United States Department of the Interior

FISH AND WILDLIFE SERVICE

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In Reply Refer To: FERC Nos. 1889 and 2485
FirstLight Power Resources/GDF Suez
Connecticut River
COMMENTS ON REVISED STUDY PLAN

August 29, 2013

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Dear Secretary Bose:

This responds to the Revised Study Plan (RSP) submitted by FirstLight Power Resources (FirstLight) on August 14, 2013 as part of the relicensing of the Turners Falls and Northfield Mountain Pumped Storage (NMPS) projects, located on the Connecticut River in New Hampshire, Vermont and Massachusetts. We have reviewed the RSP and offer the following comments.

GENERAL

In its RSP, FirstLight has adopted, either fully or partially, the majority of recommendations provided in our July 15, 2013 Updated Study Plan comment letter. The U.S. Fish and Wildlife Service (Service) appreciates the incorporation of our proposed modifications to the study methodologies. Consequently, we are focusing comments on only those study plans where FirstLight addressed our recommendations, due to the limited time frame for RSP review.

3.3.1 Instream Flow Habitat Assessment

Habitat Suitability Index Criteria

This section of the RSP correctly indicates that FirstLight has initiated consultation on the Habitat Suitability Index (HSI) curves, but that this consultation has not concluded. On a June 20, 2013 conference call regarding the Instream Flow Study, it was agreed that a separate conference call or meeting would be scheduled to finalize curve selection.

In the RSP, FirstLight provides a set of proposed HSI curves based on consultation to date, and also indicates that selection of species and criteria for grouped species guilds needs to be developed in consultation with the study team.

As such, we are not commenting on the filed draft HSI curves at this time, but as noted in our July 15, 2013 letter, we will recommend changes to the lamprey spawning curves that should be a stand-alone species/life stage and discuss other species and guild criteria at the future meeting scheduled for that purpose.

Data Collection

FirstLight has addressed concerns regarding the calibration of flows above Cabot Station when Station No. 1 is not operating. However, discrepancies between the text and the tables on pages 3-106 and 3-107 make it unclear as to whether the low flow of 140 cfs above Cabot Station will be actually calibrated (using level loggers) or simply extrapolated (using the licensee's 40 percent-250 percent rule of thumb [see page 3-106]). The final plan should verify whether 140 cfs flow shown in the table is a "calibrated" flow.

Persistent Habitat Modeling and Dual Flow Analysis

In our July 15, 2013 comments on the draft study plan, we recommended the inclusion of spatial maps that depict weighted usable area across cells and over a range of flows for the 1D modeled reaches.

On page 3-111 of the RSP, FirstLight states "Spatial plan views of habitat suitability for a subset of species/life stages and flows will be displayed graphically. These will be identified in consultation with stakeholders to narrow the number of maps to be developed." This statement indicates concurrence with our recommendation. However, in the "Matrix of Comments and Responses" of the RSP, FirstLight states "...we have not seen any currently available technology that will spatially present dual-flow results from a one-dimensional model..." and there are similar statements on pages 3-109 and 3-110. Therefore, it is unclear what FirstLight is proposing to include in the analysis of habitat/flow data.

In their comments on the RSP, The Nature Conservancy (TNC) provides an example graphic that can be produced using the software PHABSIM for Windows v. 1.5.1 and a detailed discussion of the process to develop the information we requested. Based on information provided by TNC, the analysis we recommended is possible. Therefore, we reiterate our recommendation that spatial graphics of habitat at various flows be developed as part of this study. As we stated in our July 15, 2013 letter, creating plots for every species and every life stage under multiple discharge scenarios may be unnecessary and excessive and the decision concerning which plots to include in the study report should be determined in consultation with agencies and other stakeholders.

3.3.2 Evaluate Upstream and Downstream Passage of Adult American Shad

Whole River Telemetry Studies

This section identifies a proposed test flow regime of at least three days of testing at each of the three flows (2,500, 4,000 and 6,300 cfs) from April to early June, and a least three days of testing of flows of 1,000 and 1,500 cfs in June and early July after the end of the sturgeon spawning period. In the Matrix of Comments and Responses on page 3-435, the bullet entry regarding our comments on test flows is oversimplified. Our July 15, 2013 letter identified target test flows as included in the RSP, but also included a recommendation of three replicates of three-day tests of each flow. This recommendation was clarified in an email to Robert Stira of FirstLight on July 17, 2013. Trout Unlimited provided comments similar to those in our July 15, 2013 letter, but in the matrix, FirstLight referenced that their proposed protocol conformed to the Service's recommendation. However, this is not the case. The proposed plan proposes no less than three days of evaluation of each test flow, but it does not propose three consecutive days of testing or three replicates of each three-day period. It is unclear whether the plan proposes one three-day period or three separate one-day periods of testing.

We believe that separate replicates are critical to assure that different periods in the migration are sampled, but also believe that a one-day test is not adequate to assess behavior which can vary greatly based on other environmental conditions than flow. Therefore, we stand by our original recommendation that each test flow be evaluated for three separate three-day periods.

Task 5: Reporting

The study report should include:

- shad release numbers, locations and dates;
- data on released fish (length, weight 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; and
- a graphic spatial and temporal depiction of movements of all fish.

Turners Falls Upstream

The study report should include:

- 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 eventually pass the fishway;
- behavior of fish that do not pass the project;

- number of successful and unsuccessful forays fish made into each fishway;
- number of forays upstream from MWWTP;
- number of forays into the bypass reach at each flow; and
- analysis of how project operations affect upstream movement and entry into fishways.

Turners Falls Downstream

The study report should include:

- approach route and route of passage;
- an 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; and
- overall successful project passage.

Northfield Mountain

The study report should include:

- number of fish within the Northfield zone of influence;
- number of fish entrained;
- an analysis of delay in upstream and downstream migration at the Northfield Mountain Project based on migration behavior and passage timing at the upstream and downstream Vernon and Turners Falls projects;
- description of movement patterns in the vicinity of Northfield Mountain; and
- number of fish detected at stations upstream of Northfield.

3.3.3. Evaluate Downstream Passage of Juvenile Shad

Task 4: Reporting

The study report should include:

- the volume of spill at each gate throughout the testing period;
- an analysis of spill potential based on spill data for the out migration period over the full period of digital flow records;
- migration or passage delay at any location should be reported;
- a daily record of Northfield operations during the study period; and
- a long-term history of pumping (number of units per hour) by month for April through November which 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).

3.3.5 Evaluate Downstream Passage of American Eels

Task 2b: Telemetry Locations

In our July 15, 2013 letter, we provided a list of proposed telemetry receiver locations. FirstLight's list of receiver stations differs substantially from ours. Upon review of Table 3.3.5-1, we do not believe the locations proposed by FirstLight are sufficient to determine which passage routes eels are using to get past the projects. For instance, we had requested a receiver be located at the Upper Reservoir of the NMPS Project, but that site is not included in Table 3.3.5-1. We also requested that all receiver configurations should ensure full-depth coverage. The NMPS intake is 48 feet deep, which is too deep to get complete coverage with one surface antenna. The inclusion of droppers should increase the chances of detecting eels at greater depths near the intake; however, because droppers have a relatively narrow read range, some eels still could get entrained but not be detected (this occurred at the Muddy Run Project). Including a receiver at the Upper Reservoir would provide system redundancy and increase confidence that all tagged eels in the vicinity of the NMPS intake are detected.

The only way the Service would not object to omitting a receiver at the Upper Reservoir station is if FirstLight can provide assurance that the receiver system at the intake will provide full depth and full width coverage.

Likewise, the Service is concerned with the receiver locations in the Cabot Station forebay and tailrace. In order to meet study objective #2, it is absolutely critical that the location and configuration of receivers is sufficient to discern whether eels are passing via the turbines or the bypass sluice. Limitations with using telemetry to detect fish using the downstream bypass were identified by Dr. Alex Haro. To overcome those limitations, Dr. Haro recommended using a PIT system to supplement the telemetry data. Based on information in the study plan, FirstLight proposes to use an Orion receiver with a dipole antenna to monitor the entrance to the bypass.[1] Given the proposed tag pulse rate (two-second intervals) and the water velocity through the bypass sluice, a single antenna could miss detecting tagged eels using the bypass. In order to increase the probability of detection, multiple droppers should be placed along the sluice.

We also had recommended installing a telemetry station in the Cabot station tailrace. FirstLight would install a Lotek SRX with a yagi antenna to monitor the full river width. While having the system set for far field coverage will help in interpreting the motion sensor data (i.e., the mortality component of the tags), near field coverage in the immediate tailrace area is needed to assist in determining whether eels detected at the Cabot forebay are passing via the turbines or the bypass sluice.

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[1] In its response to comments on the Updated Study Plans (3.9 Matrix of Comments and Responses), FirstLight indicates that it will sample the bypass during the migration season, but there is no discussion of this in the actual RSP.

Task 4: Turbine Survival

The Service had requested that all pertinent unit operational conditions be tested (e.g., minimum load, full load, peak efficiency). FirstLight has proposed to evaluate turbine survival with the units set at best efficiency conditions, but it remains unclear whether the units are ever operated at other than best efficiency. FirstLight should either verify that units will always be operated at best efficiency under a new license, or expand balloon tag testing to cover all turbine settings that could be employed during the next license term.

Task 5: Reporting

The study report should include:

- eel release numbers, locations and dates;
- data on each released eel (e.g., length, weight, and morphometric criteria);
- river temperature (collected every hour) at Northfield, canal, bypass and below Cabot Station;
- route selection;
- analysis of how project operations affect downstream movement and route selection;
- behavior of fish that do not pass the project;
- delay of eel: location and time;
- survival of eels passing each project facility;
- a daily record of Northfield operations during the study period; and
- 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).

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 5: Data Analysis and Reporting

In addition to a map of all spawning locations, detailed maps of Phase II locations should be provided. Additional information should include:

- the number, dates and times of observations in Phase I;
- a description of flow manipulations including change in flow and stage, the time for the effect to be realized (start and end times), and whether the flow was increased or decreased;
- the number of splashes before, during and after flow manipulation;
- number of eggs collected before and after flow manipulation;
- behavior of fish during manipulations;
- river temperatures during the study period;
- discharge in 15-minute increments during the period of the study; and
- comparison of 2014 flow fluctuations to flow fluctuations in prior years.

3.3.7 Fish Entrainment and Turbine Passage Mortality Study

Task 2: Quantification of Shad and Eel Entrainment

The Service has repeatedly requested that FirstLight quantify entrainment of early life stages of shad at NMPS. Justification for this request can be found in our original study request as well as our July 15, 2013 comment letter on the Updated Study Plan.

In its RSP, FirstLight states that it is not proposing to quantify entrainment of early life stages of shad because, given the low natural survival from egg to juvenile, losses at NMPS would not be expected to impact the overall shad population or inform potential protection or mitigation measures. We address both of these rationales below.

According to an Environmental Protection Agency (EPA) Regional Analysis Document cited by FirstLight, only 0.0000182 percent of shad eggs survive to juveniles. The Service does not dispute that most eggs do not survive to become juveniles. However, there are a number of reasons why it is disingenuous to rely solely upon this rate to justify not conducting a quantitative entrainment study.

- Quantitative ichthyoplankton studies are routinely required and conducted at cooling water intake structures (CWIS) throughout the country as part of the National Pollutant Discharge Elimination System (NPDES) program under Section 402 of the Clean Water Act (CWA). The CWA is administered by EPA. EPA is the agency that published the cited survival fraction, and thus is well aware of the low survival of eggs, yet it still requires ichthyoplankton entrainment monitoring. Therefore, it stands to reason that EPA believes that there is a level of entrainment that is unacceptable at CWIS. Similar to pump storage facilities, entrainment at CWIS typically is assumed to result in 100 percent mortality of entrained organisms.
- FirstLight's reliance on the low egg to juvenile survival rate does not address the Service's concern that entrainment of early life stages could be impacting the ecosystem productivity of the Turners Falls pool (i.e., removing a prey source likely important to food web interactions).
- While survival rate of egg to juvenile is low, average age-based survival rates for shad from 1979 to 1982 were found to be: days 4 to 9 – 0.761; days 10 to 18 – 0.854; days 19 to 28 – 0.909; days 29 to 33 – 0.942; days 34 to 80 – 0.982.[2] Therefore, eggs that hatch and survive to four days have a relatively high survival rate. It is not only egg entrainment that concerns the Service, but entrainment of all young-of-year stages, including yolk sac and post-yolk sac larvae. Unless we know how many of which life stages are being entrained, we cannot determine what level of impact operation of NMPS is having on the Turners Falls shad population.

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[2] Crecco, V., T. Savoy and L. Gunn. Daily Mortality Rates of Larval and Juvenile American Shad (*Alosa sapidissima*) in the Connecticut River with Changes in Year-Class Strength. 1983. Canadian Journal of Fisheries and Aquatic Sciences. 40: 1719-1728.

Analyzing the quantitative entrainment data relative to environmental and operational conditions during the study is critical to the development of the most protective error-free conservation and mitigation measures. For example, if the majority of entrainment occurs during certain times of the day or night, pump-back operations potentially could be shifted to avoid those peak entrainment hours. For that reason, and as included in our original recommendation to FirstLight, we continue to strongly encourage as rigorous analysis as possible to accurately quantify entrainment of early life stages of shad.

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

Task 5 – Report

FirstLight plans to include "maps, cross-sections and other visualizations of the model results that are relevant to the study objectives." FirstLight indicates that composite AutoCAD drawings are being developed from bathymetry and coupled with project drawings to develop the computational fluid dynamics (CFD) model. For the Service to properly interpret the "maps, cross-sections and other visualizations" from the CFD model, we request that the bathymetry and relevant project drawings also be included in the report.

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

Methodology

In our July 15, 2013 letter, we requested that FirstLight run a transient versus steady-state 2D model. FirstLight appears to have revised the RSP to indicate they will run a transient model; however, this section on page 3-226 still refers to the River 2D model as "steady-state." We believe this is a typographic error but it should be corrected.

3.3.15 Assessment of Adult Sea Lamprey Spawning

In our July 15, 2013 comments, we recommended that FirstLight modify their proposal to add modest radio-tracking of pre-spawned adult lamprey eel to their study plan similar to that proposed by TransCanada for their projects and adopt the nest monitoring protocols proposed by TransCanada. FirstLight has adopted those recommendations, but has eliminated the habitat-based survey for nests proposed in the draft study plan. We had recommended the radio-telemetry be added to, not replace, the previous plan. In fact, in our July 15, 2013 comments to TransCanada, we recommended that some amount of habitat-based surveys of potential spawning habitat be added to their plan which relied solely on radio-telemetry to identify nest locations. Our July 15, 2013 comments to TransCanada that explain why multiple approaches are needed to assure that sufficient information is collected are pertinent to this revised plan and are excerpted below:

> *However, given the limited number of radio-tagged lampreys and the large areas of mainstem and tributary rivers that lampreys could disperse to, we recommend that TransCanada also utilize the data from the Hydraulic Modeling Study (Study 4) and Aquatic Habitat Mapping (Study 7) to locate potential areas of lamprey spawning habitat based on substrate and depth criteria or lamprey spawning and incubation. During the course of this and other studies, these areas could be observed for lamprey spawning concentrations that may not be identified by the radio-tracking survey if no tagged individuals select those sites. If any such areas offer different habitat conditions from those occupied by tagged individuals, they may be appropriate for inclusion in the nest monitoring phase of the study and/or provide potential unique habitats for evaluation in the Instream Flow Study (Study 9). Addition of this component would strengthen the study plan by providing an alternative method to identify spawning areas and potentially expand the geographic location and habitat conditions that could be evaluated for project effects.*

Based on the same reasoning we cited in our July 15, 2013 letter to TransCanada, we recommend that the habitat surveys originally proposed by FirstLight be reinserted into the lamprey spawning study plan.

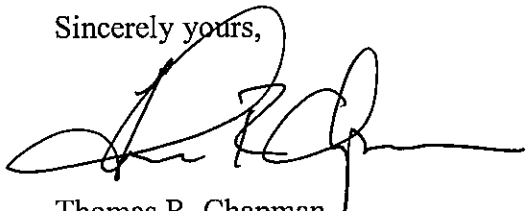
Task 3: Report

The study report should include:

- locations of all telemetry detections;
- discharge and stage during all observations of redds during fluctuations;
- continuous river temperature data;
- maps of all suitable spawning locations; and
- maps of all redds located during the study.

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

Sincerely yours,



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