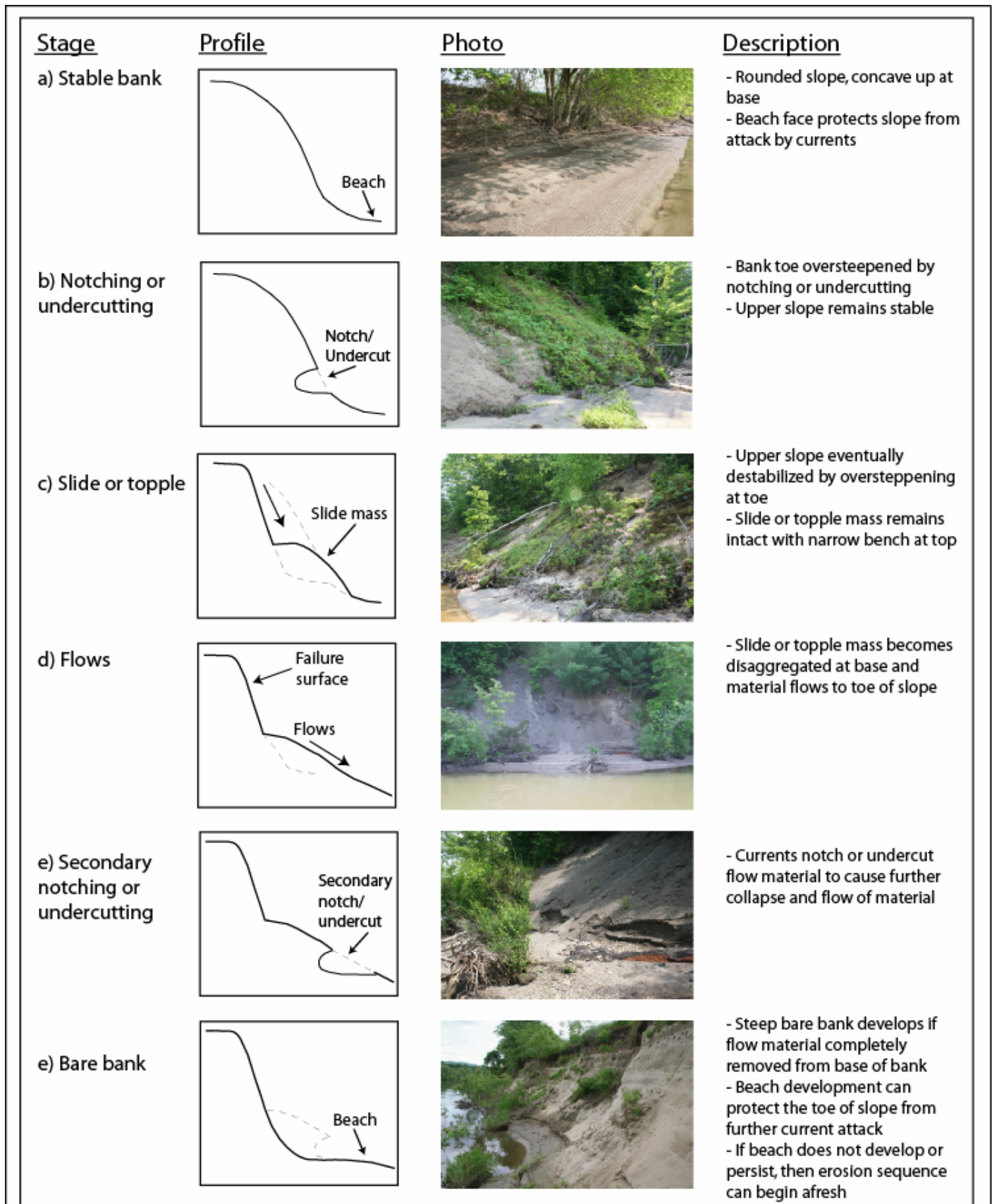


Figure 30: Model illustrating idealized sequence of erosion. Different stages of erosion can be occurring adjacent to each other along a long continuously eroding bank.

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

UPDATED PROPOSED STUDY PLAN

Group	Mass Wasting	Erosion Type	Degree Upper Riverbank Vegetation	Upper Riverbank Slope	Upper Riverbank Sediment	Lower Riverbank Slope	Lower Riverbank Sediment	Upper Riverbank Height	Lower Riverbank Vegetation
			to Heavy				to Rock	High	Heavy
7	None	None	Moderate to Heavy	Flat	non-Rock	Flat to Vertical	Silt/Sand to Rock	Low to High	None to Heavy
8	None	None	None to Heavy	Flat to Overhanging	Rock	Flat to Vertical	Silt/Sand to Rock	Low to High	None to Heavy

Comparison of Field's stage of erosion to Table 3.1-1 Matrix of Riverbank Features and Characteristics

Field's Figure 30 presents 6 stages of erosion as presented above. These 6 combinations of riverbanks provide useful information on possible combinations of riverbank features and characteristics. The matrix of riverbank features and characteristics utilized in the 2008 FRR and proposed for the 2013 FRR provide a comprehensive set of key features and characteristics, including those outlined by Field, 2007. The use of the matrix allows for a detailed and comprehensive approach in classifying riverbanks and allows development of a detailed and comprehensive understanding of riverbanks. Each of the stages described in Field's Figure 30 is included in the matrix as shown in Table 1. Inclusion of the six descriptions of riverbanks developed by Field and the numerous other possible sets of riverbank features and characteristics in the matrix provides a comprehensive set of riverbank features and characteristics that both describe the riverbank conditions as observed in the field, as well as the stages of erosion as described by Field.

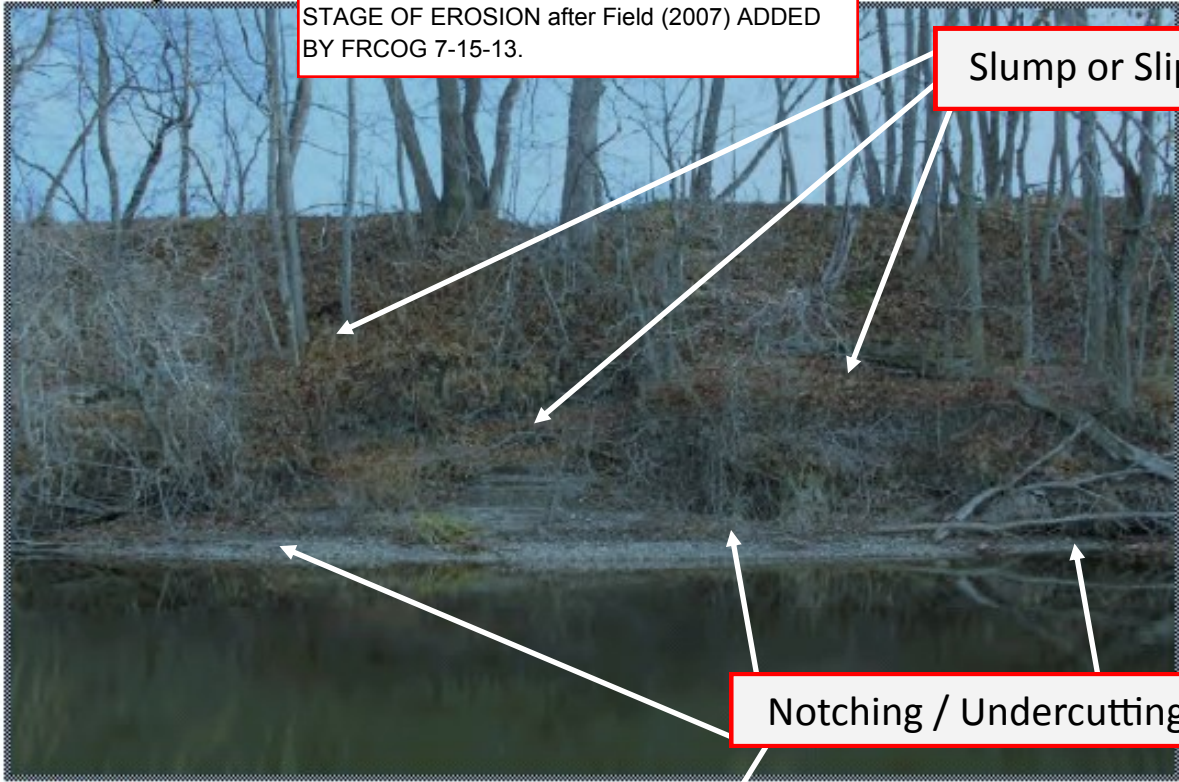
Table 1. Comparison of Field's stage of erosion with matrix of riverbank features and characteristics

Field	Matrix
a) Stable bank	Upper bank slope (flat to steep), Upper bank vegetation (moderate to heavily vegetated as well as even less vegetated conditions), with little to no erosion,
b) Notching or undercutting	Erosion Type: Undercut toe, notching; Degree of erosion: (little/none, some, extensive)
c) Slide or topple	Erosion Type: Slide; Degree of erosion: (little/none, some, extensive)
d) Flows (disaggregated slide)	Erosion Type: Slide; Degree of erosion: (little/none, some, extensive)
e) Secondary notching or undercutting	Erosion Type: Undercut toe, notching; Degree of erosion: (little/none, some, extensive)
f) Bare bank with beach	Upper bank slope with none to very sparse upper bank vegetation, flat lower bank slope

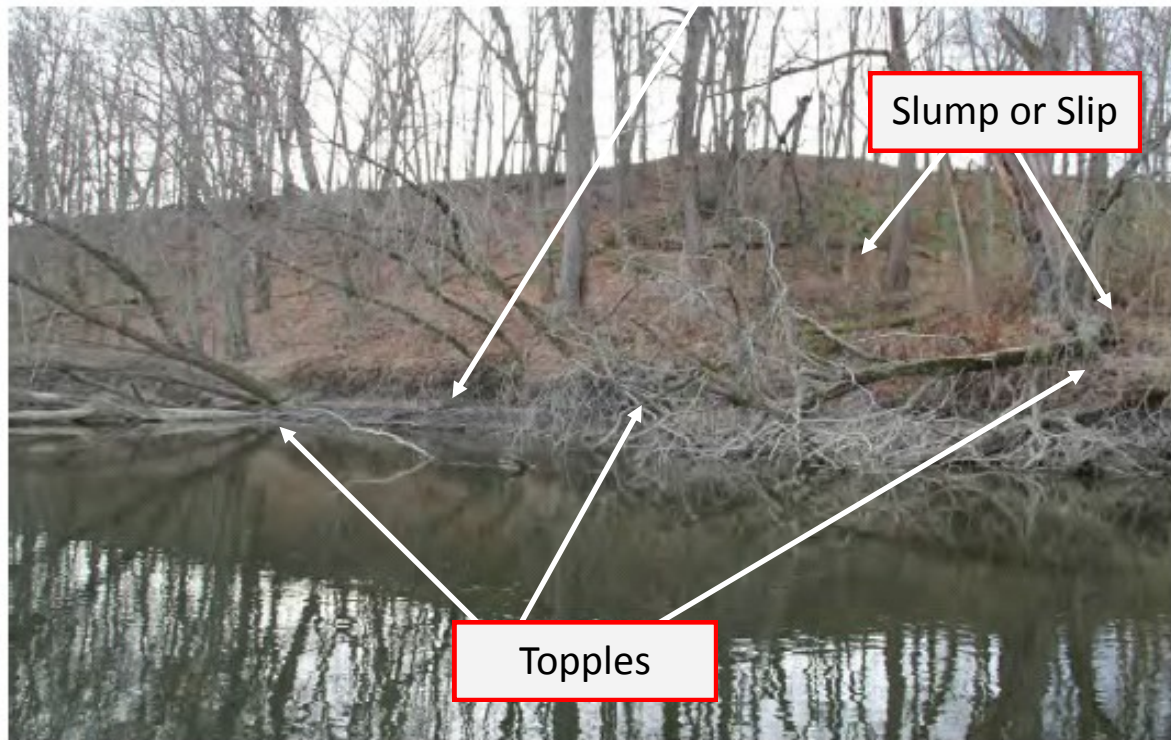
From the 3rd draft of the QAPP for the 2013 Full River Reconnaissance submitted by First Light on April 15, 2013.

Mass Wasting:

TEXT, TEXT BOXES AND ARROWS on the following pages that IDENTIFY THE TYPE AND STAGE OF EROSION after Field (2007) ADDED BY FRCOG 7-15-13.

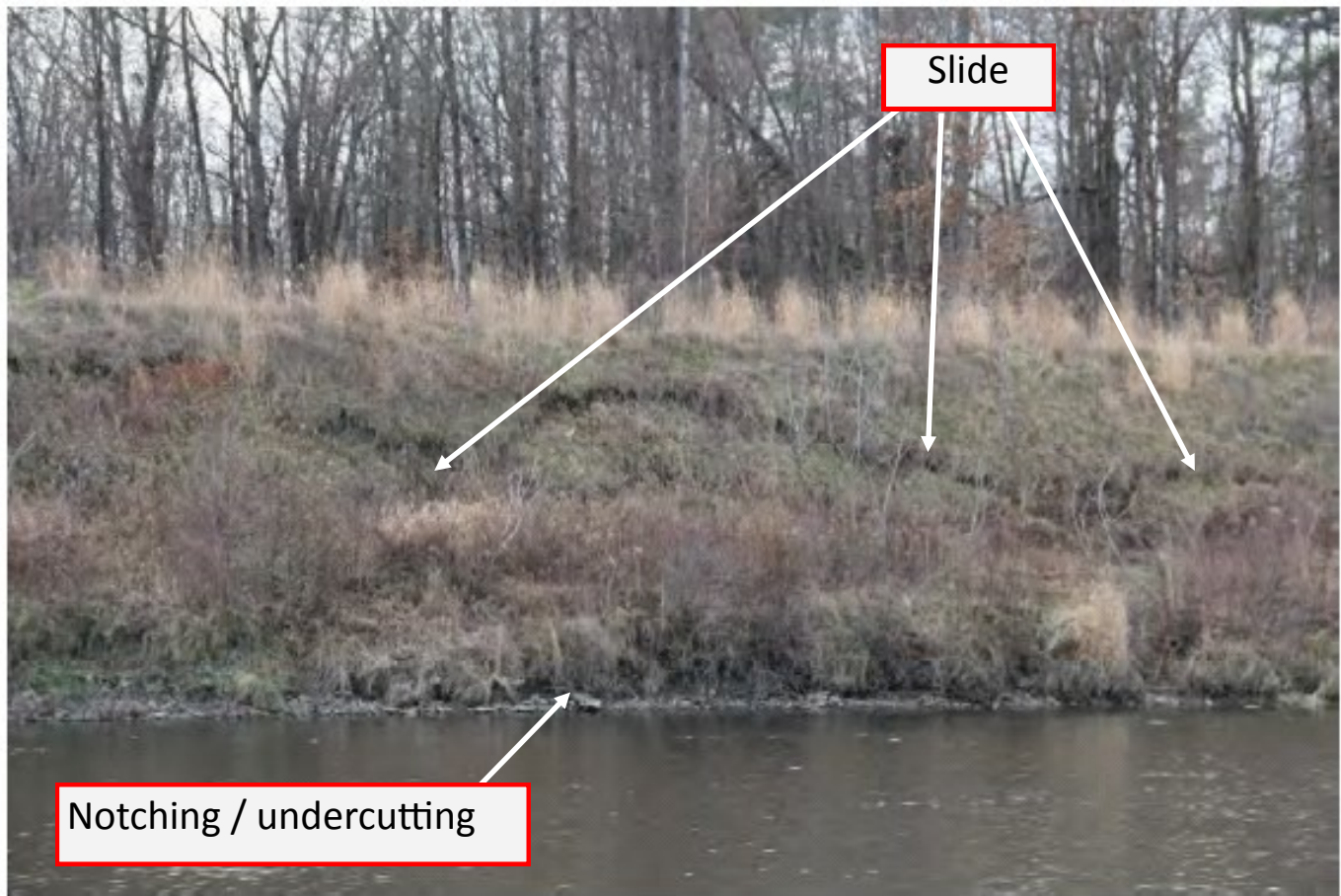


Little/None



Little/None

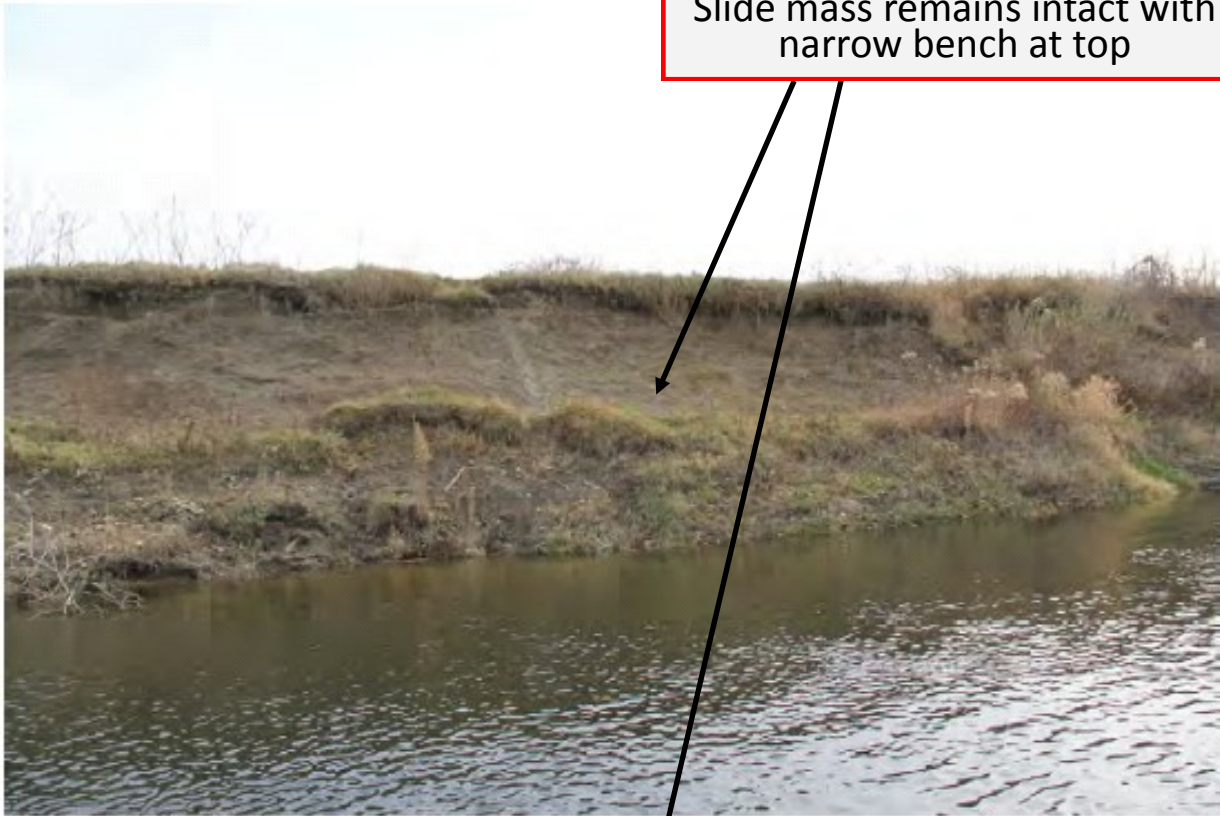
Stage of Erosion: b and c
Erosion Type: Falls (undercuts, gullies), Topples, Slides (slump, slip)



Little/None

Stage of Erosion: b and c
Erosion Type: Falls (notching, undercutting)
Slides (planar slip)

Slide mass remains intact with narrow bench at top



Some



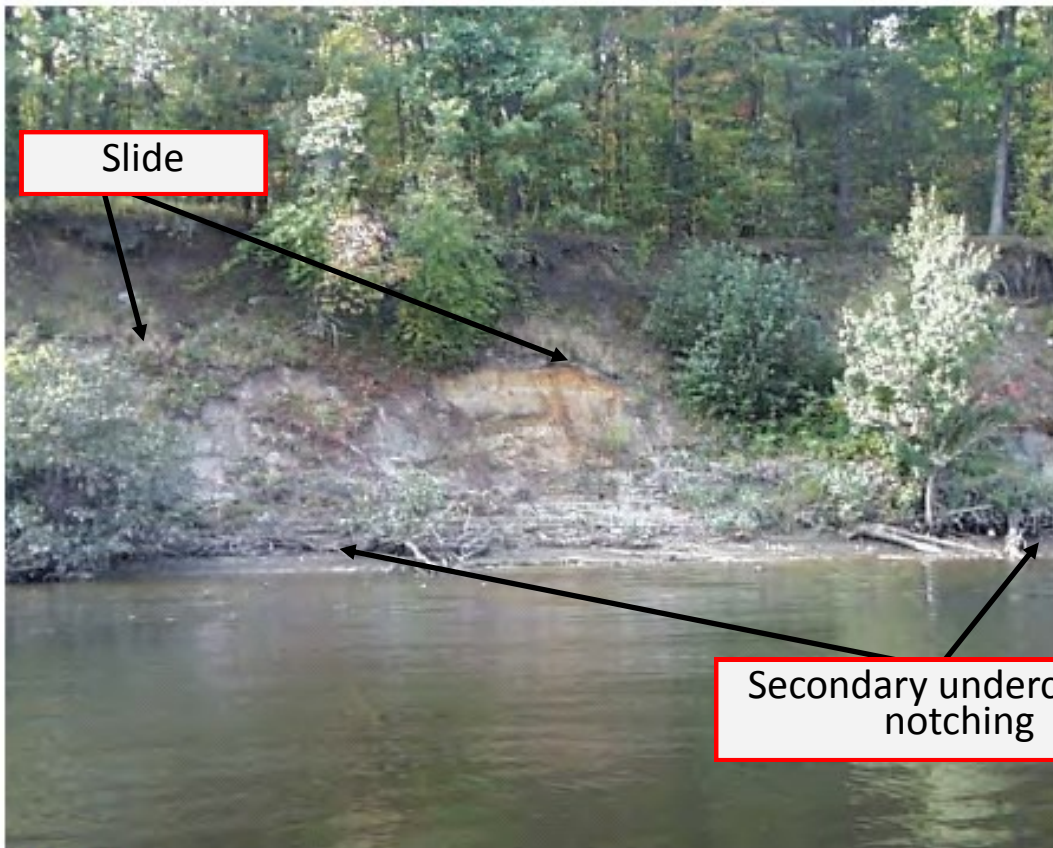
Some

Stage of Erosion: b and c — Slide mass remains intact with narrow bench at top

Erosion Type: Slide



Extensive



Extensive

Stage of Erosion: b and e
Erosion Type: Slide (planar slip), Falls (undercuts)



Extensive

Stage of Erosion: e (End stage)

This is a stabilized site. It is the Flagg property.

Franklin Conservation District

Hayburne Building - 55 Federal Street
Greenfield, MA 01301
413-772-0384 ext. 110

July 15, 2013

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

RE: Northfield Mountain Pumped Storage Project No. 2485-063
Turners Falls Project No. 1889-081
Comments on Updated Proposed Study Plan
Proposed Study 3.1.1 2013 Full River Reconnaissance Study
Proposed Study 3.1.2 Northfield Mountain/Turners Falls Operations Impact on Existing
Erosion and Potential Bank Instability
Study Request 4.1.1 Study of Shoreline Erosion Caused by Northfield Mountain Pumped
Storage Operations
Study Request 4.7.1, Feasibility of Converting the Northfield Mountain Pumped Storage
Project to a Closed-loop or Partially Closed-Loop System

Dear Secretary Bose,

The Franklin Conservation District (District) was established in the 1940's under Massachusetts General Law, Chapter 21, Sections 18-25 as a quasi-state agency for the purpose of delivering conservation programs at the county level. The purposes of Conservation Districts in Massachusetts are: to focus attention on land, water and related resource problems; to develop programs to solve them; to enlist and coordinate help from all public and private sources that can contribute to accomplishing the District's goals; and to make citizens aware of the interrelationships between human activities and the natural environment. The broad goals of the District are the conservation of soil, water, and related natural resources and supporting local agriculture.

The District is concerned about the area of the Connecticut River affected by the presence and operation of the Northfield Pumped Storage Project and the Turners Fall Project, owned and operated by FirstLight Hydro Generating Company. We have long been concerned that the water level fluctuations associated with the operation of the Northfield Mountain Pumped Storage and Turners Falls Projects negatively impact streambank stability (erosion), water quality, wildlife habitat, endangered species, wetlands resources, and agricultural land.

The Conservation District has been intimately involved with efforts to address erosion on the reach of the Connecticut River from the Turners Falls dam to the Vernon dam, also known as the Turners Falls Pool, since the 1980s. The District has participated in the Connecticut River

Streambank Erosion Committee (CRSEC) since its inception and has actively worked with the utility companies that have owned and operated the Northfield Mountain Pumped Storage Project, with affected landowners and state and federal resource agencies, and with the FERC to address the long-term and ongoing severe erosion of riverbanks in the Pool.

The District appreciates the opportunity to submit comments on the updated Proposed Study Plan (PSP). We offer general comments on the process, specific comments on proposed study plans and study request denials, and note comments submitted by other interested parties.

General Comments

FirstLight's June 28, 2013 filing cover letter states that "(g)iven the size of the Updated PSP and the short turnaround period for stakeholder review, modifications from the original PSP are shown in track-change to allow for easier review." This is not the case for proposed studies 3.1.1 and 3.1.2. There is no indication in either study of what has changed from the original filing.

The short turnaround time is extremely unfortunate, as stakeholders have only two weeks to review a 434 page document and develop comments. For that reason these comments will have to cover less of the Updated PSP and be considerably less detailed than would be optimal.

In response to the request in the cover letter, these comments are responding to the Updated PSP. It should be noted that because of FirstLight's filings, some comments perforce relate to material in the October 30, 2012 Pre-Application Document.

If there is to be valid assessment and analysis of bank erosion over time, there must be baseline documentation of bank location and conditions at least since the time of the raising of the dam and the start of Northfield project operations. If it is not included in study proposal 3.1.1, 2013 Full River Reconnaissance, which currently proposes to track only bank conditions (and not bank location) and only as far back as 1999, then it must be included in proposal 3.1.2, Northfield Mountain/Turners Falls Operations Impact on Existing Erosion and Potential Bank Instability.

3.1.1 2013 Full River Reconnaissance Study

As a member of the CRSEC, the District is familiar with the Full River Reconnaissance (FRR) process. The District and many other members of CRSEC have long believed and commented to FERC that the FRR methodology had significant flaws in many areas. The District and CRSEC found the 2008 FRR to be particularly flawed; the CRSEC's and other stakeholders' comments and detailed critiques were filed with FirstLight and the FERC and are in the docket record.

The District understands why FERC staff thought in December 2012 that the 2013 FRR could be included in the study plan schedule, but was surprised to find the FRR as a study described in the PSP filed April 15. Despite FERC staff's apparent belief that FirstLight would develop the FRR study proposal collaboratively with the CRSEC, FirstLight did not inform the CRSEC or other stakeholders of its intentions to file the FRR as a proposed study nor did it involve interested parties in any continuing development of the FRR and the associated Quality Assurance Project Plan (QAPP) between the December 2012 CRSEC meeting in which FERC staff participated by telephone and the filing of the original Proposed Study Plan on April 15, 2013.

The District has supported requests that a QAPP be written for the FRR methodology, and is pleased that one is supposed to be part of the 2013 FRR. We reviewed drafts of the QAPP, most

recently the one FirstLight presented in December 2012 and worked with the CRSEC to provide comments to FirstLight and FERC in early February of 2013. The QAPP, Appendix D to the Pre-Application Documents (PAD), was not included in the April 15 filing and has not been updated as of the June 28 filing. The scheduled review of the QAPP is going to be limited to a two-week window in late August; that will be an inadequate amount of time to review such a critical document, given the number of concerns already expressed about the draft and considering that it will be in the same time frame as review and comment on the entire Revised Study Plan. Since the QAPP is being updated as part of the PSP review, the QAPP review should proceed in an independent, separate time line.

There have been changes in the updated FRR study proposal since the April 15 version, partially responding to comments provided at the May 15 and June 14 meetings. There remain, however, several problems with the study proposal and, particularly, with the FRR methodology.

Task 1a: Identify and Define Current Riverbank Features and Characteristics

It is disingenuous for FirstLight to assert in the first paragraph that the matrix in Table 3.1-1 was based in part on discussions with the CRSEC. To the contrary, the District and the CRSEC have objected strenuously to that matrix since it was first presented.

The field data logging worksheet, Table 3.1-1, and the riverbank characterization matrix, Table 3.1-2, continue to be extremely flawed. Stages of erosion and features indicative of erosion are ignored. The erosion types listed in table 3.1-1 include two categories that were identified as being stages of erosion, not types of erosion, by Field in 2007. The coding of segments which results from the Table 3.1-2 matrix is lengthy, confusing, and not useful for prioritizing projects.

As many reviewers have commented, Table 3.1-1 only confuses any evaluation of erosion by considering mass wasting as a category unto itself, rather than as a type of erosion occurring. A minor example of flaws in this table is the reference regarding Upper Riverbank Height to “total height above normal water level” when there is no definition given of what normal water level is.

Table 3.1-2: Riverbank Characteristics and associated Table 1, Comparison of Field’s stages of erosion with matrix of riverbank features and characteristics, illustrate the confusion inherent in the meaningless categorization in Table 3.1-2. While Table 1 ostensibly relates Field’s six stages of erosion to erosion types, Table 3.1-2 provides only two (of eight) “Groups” that involve any type of erosion, although many other groups include steep to overhanging banks.

This Table 1 further highlights some of the problems with the Table 3.1-2 matrix: the matrix definitions of Field’s “notching or undercutting” and “secondary notching or undercutting” are identical, as are the definitions of Field’s “slide or topple” and “flows.” An examination of Field’s diagrams shows these are four distinct stages of erosion, not two equivalent “groups.”

As these examples above demonstrate, and as many reviewers commented at the PSP public meetings, the proposed study does not adequately address the many concerns about the FRR methodology that have been provided repeatedly to FirstLight and filed with the FERC by the CRSEC and others regarding the 2008 FRR.

Another significant shortcoming of this proposal is the reliance on photos of bank conditions that are contained in the QAPP. The photos do not accurately depict the conditions they are labeled for and often include visual evidence contradicting assertions in the text. If the photos are

supposed to “provide a consistent guide as to how riverbank features and characteristics will be classified,” the proposal is fatally flawed – it will not provide objective, scientifically valid data.

Task 3: Land-use Mapping

This task is to “evaluate trends in bank erosion in relation to adjacent land use.” If it is to evaluate trends it must extend back in time, not just look at current conditions. The width of riparian buffers, for example, should be assessed since the start of Northfield Project operations.

Study Schedule

FirstLight has requested the FERC allow it to delay delivery of the FRR report. The FRR should be delivered on the original compliance schedule in April 2014, not delayed until fall of 2014 for no good reason. The intent of the original schedule is to allow the FRR to inform timely decision making about bank stabilization projects for license compliance under the Erosion Control Plan.

3.1.2 Northfield Mountain/Turners Falls Operations Impact on Existing Erosion and Potential bank Instability

Task 2: Geomorphic Understanding of Connecticut River

As noted above in General Comments, this study should incorporate documentation of existing conditions at the start of Northfield Project operations as a baseline for riverbank assessments.

Task 5c: Evaluation of Round 1 Field Evaluation

This task is based on the results of the arguably flawed FRR methodology. It describes an undefined site selection process for further evaluation. That process should be defined and should incorporate stakeholder involvement.

Task 7: Report

This task consists of nothing more than a list of nine bullet points. It should provide a detailed description of each element. It should describe the report development process, and that process should include a draft report for stakeholder and permitting agency review and comment.

Final Comments

The District believes that all elements of the proposed methodology, items one through nine, of denied Study Request 4.1.1 Study of Shoreline Erosion Caused by Northfield Mountain Pumped Storage Operations should be included in either proposed studies 3.1.1 or 3.1.2.

The District notes that denied Study Request 4.7.1, Feasibility of Converting the Northfield Mountain Pumped Storage Project to a Closed-loop or Partially Closed-Loop System, was discussed at length in public meeting. While it may be considered by some to be premature at this time, before results of other studies are complete, it certainly is an analysis that should not be completely forestalled. It is possible that other proposed studies will demonstrate that there are unacceptable environmental impacts from the current operating regiment of Northfield and such an alternative operations analysis is called for. FERC should make sure that remains possible.

The District notes and endorses the comments filed by MA DEP and the comments of the Franklin Regional Council of Governments and the Connecticut River Watershed Council.

The District requests the FERC to ensure that the licensee addresses the concerns articulated above and by other stakeholders and permitting agencies. The FERC should require FirstLight to address concerns filed with the FERC regarding the 2008 FRR, as well as comments provided at the public meetings and filings in the PSP process. The end results all are seeking should be detailed, scientifically valid assessments of project operation impacts, over time, that will inform the License Compliance and relicensing processes.

Thank you for the opportunity to comment on these important issues.

Sincerely,


Vice Chair

Carolyn Shores-Ness, Vice Chair
Franklin Conservation District

Landowners and Concerned Citizens for License Compliance

July 15, 2013

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Northfield Mountain Pumped Storage Project, FERC No. 2485-063
Turners Falls Project, FERC No. 1889-081

Comments on the Updated Proposed Study Plan (PSP) Section 3.1 Geology and Soils
3.1.1 *2013 Full River Reconnaissance Study* and 3.1.2 *Northfield Mountain/Turners Falls
Operations Impact on Existing Erosion and Potential Bank Instability* and Section 4.0
Studies not included in the PSP, 4.1 Geology and Soils, 4.1.1 *Study of Shoreline Erosion
Caused by Northfield Mountain Pumped Storage Operations*

Dear Secretary Bose:

Introduction:

The Landowners and Concerned Citizens for License Compliance (LCCLC) consists primarily of Gill and Northfield farm and conservation landowners who organized after seeing our riverbanks continue to wash down the Connecticut River in the Turners Falls Pool. Current and previous landowners have consistently advocated for more and better work to stabilize and repair areas of bank erosion with numerous filings to FERC, including professional studies commissioned by LCCLC, all of which have been made a part of the licensing proceeding.

The LCCLC has active members on the Connecticut River Streambank Erosion Committee (CRSEC), a committee of the Franklin Regional Council of Governments' (FRCOG). The CRSEC, convened in 1994 and formalized by FERC in the 1999 Erosion Control Plan, brings together the Northfield Mountain Pumped Storage Project operator, state and municipal entities, landowners, and NGO's to select and prioritize bioengineering projects to stabilize and repair areas of bank erosion in the Turners Falls Pool. More recently, the LCCLC and the CRSEC attempted to work with FirstLight to develop a suitable Quality Assurance Project Plan (QAPP) and appropriate methodology for the 2013 FRR, but the QAPP has not been finalized since FirstLight stopped collaborating on the Plan.

Some of our members filed a letter to the FERC Secretary on May 16, 2008 documenting landowner concerns having been continuous since 1972, starting with letters to the then Federal Power Commission (FPC). This filing also contained a chronology by previous landowners of thirty-five years of advocacy by concerned landowners and public agencies, that began with the activation of Northfield Mountain Pumped Storage Project in 1972, to address streambank erosion on the Connecticut River.

This chronology excerpts a July 12, 1976 Northeast Utilities letter to the FPC stating that: “Early in the planning stages of the Northfield Project, it was recognized that increased fluctuations on water levels in the Turners Falls Pond would cause damage to trees along the river’s edge....Since the initial operation of the Project in late 1972, Northeast Utilities has been aware of bank erosion and has been monitoring a number of these areas along the pond.”

A similar viewpoint is contained in the March 1977 “Streambank Erosion Control Evaluation and Demonstration Projects (Section 32) in New England,” Haverhill, New Hampshire and Northfield, Massachusetts by the Department of the Army, New England Division, Corps of Engineers, Waltham, Mass. It states on page 16: “Northeast Utilities (NU) constructed a pump-storage electric facility at Northfield Mountain which uses the Turners Falls pool as the lower impoundment. Turners Falls pool was raised 5.5 feet in 1973 and this area is one of the most actively eroding reaches of the Connecticut River today. The Corps has submitted a project proposal within the pool for construction under Section 32. NU acknowledges that much of the problem is a result of power pool operations.”

The LCCLC has been and continues to be concerned with the frequent and significant water level fluctuation associate with the operation of the Northfield Mountain Pumped Storage and Turners Falls projects which contribute to streambank erosion and impacts water quality, threatened and endangered species, fisheries, and riparian and littoral habitat. In particular, we believe that the Northfield Mountain Pumped Storage project and its operational use of the Connecticut River have been a long-term experiment that has resulted in significant adverse environmental impacts.

The LCCLC presented a photographic record of the erosion just upstream and across from the tailrace to the assembled FERC staff at the Scoping Meeting on January 30, 2013. Our scoping meeting presentation demonstrated why the current and previous owners of this conservation land have been so persistent in drawing FERC’s attention to the severity of erosion of our riverbanks and why the current restoration effort is several decades too late. In 1960 an Oak tree on the featured riverbanks stood approximately 30’ from the top edge of the bank. It is now less than 6’ from the top edge of the heavily eroded bank. This tree marks the site of Cross Section 8A that has been used by the Licensees over the years to monitor erosion in the Turners Falls Pool on the Connecticut River. So, quantitative data should be available to document this erosion, which we have previously placed in an information request in LCCLC’s 2/13/13 filing with FERC.

Comments:

We regret that the extremely short timeframe to provide comments on these studies precludes detailed comments. That said, we do have several important comments to submit for your consideration. We would also like to express our strong support of the more detailed comments submitted to you by the Franklin Regional Council of Governments (FRCOG).

Despite submitting three versions of Geology and Soils section of the Proposed Study Plan to stakeholders, with the third version made available to stakeholders on June 28, 2013, FirstLight continues to disregard the detailed comments and concerns expressed by stakeholders at the study plan meetings and in previous correspondence with FERC. We find the updated study plans for Geology and Soils unacceptable because of the numerous fatal flaws and lack of clearly stated goals, objectives and deliverables, as detailed in the FRCOG's comment letter. FirstLight has not followed through to develop a Quality Assurance Project Plan that would serve as the basis for these studies. We urge FERC to require FirstLight to work with stakeholders to complete a credible QAPP, and to then undertake studies that are based on technically defensible science. The mandatory conditioning agencies and stakeholders must have confidence in the collection and analysis of data that will be used to evaluate the potential impacts that project operations have on the river and its resources.

We assert that bank erosion is the principal environmental problem in the Turners Falls Pool and impacts all the other resources listed in the Proposed Study Plan – Water Resources; Fish and Aquatic Resources; Terrestrial Resources; Wetlands, Riparian and Littoral Habitat; Recreation and Land Use; Cultural Resources; and Developmental Resources. We urge FERC to require FirstLight to develop clear and scientifically defensible studies that will provide valid and useful data about the impacts of project operations on riverbank stability and erosion in the Turners Falls Pool.

In particular, we are concerned that the findings, conclusions and recommendations of the *Fluvial Geomorphology Study of the Turners Falls Pool on the Connecticut River Between Turners Falls, MA and Vernon, VT*, prepared by Field Geology Services of Farmington, ME (Field, 2007) have been completely ignored by the licensee in the formulation of their proposed Study Plans to gather information on the geology and soils of the Turners Falls Pool. Dr. Field's study was commissioned by FirstLight to "understand the causes of bank erosion and identify the most appropriate methods for bank stabilization on this section of river." We believe that Dr. Field's work is a comprehensive, well researched and scientifically based document.

3.1 Geology and Soils

Proposed Study 3.1.1 2013 Full River Reconnaissance Study

We assert that the 2013 FRR study plan is not adequate for compliance or relicensing purposes. We are disappointed that the detailed, comprehensive comments prepared by the FRCOG and other stakeholders, including the LCCLC, on the 2008 FRR methodology, the final report for the 2008 FRR, and the QAPP and proposed methodology for the 2013 FRR have not been addressed or included in the 2013 FRR methodology. **The proposed methodology for the 2013 FRR is exactly the same as that used in 2008, which is unacceptable.**

Field (2007) stated that future efforts for monitoring erosion in the Turners Falls Pool must utilize a consistent, well documented technique for identifying erosion sites that is conducted in the early Spring or late Fall when bank exposures are least obscured by vegetation: “*such a technique should be based on the types of erosion observed and stage of erosion present not proxies for erosion or erosion susceptibility such as the amount of vegetation, percentage of exposed soil, bank height and slope, or soil type*”. [emphasis added].

Unfortunately, FirstLight chose to ignore these recommendations and instead both the 2008 and 2013 FRR methodologies (Tables 3.1-1 and 3.1-2) **use all of the “proxies for erosion or erosion susceptibility” described by Field**. The spatial and temporal extent of the erosion cannot be documented by the methods proposed for the 2013 FRR. We urge an approach that documents the type and stage of erosion according to Field (2007) so that maps can be generated that show, for example, the linear extent and location of all types and stages of erosion. Knowing this information is critical to any efforts to understand the causes of erosion, which FirstLight proposes to do in Study 3.1.2. **Data that are proxies for erosion should not be used as data in the study to determine the causes of erosion.**

In addition to completely revising the 2013 FRR methodology, there are two tasks that could be added to Study 3.1.1 to provide data that would be informative to the relicensing process. They are:

1. The photographic log of the riverbanks compiled during the fluvial geomorphology study (Field, 2007) should be updated during the 2013 FRR to provide a method for visually identifying and confirming the condition and location of eroding banks. Re-photographing the riverbanks periodically from the same locations will provide a means of identifying new erosion sites or, conversely, areas that are stabilizing. Unfortunately, this simple, relatively low cost recommendation was not implemented in the 2008 FRR or proposed for the 2013 FRR. A wealth of information can be easily gleaned from photographs and photographic logs that are updated over time.
2. Field (2007) recommended that the initial photographic log compiled during his study be compared with continuous digital image logs taken during 2001 and 2004 (NEE, 2005). We would add the continuous digital image logs taken for the 2008 FRR and the 2013 FRR to this list.

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

Again, we are disappointed that FirstLight’s proposed study does not specifically build upon the findings and recommendations in the Field (2007) report. Dr. Field reviewed and summarized the previous work that had been done by the Army Corps of Engineers and others to understand the erosion occurring in the Turners Falls Pool. According to Field (2007), conditions in the Turners Falls Pool create a situation where the riverbanks are near the threshold of erosion. An important opportunity has been missed to build upon scientifically sound and well documented

work. We urge FERC to require the Study Plan be revised to provide scientifically sound and defensible data.

4.0 Studies not Included in the PSP

4.1 Geology and Soils

4.1.1 Study of Shoreline Erosion Caused by Northfield Mountain Pumped Storage Operations

As a point of clarification, NOAA's National Marine Fisheries (NMFS), a Federal resource agency, also requested this study (study request 6.14) in their comments filed on March 1, 2013. NMFS was not listed as requesting this study. The goals and objectives of this study, as stated in several stakeholders' requests, including the LCCLC, would be to determine the environmental effects of the presence and operation of the licensed facilities on riverbank stability, shoreline habitat, agricultural farmland, wetland resources, bed substrate, and water quality in the Turners Falls impoundment.

FirstLight dismissed the Relevant Resource Management Goals (18 CFR Section 5.9(b)(2)) listed by the LCCLC by stating that we, along with other stakeholders that requested the study, were not resource agencies. NMFS is a federal resource agency and listed among their numerous resource management goals was the concern that elevated levels of suspended sediment are associated with a diminution in water quality which also affects the quality of habitat encountered by *trust resource species*. [emphasis added]

We are very concerned that FirstLight omitted the study requested by NMFS, the LCCLC, FRCOG and other stakeholders. The argument given by FirstLight that certain requested tasks should not be done because FERC uses current conditions as its baseline for evaluating project effects and alternatives is not valid from a scientific basis. The baseline conditions should at a minimum bracket the timeframe for data analysis to the year the Northfield Mountain pumped storage project came on-line to the present day. However, current conditions, meaning what we see today, and future conditions under which the project will operate, cannot be evaluated in any meaningful way without an appropriate context. We understand that TransCanada is assembling and reviewing historical data as part of their study plans related to understanding erosion in the upper reach of the river. We assert that a similar level of effort is required for the Turners Falls Pool. We are asking for a reasonable time period, a reasonable context within which collected data will be evaluated to assess the impacts of project operations in the Turners Falls Pool and cumulative impacts of all five projects on the river.

We are dismayed that FirstLight would assert that it "is unclear how the requested data would inform potential PME measures." (page 4-3). Understanding how project operations affect the river, its banks and other resources is critical to designing appropriate PME measures. **Giving the erosion issue "short shrift" in the Study Plan process will ensure that inadequate and suspect data informs potential PME measures.**

We request that FERC direct FirstLight to add the following tasks from NMFS', LCCLC's, FRCOG's and other stakeholders' study request – *Study of Shoreline Erosion Caused by Northfield Mountain Pumped Storage Operations* to FirstLight's proposed study 3.1.2.

1. This study should determine the net soil loss in cubic yards between when the pumped storage project came on-line and the present; a density estimate of the eroded material should also be provided. Provide an analysis of where the greatest loss has occurred, location of proximity to the tailrace, soil type, riparian land use, and vegetative cover in that area. Calculate nutrient loadings (nitrogen and phosphorus compounds) to the river system based on soil loss.

2. Obtain copies of the original survey plans for the project (Exhibit K), and complete a new survey using the same landmarks used previously. The Field (2007) report states on page 11 that the original survey plans of the river are still retained by Ainsworth and Associates, Inc. of Greenfield MA. Use pre-operation aerial photos and current aerial photos to complete a 10-foot topographic map of the section of river between Turners Falls Dam and Vernon Dam and the 200-foot buffer regulated under the Massachusetts Rivers Protection Act. The Field (2007) report on page 11 states that Eastern Topographics, Inc. determined that sufficient information is known about the 1961 aerial photos (e.g., height of airplane) to create a 10-foot topographic map of that time period, and that 1961 aerial photos could be accurately overlaid with recent aerial photos. Field (2007) states that this analysis would enable a more reliable determination of small-scale shifts in channel position and changes in bank height that may have resulted from the erosion of a low bench that previously existed along portions of the river and help identify areas of the most significant bank recession during the past 45 years. Among other things, create a single map showing areas of erosion and deposition, and also overlay the Field report's hydraulic modeling analysis of the river channel. "

3. Complete detailed surficial mapping (topographic map or LIDAR) to identify the various geomorphic surfaces, height of benches/terraces above the river level, and types of sediments underlying the surfaces. This will allow one to determine how erosion varies with geomorphic conditions. One could then normalize the amount of erosion to a specific type of bank material/geomorphic surface/terrace.

FirstLight's reason for not conducting LIDAR, which they said was too expensive and other topographic data was available, is not valid for two key reasons. First, the data FirstLight proposes to use, the USGS 10 meter digital elevation model, does not have sufficient resolution to determine how erosion varies with geomorphic conditions. Second, TransCanada is using LIDAR for the northern reach of the river and consistent data is needed to enable FERC to evaluate both individual project impacts and cumulative impacts.

Thank you for the opportunity to submit comments on FirstLight's Updated Proposed Study Plan. We regret that the short timeframe between receiving the Updated Proposed Study Plan (June 28, 2013) and the date the comments are due (July 15, 2013) does not provide us an opportunity to submit more detailed comments.

The LCCLC looks forward to continuing our active engagement in the relicensing of the Turners Falls Dam and Northfield Mountain Pumped Storage Projects. We request having a local representative from the FRCOG, Franklin Conservation District, Gill Conservation

Commission, or LCCLC accompany FirstLight when they conduct the FRR. The more eyes on the river the better!

Respectfully submitted,

/s/Michael Bathory, Member
Landowners and Concerned Citizens for License Compliance
144 River Road
Gill, MA 01354

cc: John Howard, First Light Hydro generating Company

Robert McCollum, MA Department of Environmental Protection

Robert Kubit, MA Department of Environmental Protection

Peggy Sloan, Franklin Regional Planning Board

Tom Miner, Connecticut River Streambank Erosion Committee

Ken Hogan, Federal Energy Regulatory Commission

Chris Chaney, Federal Energy Regulatory Commission

Congressman James McGovern

Jennifer Soper, MA Department of Conservation and Recreation

Paul Jahnige, MA Department of Conservation and Recreation

Senator Stan Rosenberg, Massachusetts State Senate

Senator Benjamin Downing, Massachusetts State Senate

Representative Denise Andrews, Massachusetts House of Representatives

Bethany A. Card, MA Department of Environmental Protection

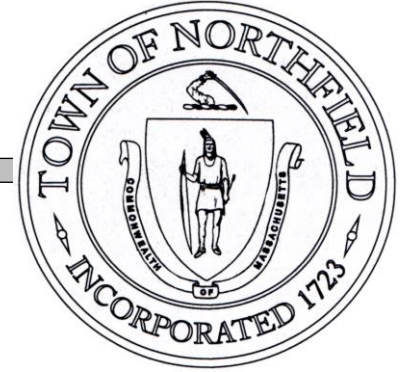
Michael Gorski, MA Department of Environmental Protection

Brian Harrington, MA Department of Environmental Protection

TOWN OF NORTHFIELD
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July 15, 2013

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Northfield Mountain Pumped Storage Project, FERC No. 2485-063
Turners Falls Project, FERC No. 1889-081

Comments on the Updated Proposed Study Plan (PSP) Section 3.1 Geology and Soils,
3.1.1 *2013 Full River Reconnaissance Study* and 3.1.2 *Northfield Mountain/Turners Falls
Operations Impact on Existing Erosion and Potential Bank Instability*.

Dear Secretary Bose:

The Town of Northfield is pleased to submit comments on the above-referenced sections of the Updated Proposed Study Plan submitted by FirstLight. The Town of Northfield is the only Town in the Commonwealth of Massachusetts to straddle the Connecticut River, having land on both the western and eastern banks. We therefore have considerable interest in all Connecticut River issues, including physical, biological, ecological, and economic.

The Town strongly supports the comments of the Franklin Regional Council of Governments (FRCOG) submitted to you on the Updated Proposed Study Plan. We are particularly concerned that bank erosion is the predominant environmental problem in the Turners Falls Pool and impacts all the other resources listed in the Proposed Study Plan – Water Resources; Fish and Aquatic Resources; Terrestrial Resources; Wetlands, Riparian and Littoral Habitat; Recreation and Land Use; Cultural Resources; and Developmental Resources. We urge FERC to require FirstLight to develop clear and scientifically defensible studies that will provide valid and useful data about the impacts of project operations on river bank stability and erosion in the Turners Falls Pool.

As an example, we are concerned that the findings, conclusions and recommendations of the *Fluvial Geomorphology Study of the Turners Falls Pool on the Connecticut River Between Turners Falls, MA and Vernon, VT*, prepared by Field Geology Services of Farmington, ME (Field, 2007) have been completely ignored by the licensee in the formulation of their proposed Study Plans to gather information on the geology and soils of the Turners Falls Pool. Dr. Field's study was commissioned by the FirstLight to "understand the causes of bank erosion and identify the most appropriate methods for bank stabilization on this section of river." We believe that Dr.

Field's work is a comprehensive, well researched and scientifically-based document and one that provides a solid foundation for the additional data collection efforts to be undertaken during relicensing.

We support FRCOG's assertions that Study 3.1.1, 2013 Full River Reconnaissance (FRR) study plan and Study 3.1.2 Northfield Mountain/Turners Falls Operations Impact on Existing Erosion and Potential Bank Instability are not adequate for relicensing purposes. We are disappointed that once again the detailed, comprehensive comments prepared by the Town of Northfield's Conservation Commission, FRCOG and other stakeholders on the 2008 FRR methodology and the findings of the 2008 FRR have not been addressed or included in the 2013 FRR methodology. **The proposed methodology for the 2013 FRR is exactly the same as that used in 2008, which is unacceptable.**

Field (2007) stated that future efforts for monitoring erosion in the Turners Falls Pool must utilize a consistent, well documented technique for identifying erosion sites that is conducted in the early Spring or late Fall when bank exposures are least obscured by vegetation: "*such a technique should be based on the types of erosion observed and stage of erosion present not proxies for erosion or erosion susceptibility such as the amount of vegetation, percentage of exposed soil, bank height and slope, or soil type*". [emphasis added].

Unfortunately, FirstLight ignored Dr. Field's recommendations and instead both the 2008 and 2013 FRR methodologies (see Tables 3.1-1 and 3.1-2) **use all of the "proxies for erosion or erosion susceptibility"** described by Dr. Field. The spatial and temporal extent of the erosion cannot be documented by the methods proposed for the 2013 FRR. We urge an approach that documents the type and stage of erosion according to Field (2007) so that maps can be generated that show, for example, the linear extent and location of all types and stages of erosion. Knowing this information is critical to any efforts to understand the causes of erosion, which FirstLight proposes to do in Study 3.1.2. **Data that are proxies for erosion should not be used as data in the study to determine the causes of erosion.**

Please be sure that FERC exercises its public authority to maintain and enhance the best qualities of the Connecticut River during this relicensing process, while eliminating or at least minimizing those qualities which detract from the health of the river.

Thank you very much.

On behalf of the Board of Selectmen of the Town of Northfield,

Sincerely yours,



Thomas W. Hutcheson
Town Administrator

July 14, 2013

Karl Meyer, M.S., Environmental Science
85 School Street, # 3
Greenfield, MA 01301

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
88 First Street, N.E.
Washington, DC 20426

Stakeholder Comments, RE: FirstLight Hydro Generating Company's *Updated Proposed Study Plan (PSP)* for Northfield Mountain Pumped Storage Project, **FERC Project No. 2485-063; and Turners Falls Hydroelectric Project, **FERC Project No. 1889-081****

Dear Secretary Bose,

Please consider the following comments, changes and proposed improvements to FirstLight Hydro Generating Company's **Updated Proposed Study Plan (PSP)** in order to achieve the best measurable outcomes for the public's interest in a balanced and functioning Connecticut River ecosystem as you consider new operating licenses for hydropower generation at these two projects.

Comments refer to Updated PSP #s: 2.2.1; 2.3.1; 3.2.2; 3.3.1; 3.3.2; 3.3.3; 3.3.5; 3.3.6; 3.3.7; 3.3.8; and 3.3.19.

Comments:

2.2.1 & 2.3.1: Proposed Changes to Project Operation

FL Updated Proposed Study Plan, Numbers 2.2.1 and 2.3.1: Operator is considering additional generation by adding volume, flow and velocity in, 1(p.2-15): the Turners Falls Power Canal at either **Station #1** or **Cabot Station**, or operating **Cabot Station** at full capacity; and, 2(p.2-35): at the **Northfield Mountain Project**. Hydraulic capacity increase at TF/Cabot sites, and at Northfield Mountain would be near 2,000 CFS respectively.

Any back-dated decisions in adding generation at these two licensed sites may impact the effectiveness and criteria of studies that will be implemented in the interim, and may prove confounding to the two-year study regimen. Both would certainly impact downstream habitats and flows. **What criteria** is FirstLight looking at when deciding on new generation requests—and when will they reveal their choices?

3.2.2: Hydraulic Study of the Turners Falls Impoundment, Bypass Reach, ("power canal"—now omitted by FL) and below Cabot Station

Note: Hydraulic study of the TF Power Canal is a **key need** if this is again to be considered an **upstream route for migratory American shad**. After 14 years of continuous study and project improvements near the head of the Turners Falls Canal, Gate House fish passage numbers are no more improved--nor consistent, compared to numbers of fish passing Holyoke Fish Lift, than they were a quarter century ago: Holyoke Lift versus the actual percent that were able to pass

up through the TF Power Canal and through the Gatehouse: (*Figures from the Connecticut River Atlantic Salmon Commission Tech. Committee Meeting, Secretary's Report: 6/18/2013*)

Gatehouse passage success: 1989: 2.7%; 1990:7.8%; 1991:10.5%; 1992: 8.3%; 1993:3.0%

Gatehouse passage success: 2009: 2.4%; 2010:10.0%; 2011:6.9%; 2012:5.4%; 2013: 9.2%.

(p. 3-50) *"FERC has requested that FirstLight develop an unsteady state HEC-RAS model in the Turners Falls Impoundment, bypass reach, **power canal**, and below Cabot Station to the upper limit of the Holyoke Impoundment."*

FirstLight states that a hydraulic study of the TF power canal is **unnecessary**, as surface (WSEL) elevations fluctuate very little. *"Given the power canal's limited WSEL fluctuations, FirstLight does not believe a hydraulic model of the power canal is warranted."*

FERC is correct. A full hydraulics study of the TF Canal is needed. It is necessary as baseline information if migratory fish continue to be diverted into the power canal. It will also be critical information if generating capacity in the TF Canal and upstream at the Northfield Project is increased by 2,000 cfs, respectively(**2.2.1 & 2.3.1**). This would certainly impact hydraulics at the head gates and downstream in the power canal.

There are 14 head gates at the TF Gatehouse flushing directly into the TF Power Canal. Surface level elevations have very little to say about actual flow hydraulics at this site. Those head gate openings and the fluctuating head-levels from the TF Impoundment behind the dam create a region of extreme turbulence in the canal running some 500 feet downstream from Gatehouse. This is one of the bottlenecks in the power canal route that has not been overcome after 43 years of study and structural changes in this upstream route.

When the agencies and the public were taken on FERC site visits, only one group in three was given a tour of this side of the TF Gatehouse. At that time, only 4 head gates were open. The canal appeared a relatively calm place. When all head gates are open—as the Northfield Project and Cabot are run in peaking modes, or the TF Canal is run at baseload capacity through the day, this region is a boiling-roll of water. Surface speeds reach nearly 10 mph (as monitored by cyclists on the canal path). We need to know how this affects velocity and turbulence throughout the water column

Given recent fish passage increases at Holyoke Dam, it is feasible that building a facility to lift migratory fish out of the CT River and into the TF Canal below Cabot Station **could divert as many as 100,000 fish into the canal over a period of a few days**. Recent work by USGS Conte Anadromous Fish Research Center showed **American shad spending an average of 25 days in the power canal**. Researchers did not investigate whether this was a signature of **fish mortality, spawning, or milling**. Nor has the TF canal ever been investigated as **spawning habitat**—which would have been logical, given those lengths of stopover. American shad notably do not do well with stress. Piling up the population in a power canal will likely **result in major migratory delays and increased mortality**—which needs a full investigation if this path remains an option.

This should be a two-year effort, to control for differences in flow years, fish tagging and handling, and to assure that full acoustic coverage is gained through proper array deployment.

American shad have not been able to negotiate this region of high turbulence since this canal route was chosen for them in 1980. At Holyoke, as well as at Vernon Dam, fish follow attraction water that leads them directly upstream to the dams. Rates of passage at both are within the acceptable range of 40-60% that the agencies have set as targets. When the Connecticut River above Cabot Station—aka, the Bypass Reach, was allowed to be de-watered in deference to this power canal route, ***shad and herring were expected to locate and negotiate a series ladders, turns, turbines, and turbulence at a half dozen canal sites in order to reach upriver spawning areas.*** It's a migratory knot; created by humans.

The Connecticut River migratory fisheries restoration effort risks repeating **four new decades of failure** if it again ignores logic. The TF Power Canal is in need of a full hydraulic study.

Hydraulic modeling must be done here in order to avoid another migratory fisheries restoration disaster at Turners Falls. Northern Massachusetts, Vermont and New Hampshire have yet to see their guaranteed shares of the targeted shad and herring runs, nor has the program achieved anything near its stated goals: **“The intent of this program is to provide the public with high quality sport fishing opportunities in a highly urbanized area as well as to provide for the long term needs of the population for food,”** as stated in the **New England Cooperative Fisheries Statement of Intent in 1967.**

Existing Information and Need for Additional Information (18 CFR § 5.11(d)(3))

Please **ADD** to Existing Information: ***Life history and behaviour of Connecticut River shortnose and other sturgeons, 2012***, Kynard et al, World Sturgeon Conservation Society publications, **ISBN: 978-3-8448-2801-6**. Available through the North American Sturgeon and Paddlefish Society at: www.nasps-sturgeon.org/#!/publications , or directly from Dr. Kynard at: kynard@eco.umass.edu. ***Chapter 3-Migrations, Effect of River Regulation*** documents over a decade of highly relevant studies.

FirstLight's Water Level Recorders (River Stage)” The Water Level Recorders deployed by FL in 2010 that supplied **“limited data”** from the By Pass Reach and below Station 1 **should be removed from “existing information” status**. WSEL monitoring in this reach needs to be redone. Several more monitors at key sites are needed to protect resident and migratory fish, as well as the **federally-endangered shortnose sturgeon**, which gathers for **pre-spawning in the pool immediately below the Rock Dam**, and--when flows allow, chooses to spawn there.

Note *: *personal communication* from Dr. Boyd Kynard, fish behaviorist and CT River shortnose sturgeon expert:

“For 10 years between 1993 and 2007, adult snns were present at Rock Dam for 5 years prior to spawning occurring anywhere (Rock Dam or Cabot Station). During the 5 years they were present, the mean number of adults present was 10.4 (range, 3-25). Thus, many adults moved to the Rock Dam spawning site before any spawning occurred at Cabot Station suggesting they preferred to spawn at Rock Dam.” (Refer to chapters 1 & 3, ***Life history and behaviour of Connecticut River shortnose and other sturgeons, 2012***, Kynard et al, World Sturgeon Conservation Society publications, **ISBN: 978-3-8448-2801-6**. Available through the North American Sturgeon and Paddlefish Society at: www.nasps-sturgeon.org/#!/publications , or directly from Dr. Kynard at: kynard@eco.umass.edu

Need for Additional Information (3-53): Where, exactly, did FL locate WSEL monitors in the By Pass Reach? How do they intend to guard against “vandalism” ruining further data collections?

Add to information list for specific information on this reach: Life history and behaviour of Connecticut River shortnose and other sturgeons, 2012, Kynard et al, World Sturgeon Conservation Society, publications, **ISBN: 978-3-8448-2801-6**.

Additional WSEL monitors needed. In order to protect pre-spawning and spawning of shortnose sturgeon in this reach of river **additional WSEL monitors** should also be placed at: **1.** In the pool immediately below Rock Dam, **2.** on the west side of the river, in the main stem channel, **upstream of Rawson Island** which is adjacent to, and just west of the Rock Dam. That Rock Dam ledge continues through the island and reemerges as part of the thalweg near the river’s west bank.

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

If migratory fish are again to be **diverted into the TF Power Canal via a new lift** in the river near Cabot outflows (proposed), special consideration needs to be made when considering siting the lift facility.

Federally-endangered shortnose sturgeon will likely enter the lift, and there exists the risk of putting them into the power canal where there is potential for **turbine mortality**.

Migratory delay: another reason for special care in considering diversion is **migratory delay for American shad and blueback herring at this site. If a lift gets built at Cabot, there will be a need for full-time monitoring personnel in order not to risk sending SNS into the canal.** Just as at Holyoke, with Atlantic salmon monitoring, **the lift would then have to shut down—sometimes for weeks at a time, due to turbidity and the risk of NOT identifying a migrant salmon**(or in this case, a federally endangered SNS). This type of migratory delay would not likely be acceptable to the agencies, or FL (**see FL’s added text about “without delay”** under **3.3.19** : “*Evaluate the Use of an Ultrasound Array to Facilitate Upstream Movement to Turners Falls Dam by Avoiding Cabot Station Tailrace.*”

Existing Information and Need for Additional Information (18 CFR § 5.11(d)(3))

The IFIM Study needs to be conducted with increased WSEL monitors given FL’s stated intent to potentially increase generation and flow at the Northfield Project, Station 1, and Cabot Station.

Several more monitors at key sites are needed to protect resident and migratory fish, as well as the **federally-endangered shortnose sturgeon**, which gathers for pre-spawning in the pool immediately below the Rock Dam, and--when flows allow, chooses to spawn there.

Note *: *personal communication* from Dr. Boyd Kynard, fish behaviorist and CT River shortnose sturgeon expert:

“For 10 years between 1993 and 2007, adult sns were present at Rock Dam for 5 years prior to spawning occurring anywhere (Rock Dam or Cabot Station). During the 5 years they were present, the mean number of adults present was 10.4 (range, 3-25). Thus, many adults moved

to the Rock Dam spawning site before any spawning occurred at Cabot Station suggesting they preferred to spawn at Rock Dam.” (Refer to chapters 1 & 3, **Life history and behaviour of Connecticut River shortnose and other sturgeons**, 2012, Kynard et al, World Sturgeon Conservation Society publications, ISBN: 978-3-8448-2801-6. Available through the North American Sturgeon and Paddlefish Society at: www.nasps-sturgeon.org/#!/publications , or directly from Dr. Kynard at: kynard@eco.umass.edu

Need for Additional Information (3-53): Where, exactly, did FL locate WSEL monitors in the By Pass Reach? How do they intend to guard against “vandalism” ruining further data collections?

Information list for specific information on this reach, ADD: Life history and behaviour of Connecticut River shortnose and other sturgeons, 2012, Kynard et al, World Sturgeon Conservation Society, publications, ISBN: 978-3-8448-2801-6. Available through the North American Sturgeon and Paddlefish Society at: www.nasps-sturgeon.org/#!/publications , or directly from Dr. Kynard at: kynard@eco.umass.edu

Additional WSEL monitors needed to capture fuller By Pass flows profile. In order to protect pre-spawning and spawning of shortnose sturgeon in this reach of river **additional WSEL monitors** should also be placed at: **1.** In the pool immediately below Rock Dam, **2.** on the west side of the river, in the main stem channel, **upstream of Rawson Island** which is adjacent to, and just west of the Rock Dam. That Rock Dam ledge continues through the island and reemerges as part of the thalweg near the river’s west bank.

Table 3.3.1-1: Target Species and Life Stages Proposed for the IFIM Study Reaches.

Under Reach 1 & 2: **blueback herring:** add “**spawning**”—as New England Cooperative Fisheries Research Studies document BBH spawning in this reach, at the mouth of the Fall River.

Under Reach 1 & 2: **shortnose sturgeon:** add “**pre-spawning.**”

Note *: *personal communication* from Dr. Boyd Kynard, fish behaviorist and CT River shortnose sturgeon expert:

“For 10 years between 1993 and 2007, adult snos were present at Rock Dam for 5 years prior to spawning occurring anywhere (Rock Dam or Cabot Station). During the 5 years they were present, the mean number of adults present was 10.4 (range, 3-25). Thus, many adults moved to the Rock Dam spawning site before any spawning occurred at Cabot Station suggesting they preferred to spawn at Rock Dam.”

3.3.2 Evaluate Upstream and Downstream Passage of Adult American Shad

Study Goals and Objectives (18 CFR § 5.11(d)(1))

“The goal of this study is to identify the effects of the Turners Falls and Northfield Mountain Projects on adult shad migration. The study objectives are to:”

Add: “Determine route selection, behavior and **migratory delays** of upstream migrating American shad through **the entire Turners Falls Power Canal.**”

Add to “Describe the effectiveness of the gatehouse entrances;” ...

ADD IN: “and describe the behavior of migratory American in the Turners Falls Power Canal **within 500 feet** of the gatehouse entrances.”

ADD IN: “Evaluate attraction for shad reaching the dam spillway under a range of spill conditions.” **Note:** Since **a lift** is being considered at this site, evaluating **spillway attraction** is most important.

“Evaluate attraction, entrance efficiency and internal efficiency of the spillway ladder for shad reaching the dam spillway, under a range of spill conditions;” **see immediately below.**

Footnote 35 “*This may be achieved with existing information; FirstLight is awaiting data from the USGS Conte Laboratory.*”

NOTE: USGS has done 6 years (2008 – present) of study and data collection at Spillway and Gate House. All of it remains “**preliminary**”—hence never finalized, or peer-reviewed. Only “finalized” study data and findings should be included in FERC study plan design, and made available to all stakeholders for review. All studies are partially FirstLight funded.

The Need for Additional Information

Under **Task 1.** “Review existing information:” Only finalized USGS study information should be considered.

Task 2: Develop Study Design

As per FERC request, a radio and PIT tag study of the **entire Turners Falls Power Canal** should be included in this study.

Task 3: Evaluation of Route Selection and Delay

Under: **Radio Telemetry Tracking:**

Add in:

“Tagged fish will be tracked throughout the **Turners Falls Power Canal** during both upstream and downstream migration with fixed antennae and mobile tracking; using PIT tags in addition to radio telemetry tags.”

“Additional tagged individuals may need to be released farther upstream (Turners Falls power canal, * **(ADD IN: “top of Cabot Station Ladder,”)** upstream of Turners Falls Dam), to ensure that enough tagged individuals encounter project dams on both upstream and downstream migrations, that these individuals are exposed to a sufficient range of turbine and operational conditions to test for project effects, and to provide adequate samples sizes in order to address the objectives.”

Under: **Video Monitoring**

Video monitoring at the Spillway Ladder is insufficient.

Note: Video monitoring is insufficient in determining the number of fish attracted to the spillway. It will only register fish that can FIND the Spillway Ladder Entrance. This is confounded by a range of competing flows, water levels present in the By Pass, and spill from the dam. A full range of telemetry tracking needs to be employed at the TF Spillway—not simply at the Spillway Ladder and SL Entrance.

Task 4: Evaluation of Mortality

Note: Preliminary USGS TF Canal studies have suggested uninvestigated data indicating mortality within the Turner Falls Power Canal. **Mortality tagged fish and data should be collected throughout the entire TF Power Canal, to correct for overall mortality.**

The number of fish suggested to be fitted with mortality tags is insufficient in all these studies, and should be increased by a factor of two.

Table 3.3.2-1: Proposed locations and types of monitoring and telemetry equipment proposed for the upstream and downstream passage of adult shad study.

ADD in: (to identify migration routes and delays):

After “Cabot Ladder”, add new location: **Eleventh Street Canal Bridge: PIT Tag Reader**
Before “Rawson Island”, **add new** location: **TF Power Canal, 400 feet downstream of Gate House.** PIT Tag Reader and Lotek SRX.

Also before “Rawson Island”, add new location: **“Rock Dam Pool, immediately downstream of Rock Dam.”** Lotek SRX.

After “Turners Falls Spillway Ladder,” **add: Turners Falls Spillway, Montague Dam.** Lotek SRX; followed by **a new location, add in: Turners Falls Spillway, Gill Dam.** Lotek SRX.

QUESTION: What is the exact location considered for “Below Turners Falls Dam” ?

3.3.3 Evaluate Downstream Passage of Juvenile American Shad

Task 3: Turbine Survival

Evaluations should be done for **all turbines, with all turbines operating**, at both Cabot and Station 1, to capture the broadest range of conditions at these sites.

3.3.5 Evaluate Downstream Passage of American Eel

Level of Effort and Cost (18 CFR § 5.11(d)(6))

Study ticket price is **too expensive**.

“The estimated cost for this study is approximately between **\$350,000 and \$450,000.**”

Note: Costs of this American Eel Study are **prohibitive**, particularly since there is no benchmark data on the ecosystem importance of eels above Mile 122, TF Dam.

*This rivals the costs of all studies supported to assess migration and mortality of **American shad, a restoration target species to Vermont and New Hampshire for 46 years.***

A significant proportion of that money could best be used to increase the scope of study: **3.3.2, and 3.3.7: Evaluate Upstream and Downstream Passage of Adult American Shad; and 3.3.7 Fish Entrainment and Turbine Passage Mortality Study.** *These could then include a full study of the Turners Falls Power Canal--and increasing the number of mortality-tagged fish.*

Cost effectively, a literature survey, and results from Holyoke Dam studies and Cabot data collection should suffice to gauge survival of American eel at Turners Falls/Cabot/Northfield. A portion of the funding could be used to construct an eel-way at TF Dam—a relatively inexpensive structure.

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

Under: ***Existing Information and Need for Additional Information (18 CFR § 5.11(d)(3))***

Information as American spawning and spawning habitat *is missing* for the pool where *shortnose sturgeon spawn*, the **Rock Dam Pool**, immediately downstream of that notched ledge in the river.

Task 2: Examination of Known Spawning Areas Downstream of Turners Falls Dam

Note: The **Turners Falls Power Canal needs to be investigated as a spawning location** for American shad. USGS studies have registered migratory shad remaining in the TF Canal for and **average of 25 days**. Adult shad, which do not feed during spawning migration, must complete their salt-to-river-to salt spawning runs within 44 days in order to survive. A critical need is to know whether these fish are spawning in the TF Power Canal, milling in the canal, or whether they have expired.

3.3.7 Fish Entrainment and Turbine Passage Mortality Study

Increase the number of mortality-tagged fish; run tests for all turbines at Station 1 and Cabot, with all turbines operating.

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

Existing Information and Need for Additional Information (18 CFR § 5.11(d)(3))

Note: Three-dimensional CFD Modeling needs to extend 500 feet downstream of the Gate House in the Turner Falls Power Canal to capture the influence of the 14 head gates at the dam on migratory fish behavior and delay.

3.3.19 Evaluate the Use of an Ultrasound Array to Facilitate Upstream Movement to Turners Falls Dam by Avoiding Cabot Station Tailrace

General Description of Proposed Study

FirstLight's added language: "This study will be conducted in 2015 pending the results of Study No 3.3.1 and Study No. 3.3.2, which include analysis of historic fish passage data."

Note: *This study should be conducted for two seasons, the same time span accorded to American eel.*

Historic fish passage data likely has only minimal importance, as early spring freshet flows over the TF Spillway generally out-compete Cabot Station flows and send fish

treading water at the base of TF dam—often for weeks. Those freshet flows at the dam typically overwhelm any flow from the Spillway Ladder, and the shad essentially run down their engines treading water until the freshet subsides. At that point, flows over the Spillway are allowed to be cut to 400 cfs, which sends the shad downstream to fight their way into the spill of the canal system. **For this reason, historic data has limited value** as the quantified presence of shad at the base of TF Dam is missing, and data on the effectiveness of Spillway attraction flow does not exist.

Resource Management Goals of Agencies/Tribes with Jurisdiction over Resource (18 CFR § 5.11(d)(2))

“• American shad must be able to locate and enter the passage facility with little effort and without stress.”

“• Where appropriate, improve upstream fish passage effectiveness through operational or structural modifications at impediments to migration.”

“• Fish that have ascended the passage facility should be guided/routed to an appropriate area so that they can continue upstream migration, and avoid being swept back downstream below the obstruction.”

Note: *This study should not be contingent on results of other studies, and should be conducted for **two** seasons.*

1. Its effectiveness at another Connecticut River bottleneck has been tested.
2. It addresses the need to avoid migratory delay and failure for two key species that have topped the CT River fisheries restoration since 1967: American shad and blueback herring.
3. It keeps the fish migrating in the Connecticut River.
4. If it proves effective, it would simplify fish passage mechanisms and cut by millions of dollars the cost required for passing TF Dam. A single set of lifts at the dam would pass fish, as it has at Holyoke for decades.
5. It would avoid the expense and pitfalls of requiring fish to negotiate **two mechanisms at Cabot Station, another out of the canal, and a final grid through Gate House.**
6. It presents the opportunity to avoid the stress required of migratory fish when they are driven into the TF Power Canal, then must find their way through turbulence and fight a path through several more untried, built mechanisms.
7. **USGS studies have found the average passage time through the TF Canal is 25 days;** whereas transit times in the actual river—from Holyoke to TF Dam, or from TF Dam to Vernon Dam, are generally accomplished in a matter of 2 – 3 days.
8. This would avoid the problem of shortnose sturgeon being picked up in a lift at Cabot Station, which would be a cause for further migratory delay as lifts would have to stop to retrieve fish—and also might have to be shut for days during times of high turbidity.

Existing Information and Need for Additional Information (18 CFR § 5.11(d)(3))

Information from Proposed Project Changes, Flow, Hydraulics, Habitat, and Telemetry studies: **2.2.1; 2.3.1; 3.2.2; 3.3.1; 3.3.2;** should be used to inform the implementation of this study.

FirstLight's added-in text:

*“however, simply repelling shad from the Cabot tailrace is not a satisfactory result, for this behavioral barrier to be successful the fish would also have to keep going upstream, **without delay**, as opposed to dropping down below Cabot.”*

Note: this caveat does not present a satisfactory argument. In order to be proven ineffective, delays caused by sonics repelling fish from the Cabot entrance would have to out-compete any **delays American shad and blueback herring encounter by being drawn to the Spillway during spring freshet and not find a readable upstream flow or passage at the dam.** To this must be added the delay and stress of having river attraction and Spillway flow cut to 400 cfs, thus **sending them DOWNSTREAM to fight their way into the TF Power Canal.**

Question: Should FL be deciding what constitutes delay? Shouldn't American shad dropping back two miles downstream from the TF Spillway to Cabot Station be considered an “unsatisfactory result”?

Methodology (18 CFR § 5.11(b)(1), (d)(5)-(6))

Note: Ensonification coverage may need to be deployed far enough out into the main stem so as to lead fish out to the thalweg/main flows on the west side of Rawson Island. Simply steering fish out of the Cabot entrance, but then only allowing them the choice of the minimal flows coming down through Rock Dam at the time paltry 400 cfs release would likely keep the fish milling and confused below Station 1.

Study Schedule (18 CFR § 5.11(b)(2) and (c))

*FirstLight's **Added** text:* “

*“**if performed, the study is anticipated to conclude by mid-July 2015.**”*

Note: This should not be a **contingent** study.

End of Formal Comments

Thank you for this opportunity to participate in improving license requirements and protecting the Connecticut River ecosystem for future generations.

Sincerely,
Karl Meyer, M.S.

The Nolumbeka Project Inc.
88 Columbus Avenue, Greenfield, MA 01301
Tel. (413) 657-6020 Fax (413) 498-4318

July 10, 2013

Ken Hogan, Project Supervisor
Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
Washington, DC 20426

RE: Wilder Dam Project No. 1855-026
Bellows Falls Project No. 1855-045
Vernon Project No. 1904-073
Turners Falls Project No. 1889-081
Northfield Pump Storage Project No. 2485-063

Dear Mr. Hogan,

The Nolumbeka Project wishes at this time to respond to the proposed study plans as offered by Trans Canada and First Light.

We will start with First Light's response to our study request 1. We asked for a comprehensive investigation and mapping of the of the ancient trail systems and fishing stations and other special places that exist on the river's edge and up on the Wissatinnewag village site proper.

First Light's response suggests that archaeological surveys will result in reports that will discuss cultural landscape as a result of the surveys, but they indicate they will not be looking at steep grades and wetlands, they also indicated they will not do TCP study. The Nolumbeka project will be requesting a TCP study. That request will be filed with this letter.

Our request was clearly asking for studies of the built earthworks and trail systems that were created many thousands of years ago on the Wissatinnewag Village Site out of the need to access some of the most productive fishing in the river on what is now called the Bypass Reach. The Bypass Reach area abuts the Wissatinnewag Village site. This terrain is a steep rock ledge that goes right down to the ancient waters edge. These built trail systems were not simply ruts worn in the earth by thousands of years of use, but were engineered roadways that required the builders to cut into the upper ledge materials and redeposit that material down grade to create a safe traversing trail system to access fishing earthworks ledges on the ancient Lake Hitchcock shoreline and later down to the river. They included fishing, ceremonial sighting, and canoe-launching stations.

First light indicated that Nolumbeka offered no nexus or direct link to the project area in our study requests. Nolumbeka feels strongly about the fact that the Wissatinnewag Village site existed 12,000 years before colonial boundaries and lines were ever drawn on a map. First light offered up on their project boundaries map a lined off area showing the Wissatinnewag Village property. The village is a congruent and fully connected cultural resource that goes right to the water's edge, and in this area has not been degraded or impacted by modern progress with the exception of the damming of the river in the last hundred years, and the loss of the natural water flow rates. This cultural resource is a rare jewel. We would also like to point out that we created the conservation easement that abuts First Light's land on the rivers edge. Nolumbeka has a legal agreement with U.S. Fish and Wildlife in our conservation easement partnership that articulates our shared stewardship for the protection of the Wissatinnewag property. In this contract we share responsibility for the safeguarding of the cultural resources that connect with First Light's property, and we use that section of the Wissatinnewag village for educational programs that promote the protection of Native American cultural resources and a Native viewpoint of the history of the region. We feel we have a stronger than average connection or nexus to the river resource area and First Lights operations impact nexus.

First light and trans Canada would like to eliminate steep slopes and or swamps or wetlands from study consideration. This request by the Licensee's is exactly why we recommended the need for more culturally sensitive and better-trained researchers. To address wetlands, Nolumbeka feels there needs to be an educational component that might help First Light, Trans Canada and FERC understand how important to Native cultural values wetlands have always been. Wetlands have been for thousands of years one of the most powerful gathering places for healing resources and ceremony, as well as foraging and are very often associated with ceremonial stone landscapes. To disregard the need to look more closely at wetlands is to marginalize a culture's ceremonial connection to the land, their history and values. Many important archaeological discoveries have been located in what were considered wetland areas. Nolumbeka would like to request that steep slopes and wetlands be included in the cultural studies, inventory and project boundaries discussions. If the Licensee's choose not to look at steep slopes and wetlands they will not have a complete inventory of the cultural resources in their project areas.

Nolumbeka also requests to be a part of the on the ground field studies and data analysis component of this project licensing process. Since 1997 we have been doing research, data analysis and field monitoring of archaeological sites and have worked closely with the Narragansett (NITHPO). We have created a digitized historic cultural database and have worked with a number of tribes including the Narragansett (NITHIPO) to assist in their cultural and historical research when the tribes have been working to protect their cultural resources on project impacted lands. The Nolumbeka Project has been one of the early organizations involved with the discoveries of a number ceremonial stone landscapes. We have offered to continue our work with the Narragansett Tribe to create a centralized database in the Gill Turners Falls area to streamline and make study reports and oral histories more accessible to the tribes when projects impacts might need to be taken into consideration in the river boundaries area.

We are aware that a number of archaeological 1A studies have been done without tribal partnership. Trans Canada has requested the right to recycle an archaeological 1A study created five years ago under an old licensing issue without tribal participation or monitoring. We feel that is not the way to build trust with the tribes or the public and seem to not be congruent with the spirit of the 106 processes. Nolumbeka pointed out in our first letter to FERC that we felt it was important to bring on board professionals trained by the tribes to recognize the life ways and sacred practices and spaces of the indigenous peoples of this river valley culture. The Nolumbeka Project sees the recycling of Trans Canada's 5-year-old archaeological 1A study as a short cut that undermines the 106 processes.

In 2.1.6 Cultural Resources FERC def # 6 FERC requested First light to provide available information of Indian Traditional Cultural and Religious Properties as specified in 5.6 (d) (3) (x) (B), and 5.6 (d) (3) (x) (C).

First Light replied, "There are no known Indian traditional cultural properties (TCPs) or religious properties within the Turners Falls Project and Northfield Mountain Project boundaries". First light acknowledged The Turners Falls Sacred Ceremonial Hill Site, but claimed that it was not located in either of the projects boundaries.

Nolumbeka would like to respond that the Turners Falls Sacred Ceremonial Hill Site is not just a hill at the Turners Falls Airport, but is as a district that covers a 20-mile radius. This district covers a great deal of First Light's Project boundaries. Also some of the stone structures located on the Wissatinnewag Village property are a component of the Ceremonial Hill and have a direct line of vision and contextual connection to that location.

There is an Indian village currently underwater in Barton Cove, and in First Light's APE. Prior to the raising of the water level for the hydro production, that piece of land was pastureland and well before it was a pasture it was a part of the Great Falls village that was attacked by William Turner in the early dawn raid at the Great Falls on May 19, 1676. This site is by its very nature a traditional cultural property and also a religious property. Under water in that area are some of the cultural artifacts of that village and the attack, which includes a number of muskets that were being repaired at the village at that time as well as the forge and at least 2 pigs of lead. It can be expected that the personal artifacts of some of the victims could well be under water in that locus as well.

Just south of the By-Pass Reach area there are shell middens on the north end of the islands that were deposited over thousands of years during the warmer months when the prevailing winds are out of the south. Nolumbeka would like to see studies of these middens. We feel they could reveal significant new information on the sturgeon and shellfish habitat in the By-Pass Reach area and the river in general. It is also common for cultural discarded artifacts to be located in the disposal sites such as midden areas. These are well within First Light's APE. Nolumbeka feels First light's operations have had an impact on the cultural resources within their APE with erosion most especially but not limited to the area in and around the islands and on the shell midden sites as well as

directly across from the Northfield Mountain Project and at many points down river including the Kells Farm Paleo Indian Site.

Nolumbeka would like to respond to 2.2.2 Cultural Resources (FERC AIR #2)

FERC requested First Light to include in your study proposal that you would also consult with the Vermont, Massachusetts, and New Hampshire SHIPO'S and any involved Indian Tribe or other interested parties in formulating each of the tasks.

First light has not consulted with any Indian tribe that we know of, nor have they consulted with The Nolumbeka Project in formulating what the projects APE will look like. We have yet to see any research data for review on the known cultural resources in the project boundaries. It appears to us that First Light will create the APE with only SHIPO review and has not brought in the Tribes and other interested parties including Nolumbeka. We would like to have the chance, in a timely manner, to review and respond to the data that will be used to set the projects APE.

Nolumbeka feels First light misunderstood the study request from a number of other interested parties including Nolumbeka and the Town of Montague regarding the Great Falls Native Cultural Park. The study requests for the Great Falls Native Cultural Park was a request to study what it would look like for the Licensee's to help create the Great Falls Native Cultural Park as a way to give back to the Native American community and the general public something of cultural value that would help create historic tourism as a form of recreation and education in this area. This would go a long way to make up for the cultural resources that have been compromised on the river over the years during the development of Hydro Power. These Native American cultural resources were not addressed during the last licensing process many years ago. Nolumbeka has documented a number of cultural resources that have been damaged, destroyed and or lost and have on a number of occasions slipped by First Light's accountability to those resources over the years. The Great Falls Native Cultural Park would also allow for a more balanced Native historical viewpoint on the Great Falls massacre of May 19,1676. This story is a powerful piece of history that needs to be told from a Native perspective. Nolumbeka feels that the story told from that perspective would contribute to the Recreational Historic Tourism in our area. A number of years ago a study was done to get a sense of what percentage of sites listed on the National Register of Historic Places are Native American sites compared to other cultural groups. In Massachusetts out of the 3,602 sites listed only 1 out of 300 sites were Native American. That is 0.33% of the sites listed. In Maine out of 1,295 sites listed there were 102 Native sites. That is 1 out of 12.7 sites listed as Native American. The Great Falls Native Cultural Park is a chance to shift the trend that has led to such low numbers of Indian sites listed on the National Register of Historic Places that has prevailed here in Massachusetts for over 40 years. The Great Falls Native Cultural Park would expand a form of recreation that is catching on all over the world, Recreational Historic Tourism. Right here in the Great Falls area, the State Massachusetts has the history of a fascinating 12,000-year-old Indigenous culture that could be taped into as part of Recreational Historic Tourism. This is a form of recreation that has been overlooked for too many years. Nolumbeka strongly supports a study by the Licensee's to create a Native Cultural Park in the Montague Gill area.

2.3.3 Cultural Resources (FERC AIR 37)

In addition to the FERC, Massachusetts, Vermont and New Hampshire recommendation to do a Phase 1A Archaeological Survey and Historic Structure Survey, Nolumbeka requests that FERC consider requiring that survey to include Native American built stone structures, earthworks and ceremonial stone built landscapes in the APE as is the case in other states like Ohio, and if physically connected to go beyond the APE. Nolumbeka finds the APE maps we currently have to view, offer very little insight on what exactly is out there for cultural resources. Without the ability to review any studies that have been done, we find there is no way for us or the tribes to participate on the assessment of the applicability of the suggested APE Boundaries. Nolumbeka would like to review the research and compare it with what we know to exist in our archives before we would feel we have been allowed to be a contributor in this process. We have been doing this type of research work for the tribes since 1997, and we understand the process well enough to lend additional viewpoints and conversation to the decision making process in formulating each of the tasks.

3.4 Terrestrial Wildlife and Botanical Resources

3.4.1 Baseline Study of Terrestrial Wildlife and Botanical Resources at the Turners Falls Impoundment, the Bypass Reach and below Cabot Station within the Project Boundary

The Nolumbeka Project feels that our first request to do terrestrial wildlife and botanical resources studies on the Wissatinnewag property are congruent with 3.4.1 and would add to the body of knowledge that the Recreational Historic Tourism public would appreciate in their forays to the Turners Falls Gill- Greenfield historic site visits. Nolumbeka would like to take part in this process and would be happy to assist researchers on and around the Wissatinnewag Village Site.

3.6

3.6.1 Recreation Use/User Contact Survey

The Nolumbeka Project considers ourselves to be a unique stakeholder group do to the fact that we own a 41 acre 12,000 year old village site conservation easement in partnership with US Fish and Wildlife's 21 acre portion of the combined 63 acre Wissatinnewag Historical Village Site proposed to be a part of a Recreational Historic Tourism Plan for the Towns of Gill, Turners Falls and Greenfield. Our knowledge of the Bypass Reach is augmented by our access to that part of the river through our land and our mission as a cultural preservation nonprofit. We feel we could be of use to help assess possible access points in the Bypass Reach part of the river and possible canoe portage trails that might be feasible.

3.6.5

The Nolumbeka Project considers our use of the land in the project area in harmony with the cultural history and attraction to the Great Falls area, and we request to be identified as such in the goals and objectives in consideration in 3.6.5

The Nolumbeka Project Study Request 4

As part of our study request 4, Nolumbeka and the Narragansett (THPO) asked for a study to create a centralized housing facility in the Gill Turners Falls area for our archives and study programs, as well as a centralized housing facility to digitized and disseminate to appropriate tribes and researchers, the total of documents that have been amassed over the years on cultural studies done up and down the Connecticut River and in the surrounding area. The public perception at this time is that if just such a facility were in place now the current licensing process would be much streamlined as there would be no disconnect with what is out there and where it is and how it might impact any of the Licensee's projects on the river and beyond. There will be a need for just such a facility many times over the next 30 to 40 years of this license issue, and the Nolumbeka Project would be happy to team up with any of the tribes, the SHIPOs and the Licensees to create the protocols and institute such a program. Right now the cultural data that is out there is still in the early twentieth century mindset and access. This condition makes it difficult for a transparent exchange of data and research needed by the tribes and other interested parties to facilitate a balanced decision making process on the proposed Licenses for First Light and Trans Canada or any future projects that might need cultural impact consideration. The Nolumbeka Project feels our request could play an important part of creating a new attitude around Native American cultural preservation efforts here in the Connecticut River Valley and beyond and we strongly encourage FERC to support just such an endeavor.

Thank you,

Joseph Graveline, President
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July 14, 2013

Ken Hogan, Project Supervisor
Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
Washington, DC 20426

RE: Wilder Dam Project No. 1855-026
Bellows Falls Project No. 1855-045
Vernon Project No. 1904-073
Turners Falls Project No. 1889-081
Northfield Pump Storage Project No. 2485-063

Dear Mr. Hogan,

The Nolumbeka Project Inc. would like to request a Traditional Cultural Properties Study for the above listed projects.

Study Request. Traditional Cultural Properties Study

During the June 12, 2013 study plan meeting discussing proposed study plan (PSP) studies 3.7.1 Phase 1A Archaeological Survey and 3.7.2 Reconnaissance-Level Historic Structures Survey, our group raised the question about whether a sacred ceremonial landscape would be considered a “structure” in the Historical Structures Survey. The answer was that these are typically covered in a Traditional Cultural Properties (TCPs) Study Plan, which is not currently in the PSP. We are therefore submitting a request for one.

TCPs are locations associated with cultural practices or beliefs of a living community that are: 1) rooted in that community’s history; or 2) important in maintaining the continuing cultural identity of a community. (National Register Bulletin 38, 1998:1). Parker and King (1998) defines a TCP as:

- Locations associated with traditional beliefs of an aboriginal/indigenous group about its origins, its cultural history, or the nature of the world and cultural landscapes.
- A rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents.
- An urban neighborhood that is the traditional home for a particular cultural group, and that reflects its beliefs and practices.
- Locations where Native American religious practitioners have historically gone and are known or thought to go today, to perform ceremonial cultural rules of practice.
- Locations where a community has traditionally carried out economic, artistic or other cultural practices important in maintaining its historic identity.

Goals and Objectives

The goal of the study is to assist the Federal Energy Regulatory Commission (FERC) in meeting its compliance requirements under Section 106 of the National Historic Preservation Act (NHPA), as amended, by determining if licensing the Project will have an adverse effect on National Register of Historic Places (NRHP)-eligible TCPs, ethnographic resources, or other cultural resources of tribal significance.

The objective of this study is to identify TCPs and other cultural resources of tribal importance that may potentially be affected by Project operations, evaluate their eligibility to the NRHP, and identify Project-related activities that may affect TCPs, other tribal interests, or traditional interests of other groups within the Area of Potential Effect (APE).

Relevant Resource Management Goals

The Nolumbeka Project in cooperation with the Narragansett Indian Tribal Historic Office (NITHIPO), the Town of Montague, the Town of Gill and other interested tribes and organizations, and as a conservator of one of the largest and oldest village and cultural gathering places on the whole of the Connecticut River, would like to elevate the awareness of the cultural, and ceremonial history of the Great Falls and Ceremonial Hill locus and beyond, including the historical events surrounding the Great Falls Massacre of May 19, 1676, to reflect the importance of the Native American cultural life ways that are so uniquely concentrated in this area for the purpose of preservation and education. Nolumbeka seeks to stimulate one of the newest recreational activities catching on all over the world, Recreational Historical Tourism. Our goal is to bring awareness to Native culture and history and with the success of that, tourist dollars into the area to help ensure the continued protection and preservation of ancient sacred sites, the 12,000 year old trail systems and fishing stations, the expanded ceremonial stone landscapes, burial grounds and battle grounds sites and other cultural resources in this area and further up north on the Connecticut River including Vermont's petroglyph's and ceremonial stone calendar sites. One of the first steps is to identify and acknowledge as many of the cultural assets eligible for listing on the National Register of Historic Places as possible.

An important statistic to take into consideration on this subject is that Massachusetts, Vermont and New Hampshire seem to be lagging behind many other states in the country on their preservation efforts around Native American Cultural Resources. The chance of a Native American site being listed on the National Register of Historic Places in Massachusetts is 1 out of 300, in Vermont, it is 1 out of 147.2, In New Hampshire it is 1 out of 105 while in places like Maine it is 1 out of 12.7.

If this is going to be a 50- year license issue, it will reflect a 50 year lock in on the States and Licensee's attitude around the their responsibility to preservation efforts of our Native American cultural assets and resources here in the Connecticut River Valley. Nolumbeka Feels it is time for Massachusetts, Vermont and New Hampshire to elevate our collective Native American cultural preservation responsibilities to that of other states like Maine. Nolumbeka feels that a comprehensive TCP is an important first step.

Public Interest Consideration If Requester Is Not A Resource Agency

Section 106 of the National Historic Preservation Act (1966) requires that federal agencies, licensees, and those receiving federal assistance take into account the effects of proposed undertakings on any resource that is listed on or is eligible for the NRHP. The Nolumbeka Project considers our organization a limited resource agency. The Nolumbeka Project represents the following public interests: historic cultural tourism, preservation of sacred sites and ceremonial stone landscapes, a wider public interest in educational and artistic Native American events such as an annual Narragansett and Town of Montague proposed tribal canoe race on the Connecticut River to coincide with a popular Peoples Harvest Native American art music and history event, and the desire for the Town of Gill and Montague to create a Native American cultural educational park.

Existing Information and Need for Additional Information

Sections 4.10.2.3 and 4.10.2.4 of the Pre-application Document (PAD) described the Woodland Period (1000BC-AD1600) and the Contact Period (AD1500-AD1620) generally. This should include Paleo-Indian (12,000-BC-AD1676) Contact Period.

The Gill Riverside Historic District is listed as eligible for The National Register of Historic Places as well as the Turners Falls Ceremonial Hill, which is listed as a district with a 20-mile radius around the Turners Falls Airport.

There is the historic May 19,1676 Great Falls, Peskemoskut massacre site to take into consideration, including an intact parcel of that site at the top of the hill in Gill known as the Conway Site. That property had a ground penetrating radar (GPR) survey done several years ago, that produced the indication of nearly 300 unmarked burials including a very rare Spokes Burial commonly associated with the Andean culture, as well as the recent discovery of an additional Spokes Burial located not far from the one discovered in the late 1890's on the Conway site.

There is the 12,000-year-old Wissatinnewag Village site that Nolumbeka holds the deed to, located at the foot of the Great Falls, which includes a built earthworks traversing trail system going down to fishing and canoe launching stations on what was the shore line of ancient Lake Hitchcock and later in time on down to the rivers edge that accesses what is now known as the By-Pass Reach section of the river. That access point proved to be a

highly productive fishing area. The Wissatinnewag trail system also supports a number of ceremonial stone structures that directly relate to the line of sight and ceremonial connection to the Ceremonial Stone Hill at the Turners Falls Airport, as well as a large number of burials up higher on the village site. All the sections of the village site are still used today by the tribes for ceremony and other traditional practices associated with their past cultural life ways. Wissatinnewag today is a live and vibrant historical piece of property made fully accessible to the tribes and is used for the growing of Native heritage crops and seed preservation as well as education.

There is the rare 12,000-year-old Hannaman Paleo-Indian Hunting and Kill site located at the foot of the Ceremonial Stone Hill.

There are islands below the falls that were used for seasonal fishing and village sites where there are ancient shell middens on the islands north ends that could reveal a great deal about the aquatic resources that were used by the inhabitants for thousands of years. By investigating these shell middens researchers could discover what was being harvested from the river for food and utility and what the environmental health of the river was during the time of these middens. This investigation might reveal new information about the shellfish population as well as the sturgeon populations that existed at that time. There are shell middens in the Rock Dam area that should be investigated as well. Also in the Rock Dam area there were burials eroding out of the rivers edge that are well documented.

Under the waters of Barton's Cove there is an extension of the Great Falls village that was for years kept in preservation as pastureland but was later flooded by the raising of waters associated with the rising level of the dams to produce hydropower. This village was part of the 1676 Turner attack on the village of Peskeomskut. Somewhere under the waters of Barton Cove is the mouth of Heal All Brook where forges, muskets and pigs of lead were thrown into the fast flowing waters on the morning of May 19, 1676 during that predawn attack.

In the project area is the Kells Farm Site just south of the By-Pass Reach that has proven to be a very important Paleo-Indian to Contact Period village site. Some of the artifacts in known collections from that site have revealed a high concentration of ceremonial burial items. On the Kells Site there are also a large number of ceremonial stone markers that indicate part of the site was used for sacred practices and ceremony. Some of the stones have very interesting markings on them that might prove to be useful to expand the level of knowledge surrounding ceremonial stone sites.

There is an extension of the Wissatinnewag Village that connects with that part of the Wissatinnewag Village that The Nolumbeka Project owns. That site is has had less impact than some parts of our section of the village and should be taken into consideration in a TCP study.

To date, there has been no comprehensive professional cultural properties inventory of the Project APE to identify such resources. The Nolumbeka project feels this is a necessary part of the re-licensing regulatory process. Also Nolumbeka feels that recognition of historical structures should be applied to ceremonial built stone structures and the built earthworks of the engineered steep slop Indigenous trail systems and fishing stations.

Nexus to Project Operations and Effects.

First Light's continued operation and maintenance of the Turners Falls Dam and Northfield Mountain Pumped Storage Projects has a potential to affect TCPs especially due to erosion and under monitoring of cultural properties from looting and limited knowledge of ceremonial practices and recognition of sacred cultural resources.

Under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, federal agencies must take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. As defined under 36 CFR 800.16(l), historic properties are prehistoric or historic sites, buildings, structures, objects, districts, or locations of traditional use or beliefs (i.e., TCPs) that are included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). Historic properties are identified through a process of evaluation against specific criteria. For most cultural resources evaluated for listing on the NRHP, these criteria are found at 36 CFR 60.4. However, to be considered a historic property, a TCP must meet other significance criteria identified in amendments made to the NHPA in 1992. These criteria are found at §101(d)(6)(A)

Proposed Methodology

Task 1: Establish study area

The study area should be the same APE determined by the State Historic Preservation Offices (SHPOs) and Narragansett Indian Tribal Historic Preservation Office (NITHPO), after consultation with knowledgeable local contacts and organizations including The Nolumbeka Project.

Task 2: Research archives

The Nolumbeka Project archives are available for use in this process, also the University of Massachusetts (U-Mass) Archaeological Services Archives can be tapped, but with the caveat that they often list research locations and studies under a number of different names for the same locus. This has in the past, allowed for a disconnect of access to the full body of knowledge on a given site if it was listed at one time or another under a different name. There are local highly knowledgeable researchers at The Nolumbeka Project, and the Narragansett (NITHPO) have access to cultural practices and information that could expand on the body on knowledge of this area, as well as other local researchers. The research library at the Pocumtuck Valley Memorial Association Library (PVMA), (the Memorial libraries) in Historic Deerfield library up stairs collection, U-Mass library, is an expanded body of knowledge. The Historic Commissions in the surrounding towns and the Historical Society in Northfield and Gill, Carnegie Public Library in Turners falls has land improvement maps that show what was done in the Gill Riverside and Turners area. The records of the Massachusetts, Vermont and New

Hampshire SHPO'S should be reviewed. . Look for private and public manuscript collections, pictorial resources and maps, including local newspaper archives, articles and the Kells Farm Family Private Artifacts Collection.

Task 3: Tribal Consultation and Identification of Resources

Following the ethnographic literature review suggested in step 2, the next step in identifying potential TCPs will involve extensive tribal and local researchers consultation. Consultation and the necessary fieldwork and potential TCPs documentation shall be in accordance with Section 106 of the NHPA, as amended, and shall be consistent with the National Register Bulletin No. 38, Guidelines for Evaluating and Documenting Identification of Traditional Cultural Properties (Parker and King 1998).

In order to facilitate tribal consultations, the Licensee's are requested to retain a qualified, professional ethnographer who meets the standards for ethnography as defined in Appendix II of National Register Bulletin No. 38. The Licensee's will coordinate its selection of the ethnographer with the assistance of affected tribes and other interested cultural/tribal stakeholders including the Nolumbeka Project anthropologist

The ethnographer, in consultation with tribal representatives including the NITHPO and other tribes and stakeholders will determine the scope and breath of interviews. It will be the responsibility of the ethnographer to contact the appropriate tribe(s) and interested tribal and cultural stakeholders to arrange for interviews at a time and location acceptable to those tribal Interviewees. The ethnographer and tribal interviewees may need to visit the APE together to accurately define potential TCPs or other ethnographic and non-TCP cultural resources of importance to the tribes. It may be necessary for the Licensee's to arrange for an initial introductory meeting bringing together the Licensee's, tribal representatives, and the ethnographer.

Interviews will often need to be conducted on a one on one basis with the ethnographer. The oral traditions and information collected during interviews will be used to help define the potential TCPs, or other cultural resources of tribal significance in the APE, and assist in making sound judgments and resource management and other decisions in the Projects planning. If during tribal interviews the ethnographer and interviewees determine it appropriate, the Licensee's ethnographer will coordinate with tribal interviewees to obtain Traditional Ecological Knowledge. The sole purpose of addressing Traditional Ecological Knowledge (TEK) will be to identify important tribal locations and cultural resources within the APE.

If participating tribes do not wish to disclose the locations of any potential TCPs or other cultural resources, the Licensee's will instead work with the tribes to identify the general issues and concerns that the tribes(s) may have regarding potential impacts of the Project upon resources known to the tribe(s) and further work with the tribes and appropriate land management agencies to develop agreeable measures to address these concerns.

Step 4-Site Visits

Capable tribal representatives, and stakeholders including The Nolumbeka Project researchers and the Licensee's ethnographer may wish to visit archaeological sites including (Wissatinnewag and the Kells Farm as well as the islands and shell middens and the petroglyphs locos containing artifacts, features, scared artwork or other physical remains from past human activities) identified during the study or during the Licensee's Historic Properties Study. The purpose of the visit would be to provide tribal representatives the opportunity to exam any archaeological sites of interest to the tribes that were encountered during the Historic Properties Study fieldwork, and to enable the ethnographer to obtain additional information on the potential TCPs that may be associated with the sites. The licensee's or their enthrpgrapher will make a reasonable effort to reach out to the participating tribes to invite participation in archaeological site visits by calling, sending letters or through electronic mail.

Step5-National Register of Historic Places Evaluation

Following the completion of step 4, the Licensee's ethnographer will evaluate the eligibility of identified TCPs and other cultural resources of tribal importance for listing on the NRHP using the data collected from the field studies described above. This will be done in consultation with participating tribes. The amendments in 36CFR 60.4 to the NHPA in 1992 (ss101(d)(6)9A0) specify that properties of traditional religious and cultural importance to a tribe may be determined eligible for inclusion in the NRHP because of their "association with cultural practices or beliefs of a living community that are: 1) rooted in that community's history; and 2) are important in maintaining the continuing cultural identity for the community." Nolumbeka believes that both criteria exist in the Great Falls area for a number of tribes.

All TCP that are evaluated at this phase will be done with the affected tribes, the appropriate federal agencies and the SHIPs. Those evaluations will be submitted to the appropriate agencies and tribes for review and comment prior to final submission to the SHIPs for concurrence. The Licensee's will work with the tribes regarding resources of tribal importance that may not qualify for the NRHP, or resources the tribes may have regarding potential impacts of the project upon resources known to the tribes. The Licensees will work with the tribes and land management agencies to develop agreeable measures to address these concerns.

Step 6-Identify and assess Potential Project Effects on National Register Eligible Properties

As required under 36 CFR ss 800.5 the Licensees will identify and assess any adverse affects on TCPs resulting from Project O&M. Adverse effects are defined as follows:

An adverse effect is found when an undertaking may alter, directly or indirectly any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the properties location,

design setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be further removed in distance or be cumulative (36 CFR ss 800.5 (a) (1)).

Step 7-Reporting

The Licensees will prepare a report at the conclusion of the study that includes the following sections; 1) Study Goals and Objectives; 2) Methods; 3) Results; 4) Discussion, and; 5) Description of Variances from the FERC-approved study proposal, if any.

Copies of this report will be provided to the affected Indian tribes including but not limited to the Narragansett NITHPO, interested stake holders including but not limited to the Nolumbeka Project research staff, and other interested parties. Interested parties will be provided the opportunity to review the TCP report before it is sent to the SHIPOs for concurrence.

Step 8-Consistency of Methodology with Generally Accepted Scientific Practices

The proposed study methods listed above should be consistent with ACHP's guidelines for compliance with the requirement of Section 106 of the NHPA found at 36 CFR 800 and with the related guidance set forth in National Register Bulletin 38.

Level of Effort and Cost

We estimate that this study will cost \$50,000 - \$100,000

References

Parker, Patricia L., and Thomas F King, 1998. Guidelines for Evaluating and Documenting Traditional Cultural Properties. National Register Bulletin 38. U.S. Department of the Interior, National Parks Service, Washington, D.C.

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*Agency of Commerce and
Community Development*

July 15, 2013

Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Re: VT SHPO Comments on the June 28, 2013 Updated Proposed Study Plan for the Turners Falls (FERC No. 1889) and Northfield Mountain Pumped Storage (FERC No. 2485) Projects, First Light Power Resources.

Dear Secretary Bose:

Thank you for the opportunity to comment on the above referenced project.

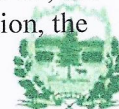
The Vermont Division for Historic Preservation (Division) is providing the Federal Energy Regulatory Commission (FERC) with the following comments pursuant to 36 CFR 800.4, regulations established by the Advisory Council on Historic Preservation to implement Section 106 of the National Historic Preservation Act. Project review consists of assisting FERC in identifying the project's potential impacts to historic buildings, structures, historic districts, historic landscapes and settings, and known or potential archeological resources that are listed in or may be eligible for inclusion in the National Register of Historic Places (National Register).

As currently defined, the Cultural Resources Study Plan (Section 3.7) presented by First Light is limited to a Phase IA Archaeological Survey and a Reconnaissance Level Historic Resources Survey. While these study plan components represent necessary first steps in the cultural resource review process, they are first steps only and will by no means provide all the data necessary to identify and evaluate the full suite of cultural resources present in the Project area.

By definition, the Phase IA study will only provide background information on known archeological resources and a preliminary assessment of the potential location of additional archeological resources within the project area. Similarly, the Reconnaissance Level Historic Resource Survey will identify and compile information on known historic structures but not evaluate the structures to determine their eligibility to the National Register or assess the project's effect on National Register eligible or listed structures.

The Division would also like to clarify that our statements during the June 14, 2013 Study Plan conference call concerning an APE determination of 10 meters (33 feet) from the top of bank along the Project boundary were made in reference to a discussion of Phase IB site identification and Phase II site evaluation study efforts. In general terms, a Phase IA study usually includes a larger zone of review in order to identify the broadest spectrum of cultural resources that may be affected by any project.

The current Phase IA study plan includes provisions for further consultation with the relevant SHPOs, the Narrangansett THPO, and any other interested Native American tribes with regard to APE definition, the



K. Bose
Page 2 of 2
July 15, 2013

development of a archeological sensitivity model, and an archeological field reconnaissance methodology. The Division looks forward to this consultation and recommends that a specific consultation schedule be provided in the Revised Study Plan. In addition, the Revised Study Plan should also provide specific reference to the development and implementation of the following Cultural Resource Study Plan components that will be necessary subsequent to the completion of the Phase IA:

- A Phase IB site identification survey within all archeologically sensitive areas and potential site locations within the APE that are actively eroding. This study should include strategies to implement deep testing methods for identification of deeply buried cultural components.
- Phase II site evaluation of any archeological site identified in the Project APE as a result of the Phase IB survey or any known site that is located within a portion of the APE that is actively eroding to determine their boundaries and eligibility for inclusion on the National Register of Historic Places.
- A phased plan to complete Phase II site evaluation of any remaining currently recorded archeological sites in the Project APE to determine their boundaries and eligibility for inclusion on the National Register of Historic Places.
- Identification of Traditional Cultural Properties.
- Historic Structures Assessment and Evaluation Report

The above studies will provide the basis for the development of a project specific Historic Properties Management as well inform on the development of Mitigation Plans and Programmatic Agreements to address any adverse effects to historic properties. Completion of these actions will ensure that this Projects relicensing fully considers potential impacts to historic properties in compliance with the National Historic Preservation Act.

Sincerely:
VERMONT DIVISION FOR HISTORIC PRESERVATION



 Noelle MacKay
Acting State Historic Preservation Officer

Lisa McLoughlin

Warren Ondras

7/8/13

Supporting Arguments for Noise Study

Summary of Current Situation:

FirstLight has rejected our request for a Noise Study, and upon appeal continues to resist doing a study to determine if their operation is making any noise that can be heard by its neighbors. A determination from FERC on our appeal is forthcoming. Mr. Hogan has asked us to submit further data, and has indicated it is proper to respond to FirstLight's reasons for rejection. We submit these arguments and data in support of a determination to do the study.

Overall Argument:

Our main argument is that in 2010, we started hearing noises we have not heard before. We live approximately 1 mile from the mountain, on the next line of hills. The noises we hear generally occur in the middle of the night and wake one or both of us. A pilot table of data from 2/11/13 to 4/17/13 has both confirmed coincidence of the sounds with Northfield Mt. operation (please see our presentation submitted by FirstLight as additional documentation 6/28/13---the confirmation of equipment running in the table on page 6 were submitted to us and Mr. Hogan by email by Mr. John Howard on 4/23/13).

We are asking FirstLight to do further study to determine if the noises we heard during and outside this period of time are created by them.

Responses to First Light's Stated Reasons to Reject our Requested Noise Study:

1.

FL (FirstLight): "...no other allegations of noise disturbance have previously been made since the plant went into service in 1972." (source: Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No.1889) Updated proposed study plan, page 4-20)

Response: While it may be true that no noise complaints have reached FL, there have been noises heard by or reported to at least 2 other entities:

- a) Our nearest neighbor, Bob English, has heard similar humming noise from the mountain since about the same time (2010) (source used with permission: private email communication 11/2/11).
- b) The Town of Erving has received noise complaints about the mountain by residents of Erving who live near the mountain (source: member of Erving Conservation Commission, in-person conversation 6/30/13).

We feel doing a more complete survey of our neighbors may reveal other sources, as FL has not ever to our knowledge done a study to ask if anyone hears anything. *According to our research, we are not the only ones who hear noises coming from the mountain.*

2.

FL: "Due to the location of plant infrastructure deep inside of a mountain, FirstLight does not believe noise levels related to Project operations are at a level outside of the plant that could negatively impact the quality of life of Project neighbors. FirstLight believes the mountain, which the plant is located inside of, acts as a natural insulator of noise. This belief has been confirmed by FirstLight personnel who work outside of the mountain and have not heard excessive noise levels during Project operations." (source: Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No.1889) Updated proposed study plan, page 4-20)

Response: Some of the project is deep within the mountain, and some is not. The project includes extensive waterways including a tailrace tunnel that exits into the river and carries many tons of water at high rates of speed, and an open air reservoir.

Secondly, the undocumented testimony of FirstLight employees who, in the course of their work, did not hear "excessive noise levels," is not a good indication of what is heard by neighbors trying to sleep in the middle of the night adjacent to the mountain. The Massachusetts Department of Environmental Protection (DEP) regulations on noise emphasize the effects on others outside the property line:

"The MassDEP noise pollution policy describes criteria that MassDEP uses to evaluate noise impacts at both the property line and the nearest occupied residence or other sensitive receptor. When noise is found to be a nuisance or a threat to health, MassDEP requires the source to mitigate its noise.

Noise levels that exceed the criteria at the source's property line by themselves do not necessarily result in a violation or a condition of air pollution under MassDEP regulations (see 310 CMR 7.10 U). **The agency also considers the effect of noise on the nearest occupied residence and/or building housing sensitive receptors** [emphasis added]. " (source: <http://www.mass.gov/eea/agencies/massdep/air/programs/noise-pollution-policy-interpretation.html>; accessed 7/2/13)

The speculation by FirstLight that all aspects of its operations are fully insulated by some of them being contained by the mountain is not definitive proof they are not making sounds heard by others elsewhere.

3.

FL: "Finally, even in the event noise levels were found to be audible to Project neighbors, PME measure would a) not be possible, or b) be far too expensive to be feasible." (source: Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No.1889) Updated proposed study plan, page 4-20)

Response to Part a): This response does not take into consideration the important fact that no bothersome noises were heard before 2010. We believe that since we did not hear

noise before 2010, it is completely possible that FirstLight has, since 1972 until recently, operated in such a way that they do not make noise, and could do so again.

Here is a list of changes that have occurred at the mountain since 2010 that we know about, some of which are related to future changes the mountain wishes to make in its operations. There could be other changes we don't know about as well, but at least this list indicates somewhere to start investigations:

a. On May 5, 2010 (source: conference call 4/23/12 with John Howard, Ken Hogan, et al and Lisa McLoughlin and Warren Ondras), the mountain discharged a large amount of sludge into the river. This affected all operations downstream of the reservoir (basically everything in the project) and required massive cleanup. The full affects of this event on the project and its equipment are not known to the public. We assume that given the high rate of speed and volume of water moved, even a small injury to mechanical equipment or change in the shape of the tunnel could cause new vibrations or sounds.

b. The Project installed new equipment: unit 3 in 2011, unit 2 in 2012 (source: Mr. John Howard, open meeting 6/12/13). This development is especially important to study because the relicensing asks for more new equipment which may be similar to these.

c. Existing equipment has developed problems: currently unit 1 is being studied for reduced shear pin life on its wicket gate, possibly due to excessive vibrations (source: additional information submitted by FirstLight to Secretary Bose 6/28/13).

d. A solar array was installed over the tailrace area. This involved cutting down trees and other foliage adjacent to the tracks which may have reduced noise pollution from the mountain and/or from trains. (source: direct observation)

Response to Part b): The refusal states that the remedy would be too expensive. At this point it is impossible to tell if it would be too expensive to change noise levels because no one even knows what is causing them. This is exactly why a study is needed. All causes would not necessarily generate the need for expensive solutions. For example, if the sounds are trains or water exiting the tailrace that we hear more loudly because they cut the tree buffer to install solar panels, correcting this could be as easy and inexpensive as planting trees.

In short, many changes at the mountain have occurred since 2010 when the noise problems began. We would like to know if the noises we hear have to do with these changes, and if they do, we would like the mountain to operate in a way that does not cause or exacerbate them further----as it did prior to 2010.

4.

FL: "Moreover, contemporaneously with the filing of this Proposed Study Plan, FirstLight is filing in the project docket supplemental information which it believes shows there is no connection between the very localized noise associated with operation of the turbines and the noises heard by the requesters. " (source: Northfield Mountain

Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No.1889)
Updated proposed study plan, page 4-20)

Sources submitted by FirstLight include: 1) a letter to Secretary Bose 6/28/13, 2) "communications between the United States Air Force and FirstLight concerning a study to measure surface vibration from the Project's underground pump generators", 3) "a memorandum to FirstLight from Douglas Leubner, MSME, who recently conducted vibration analyses for FirstLight in connection with a maintenance issue," and 4) our presentation made at the 6/12/13 study plan meeting.

Response: We have reviewed the supplemental information, and believe it does not conclusively prove that FirstLight is not making the noises we have been hearing. The data is not comprehensive. For example, it does not cover the range in which we hear many of the noises, and it does not address the issue of noises heard outside the property boundaries.

Since FirstLight does not make specific arguments about why this information proves their case, we have nothing specific to respond to. So we will briefly outline some of our own points:

a. In the 6/28/13 letter to secretary Bose, last paragraph, FirstLight argues we live "a very substantial distance from the deep underground pump generators." We feel this statement is misleading in 2 ways. First, we live about a mile from the entire facility, on top of the next line of hills (that FirstLight knows this is confirmed by John Howard's email to John Curtis of 5/7/13, submitted with the supplemental documents to Secretary Bose on 6/28/13). We believe this falls short of "a substantial distance." Sound carries, and we hear other sounds from the same area including trains, lawn mowing, and occasional trucks. Secondly, we object to the attempt to limit the scope of the mountain's operations to "deep underground pump generators" when sounds could be coming from any aspect of project operation, including parts not deep underground.

b. Responding to the content of Supplemental Material "communications between the United States Air Force and FirstLight concerning a study to measure surface vibration from the Project's underground pump generators":

These emails between Mr. John Howard and Air Force personnel are to do with the Air Force's study of "geophysical activity in the ground surrounding the underground pump generators." (source: Memorandum for Northfield Mountain Station Manager 3/18/10). This study measured vibrations associated with turbines at 60hz and 90hz. It is not stated if other frequencies were detected from the turbines or from other sources. In addition, these studies were done right over the turbines, not at any other locations. The communications don't directly answer the question: could the turbines be making noises heard by others in another location, even though Mr. Howard's original email specifically asks for that information.

c. Responding to the content of Supplemental Material "Memorandum to John S. Howard, FirstLight, From Douglas Leubner, HydroExpertise USA, June 26, 2013":

The statement by Mr. Leubner directly addresses the question asked by Mr. Howard: "What frequencies would you expect could be picked up from our rotating machinery?" This question in itself is asking for speculation. In answering it, Mr. Leubner does speculate that the equipment should not make noises in the ranges we had previously measured. We have 2 responses to this. First, it is not conclusive to say that something shouldn't be making noises. We are asking for this to be measured.

Secondly, Mr. Leubner concludes that vibrations should occur in the 90 Hz and 30 Hz ranges. Further recording does show noises in this range---please see table attached.

In short, we believe this test, which was prompted by an excessive vibration, does not answer our questions, but does show that problems with vibration exist within the mountain's equipment, and that some of our recorded sounds are at the frequencies to be expected to be outputted by project machinery.

Conclusion:

Our data collection and analysis has shown that:

- 1) The mountain did not make any noises bothersome to us before 2010.
- 2) Currently, noises do in fact exist---they have been measured and are found to be louder nearer the mountain, while the same sounds simultaneously reach us on our hill about 1 mile away.
- 3) Some of the noises we hear are within the range that engineers expect the mountain's equipment to produce.
- 4) Many changes occurred in the operation of the mountain in 2010 including: new equipment, malfunctions with existing equipment, and the elephant in the room---the landslide within the holding basin that affected everything downstream of it.
- 5) Neither our neighbor's generator (see our presentation 6/12/13 page 6) nor noises from the power lines (source: email from WMECO 6/21/13) can account for these noises.
- 6) We are not the only people who hear noises (Page 1 of this document, #1).

In short, a study is needed because no one knows if the noises are coming from changes made at FirstLight since 2010. Relicensing includes making more changes that are likely to affect noise level in the same way, being of a similar nature to expand capacity, and so they are relevant to this relicensing process. Please approve a process for studying if FirstLight's operations are creating noise bothersome to its neighbors. Thank you.

Correlated sounds at house and end of tailrace
 Night of June 9, 2013
 (Times are approximate)

Start Time	End Time	Duration	Frequencies	Characteristics
6/10/13 12:31 AM	6/10/13 4:02 AM	3:31:00	42, 45	steady tones, intermittent periods
6/10/13 6:43 AM	6/10/13 6:56 AM	0:13:00	10	steady tones, intermittent periods
6/10/13 6:45 AM	6/10/13 6:49 AM	0:04:35	78	steady tones, intermittent periods
6/10/13 1:03 AM	6/10/13 1:05 AM	0:01:30	80-100	short wavering tones
6/10/13 1:16 AM	6/10/13 1:17 AM	0:01:25	50-100	up/down bands
6/10/13 1:55 AM	6/10/13 2:00 AM	0:05:04	50-100	up/down bands
6/10/13 3:25 AM	6/10/13 3:27 AM	0:01:52	100	wavering tone
6/10/13 3:35 AM	6/10/13 4:15 AM	0:39:56	60-110	up/down bands
6/10/13 4:29 AM	6/10/13 4:39 AM	0:10:00	40-90	wavering tones
6/10/13 4:35 AM	6/10/13 4:41 AM	0:06:00	100-55	single descending log slope (like a plane, but only one frequency)
6/10/13 5:57 AM	6/10/13 5:59 AM	0:01:32	20-200	broad noise
6/10/13 6:28 AM	6/10/13 6:32 AM	0:04:00	10-400	broad noise with descending tones (large planes?)
6/10/13 6:45 AM	6/10/13 6:53 AM	0:08:00	20-200	descending log slope bands (planes?)

Other instances of similar sounds at house

Start Time	End Time	Duration	Frequencies	Characteristics
5/26/13 12:16 AM	5/26/13 7:27 AM	7:11:10	42 Hz steady	Consistent
5/27/13 12:35 AM	5/27/13 2:46 AM	2:11:00	90 Hz	intermittent
5/27/13 12:35 AM	5/27/13 7:20 AM	6:45:42	42 Hz steady	present all night at varying volumes
5/27/13 12:37 AM	5/27/13 12:46 AM	0:09:02	90 Hz	intermittent, then louder

5/27/13 1:43 AM	5/27/13 1:45 AM	0:01:52	100/150/200	loud, wavering bands
5/27/13 2:42 AM	5/27/13 2:43 AM	0:00:29	325/440/460	train whistle
5/27/13 2:40 AM	5/27/13 3:32 AM	0:52:00	50-170	parallel bands, holds at varying pitches for 30-60 seconds
6/1/13 10:07 PM	6/1/13 10:08 PM	0:01:52	58, 120, 180	loud, with smooth log descent from 80, 160, 260 - different from plan
6/1/13 10:07 PM	6/1/13 11:07 PM	1:00:09	59	steady 59 Hz
6/1/13 10:10 PM	6/1/13 10:25 PM	0:14:47	120	louder than constant background
6/1/13 10:07 PM	6/2/13 6:45 AM	8:38:55		clusters of bands 38-45, 76-79, 86-88
6/1/13 11:54 PM	6/2/13 4:25 AM	0:00:03	121	8 bursts of 3-5 seconds; two were 40 seconds apart
6/4/13 12:29 AM	6/4/13 12:56 AM	0:27:51		up/down bands (train?)
6/4/13 6:55 AM	6/4/13 8:52 AM	1:56:35	90 Hz	
6/4/13 12:29 AM	6/4/13 8:52 AM	8:23:23	30, 45 Hz	consistent
6/4/13 12:29 AM	6/4/13 4:59 AM	4:30:00	34, 41 42 Hz	fade in and out
6/4/13 4:59 AM	6/4/13 8:52 AM	3:53:23	35	fade in and out
6/11/13 1:13 AM	6/11/13 3:17 AM	2:04:00	5.5 Hz	
6/11/13 12:29 AM	6/11/13 4:55 AM	0:21:00	15 Hz	intermittent
6/11/13 12:09 AM	6/11/13 6:46 AM	6:37:41	42, 45, 49 Hz	intermittent
6/11/13 12:45 AM	6/11/13 3:10 AM	2:25:00		up/down bands
6/11/13 4:37 AM	6/11/13 5:25 AM	0:48:00		up/down bands
6/12/13 12:10 AM	6/12/13 4:20 AM	4:10:00	43, 46, 49 Hz	fade out
6/12/13 12:10 AM	6/12/13 3:14 AM	3:04:00	23 Hz	occasional
6/12/13 6:29 AM	6/12/13 9:00 AM	2:30:46	90	fairly constant
6/12/13 6:52 AM	6/12/13 7:20 AM	0:28:00	45	
6/15/13 10:22 PM	6/16/13 12:07 AM	1:45:00	41 and 42 Hz	
6/16/13 5:34 AM	6/16/13 8:35 AM	3:01:47	39 and 42 Hz	
6/16/13 2:33 AM	6/16/13 2:44 AM	0:11:00	60-120	wavering, intermittent

6/16/13 2:40 AM	6/16/13 3:34 AM	0:54:00	45-165	bands at 7 Hz steps, slight waver, loudest at 90 and 113
6/16/13 9:36 PM	6/17/13 7:38 AM	10:02:16	11 Hz	intermittent during the entire recording
6/16/13 9:36 PM	6/17/13 7:38 AM	10:02:16	39, 42, 45	intermittent during the entire recording
6/17/13 12:16 AM	6/17/13 6:12 AM	5:56:00	30 Hz	intermittent
6/17/13 6:30 AM	6/17/13 7:38 AM	1:08:16	30 Hz	louder, steady
6/17/13 12:52 AM	6/17/13 1:37 AM	0:45:00	60-120	up/down bands, loud
6/17/13 10:49 PM	6/17/13 10:52 PM	0:02:37	50-600	smooth descending bands (probably small plane)
6/17/13 11:15 PM	6/17/13 11:16 PM	0:01:29		broadband and descending bands (probably large plane)
6/17/13 11:24 PM	6/17/13 11:29 PM	0:04:56		three more prob large planes
6/18/13 12:22 AM	6/18/13 6:19 AM	5:57:00	40-120	up/down bands, intermittent
6/18/13 12:34 AM	6/18/13 12:34 AM	0:00:26		train whistle
6/18/13 1:31 AM	6/18/13 1:32 AM	0:00:28		train whistle
6/18/13 1:54 AM	6/18/13 1:54 AM	0:00:11		train whistle
6/18/13 12:59 AM	6/18/13 4:55 AM	3:56:00	11	intermittent

June 21, 2013

To whom it may concern,

My name is Robert Escott, Fire Chief in the Town of Montague for the Fire District Turners Falls. I am writing today on behalf of the Franklin County Fire Chiefs Association in reference to FERC project # 1889 Turners Falls project, FERC project # 2485 Northfield Mountain project. The concern that we have that we hope you will research during the relicensing process is with the levels of the Connecticut River during operations of the project.

As emergency responders to the Connecticut River we do not have the ability to choose when we enter the waterway. When the call for assistance comes in we must respond in a timely manner. Although high river levels do present challenges from time to time they do not prevent us from responding. However on the other side of the spectrum low river levels present challenges that greatly slow down or at times prevent a response.

When a response is needed on the Connecticut River by standard operating procedure any bordering town to the incident responds. For example purposes only let's assume an incident at the French King Bridge. This incident would bring Turners Falls Fire launching their boat from the Turners Falls Rod & Gun Club, Gill Fire launching their boat from the Barton Cove/Gill boat ramp, Northfield Dive Team launching from the Northfield boat ramp, Greenfield Fire as a safety boat launching from the Turners Falls Rod & Gun Club, Erving Fire for manpower. As you can see many resources are needed to complete an effective and safe rescue. A rescue operation such as this is greatly deterred due to low water levels which slow down or at times prevent the launching of boats.

The Franklin County Fire Chiefs Association would like you to consider the effects of low water levels on emergency responses to the Connecticut River in the areas from the Turners Falls Dam to the Vernon Dam.

If there any questions or explanations needed please feel free to contact me.

e-mail turnersfallsfire@yahoo.com

work 413-863-9023

Thank you,

Chief Robert Escott

Turners Falls Fire

Steven Alves, Turners Falls, MA.
Commissioner Jeff C. Wright
Director of Energy Projects
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: FirstLight Project No: P-2485 & P-1889;

Date: July 14, 2013

Dear Commissioner Wright,

I urge you to re-consider the forty-year practice of allowing power companies (currently FirstLight Power Resources, Inc.) to use the Connecticut River as a lower reservoir for the Northfield Mountain pumping station in Massachusetts.

Soil erosion, aquatic deaths from turbines, negative effects on fish migration from erratic river flows and on recreational use have provided ample evidence that using the river in manner should be re-examined. A closed-loop system could eliminate many of these harmful effects.

I ask you to continue that progress made by the 1972 Clean Water Act and begin the process of a feasibility study for a closed-loop system pump-storage system. With this information in hand, citizens who value the river's role in their lives can determine the best course of action.

I am the producer of the documentary film entitled, Beneath the River: An Underwater Exploration of the Connecticut, which has been shown dozens of times on public television and continues to be used in museums and K-12 through college classroom throughout the Connecticut River Valley.

Producing Beneath the River increased my knowledge of the river's history and ecology and led me to advocate on its behalf. I would be pleased to send you a copy of the film, which I think would help inform you in your decision-making role.

Sincerely,
Steve Alves
Home Planet Pictures
23 Unity Street
Turners Falls, MA 01376
hometown@crocker.com
413-834-3109

Philip F. Tomlinson, Jr., Greenfield, MA.

I strongly encourage FirstLight to study the feasibility of making Northfield Mountain a closed-loop system rather than using the river as its lower reservoir.

Peter Richardson, Exeter, NH.
To the Reader,

I would like to you to study the feasibility of making Northfield Mountain a closed-loop system, rather than continue using the river as its lower reservoir.

Water Quality is a major concern for all our streams and before we relicence Northfield Mountain you should be certain that any discharge meets Federal and State WQ standards as a minimum.

Please be able answer any and all WQ questions.

Katherine Putnam, Whately, MA.

Using the river for the lower reservoir is old technology and an old idea.

A feasibility study on making Northfield Mountain a closed-loop facility is reasonable and appropriate. It is not good for the health of the river to keep fluctuating the river levels the way this pump facility does. It also serves to further endanger species of fish, eels and lampreys that live in the river and get sucked into the intake.

As the first Blue Way and a river still in the process of being cleaned up, The Connecticut River deserves that we make sure that relicensing uses current technology and improves the health of the river for all native species of plant, animal and human to use.

Turner's Falls Dam

We also need to provide for fish passage over and back on the dam at Turner's Falls and for more water flow through the river than is currently the norm. Putting most of the water in the river through the canal is not good for the health of the river and the creatures that depend upon it. Only 10% of the shad that pass through the fish lift at Holyoke make it past the dam at Turner's Falls. This should be corrected.

Jane Whittlesey Winn, Pittsfield, MA.

Please ask First Light to study the feasibility of a closed-loop system. The amount of fish killed by these turbines year after year is appalling! It is time to update this facility!

Glen Ayers, Greenfield, MA.

Formal comments on FERC Docket P-2485-063 (Northfield Mountain pump storage, FirstLight Power)

Pursuant to the requirements of the NEPA, please include as a reasonable alternative the use of closed loop reservoir storage at the Northfield Mountain Pump Storage Facility. The continued use of the main stem of the Connecticut River as the lower reservoir is highly controversial. The review of this project must include studying the feasibility of conversion to a closed loop system to reduce the unacceptable and on-going impacts to the river system, including extensive damage to the river banks, increased invasion of riparian vegetation by invasive species, and river flow hazards to recreational use. The continued use of the river as a dumping ground for silt materials is highly controversial and subject to significant opposition. This project must be subjected to a full review of reasonable alternatives including the alteration of the project to a closed loop storage system.

Please place these comments into the official docket for this project so that they are available for judicial review, if that becomes necessary.

Thank you,

GLEN A. AYERS, R.S., C.H.O., Regional Health Agent
Massachusetts Registered Sanitarian # 1318
Franklin County Cooperative Public Health Service
c/o Franklin Regional Council of Governments
12 Olive Street, Greenfield, MA 01301
Phone 413-774-3167 x106, Fax 413-774-3169
Cell 413-834-5729 glenayers@frcog.org

Elizabeth Austin, South Hadley, MA.

I am writing to comment on the Relicensing of the Northfield Pumped Storage Facility (P-2585) on the Connecticut River in Massachusetts. This facility was licensed in 1972 and for the past 40 years we have had a trial as to its success as a hydropower facility and its impact on the environment.

Clearly, the facility has succeeded in providing power to our region and beyond. Unfortunately, it has had a negative impact on the environment. You, FERC, allowed GDF Suez to use OUR river to make power and to make money—a lot of money. Yes, we do need power and re-licensing this facility is important but by allowing this to continue to be a pumped storage facility, millions of gallons of water will be taken from our river each night and pumped up Northfield Mountain and then released during peak demand. Thus our river levels will rise and fall unnaturally day in and day out. This will continue to cause erosion of the river banks, damage to nursery habitat for fish, impingement and entrainment of fish, plus interruption to recreational use of the river.

Now is the time to make changes so that this facility has minimal impact. I strongly request that you require a serious study of the feasibility of a closed-loop design. A lower reservoir could be created and water pumped up and down as needed. The demand for electricity will most likely grow over the next 50 years. I urge you to be forward thinking when relicensing this project. If demand grows and we don't have a closed loop, more water will need to be taken from the river. Also, climate change might bring drought and low levels of water as happened in 2012. Our environment is NOT for sale! PLEASE request that the closed loop system be considered during this relicensing process.

Again, this is a 50 year decision you are facing. Please be forward thinking and please consider our environment first.

Respectfully submitted,

Elizabeth Austin
47 Camden Street
South Hadley, MA 01075
413-322-8818
Lizaustin44@comcast.net