

FEDERAL ENERGY REGULATORY COMMISSION  
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OFFICE OF ENERGY PROJECTS

Project No. 4784-106 – Maine  
Pejepscot Hydroelectric Project  
Topsham Hydro Partners Limited Partnership

**VIA FERC Service**

Luke Anderson  
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150 Main Street  
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**Reference: Determination on Requests for Study Modifications and New Studies  
for the Pejepscot Hydroelectric Project**

Dear Mr. Anderson:

Pursuant to 18 C.F.R. § 5.13(c) of the Commission's regulations, this letter contains the determination on requests for modifications to the approved study plan for the Pejepscot Hydroelectric Project located on the Androscoggin River in the village of Pejepscot and the town of Topsham, Maine. The determination is based on the study criteria set forth in section 5.15(e) and 5.9(b) of the Commission's regulations, applicable law, Commission policy and practice, and the record of information.

Background

On August 31, 2017, Topsham Hydro Partners Limited Partnership (Topsham Hydro) filed its Notice of Intent and Pre-Application Document for relicensing the Pejepscot Hydroelectric Project. Topsham Hydro's study plan was approved with modifications on July 3, 2018, requiring Topsham Hydro to conduct fifteen studies. On July 12, 2019, Topsham Hydro filed its initial study report (ISR) for six studies on aquatic, terrestrial, and historic resources. On July 10, 2020, Topsham Hydro filed its

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updated study report (USR) with the results of the remaining ten studies<sup>1</sup> on fisheries, recreation, and historical resources.

Topsham Hydro held its USR meeting on July 22, 2020. On August 11, 2020, Topsham Hydro filed a summary of the USR meeting that included proposals for two new fisheries studies on potential impediments to effective upstream fish passage at the project: a Project Sound Study and a Computational Fluid Dynamics (CFD) Modeling Study. Topsham Hydro filed its license application on August 31, 2020. Topsham Hydro proposes to file the results of both studies in the spring of 2021.

### Comments

Comments on the USR and the USR meeting summary were filed by Trout Unlimited, the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (FWS) on August 10, September 10, and September 11, 2020, respectively. NMFS and FWS support Topsham Hydro's proposed Project Sound Study as written and the proposed CFD Modeling Study with minor changes. In addition, NMFS and FWS request that Topsham Hydro conduct a new Anadromous Fish Upstream Passage Efficiency Study, a new Large Woody Debris (LWD) Sub-Sampling Study, and another eel survey. In its reply comments filed on October 9, 2020, Topsham Hydro states that it should not be required to conduct the requested new studies. On October 22, 2020,<sup>2</sup> Topsham Hydro agreed to incorporate NMFS and FWS requested modifications to the CFD Modeling Study.

### Study Plan Determination

Pursuant to section 5.15(d) of the Commission's regulations, any proposal to modify a required study must be accompanied by a showing of good cause, and must include a demonstration that: (1) the approved study was not conducted as provided for in the approved study plan; or (2) the study was conducted under anomalous environmental conditions or that environmental conditions have changed in a material way. As specified in section 5.15(e), requests for new information gathering or studies must include a statement explaining: (1) any material change in law or regulations applicable to the information request; (2) why the goals and objectives of the approved study could not be met with the approved study methodology; (3) why the request was not made earlier; (4) significant changes in the project proposal or that significant new information

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<sup>1</sup> Topsham Hydro conducted one study, a Largemouth and Smallmouth Bass Spawning Habitat Survey, that was not required by the Commission's study plan determination.

<sup>2</sup> See telephone memo at :  
[https://elibrary.ferc.gov/eLibrary/filelist?accession\\_num=20201022-3046](https://elibrary.ferc.gov/eLibrary/filelist?accession_num=20201022-3046)

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material to the study objectives has become available; and (5) why the new study request satisfies the study criteria in section 5.9(b).

Topsham Hydro's proposed Project Sound Study and CFD modeling study are approved. For the reasons explained in Appendix B, NMFS's and FWS's request for the Anadromous Fish Upstream Passage Efficiency Study, LWD Sub-Sampling Survey, and eel survey are denied (see Appendix A). Commission staff considered all study plan criteria in section 5.9 and 5.15(d) and (e) of the Commission's regulations; however, only the specific study criteria particularly relevant to the determination are referenced in Appendix B.

Topsham Hydro did not definitively state when the sound and CFD modeling study results would be filed. To prevent further processing delays, Topsham Hydro must provide the study results by April 1, 2021.

Nothing in this study plan determination is intended, in any way, to limit any agency's proper exercise of its independent statutory authority to require additional studies. In addition, Topsham Hydro may choose to conduct any study not specifically required herein that it feels would add pertinent information to the record.

If you have any questions, please contact Ryan Hansen at [ryan.hansen@ferc.gov](mailto:ryan.hansen@ferc.gov) or (202) 502-8074.

Sincerely,



for

Terry L. Turpin

Director

Office of Energy Projects

Enclosures: Appendix A – Summary of studies subject to this determination  
Appendix B – Staff's recommendations on proposed and requested studies

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**APPENDIX A****SUMMARY OF DETERMINATIONS ON PROPOSED AND REQUESTED STUDIES**

<b>Study</b>	<b>Recommending Entity</b>	<b>Approved</b>	<b>Approved with Modifications</b>	<b>Not Required</b>
Project Sound Study	Topsham Hydro NMFS FWS	X		
CFD Modeling Study	Topsham Hydro NMFS FWS	X		
Anadromous Fish Upstream Passage Efficiency Study	NMFS FWS			X
LWD Sub-sampling Study	NMFS FWS			X
Pejepscot Upstream Eel Survey	NMFS FWS			X

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**APPENDIX B****STAFF'S RECOMMENDATIONS ON REQUESTED STUDIES**

The following discusses staff's recommendations on requests for additional studies.

***Anadromous Fish Upstream Passage Efficiency Study*****Background**

The July 3, 2018, study determination required Topsham Hydro to conduct its proposed Evaluation of Spring Migration Season Fish Passage Effectiveness (2019 telemetry study), which consisted of a radio telemetry study of adult river herring (i.e., blueback herring and alewife) and American shad (hereafter collectively alosines) movement through the project's upstream and downstream fish passage facilities. The specific objectives of the study relevant to upstream passage were to: (1) estimate the proportion of adult river herring and American shad that approach and successfully pass upstream via the existing project fish lift; (2) estimate the residence time for adult river herring and American shad in the area immediately downstream of the project, prior to successful passage in the upstream fish lift or downstream departure from the study area; (3) estimate the survival or passage success for adult river herring and American shad passing upstream through defined river reaches as they approach the project; (4) describe the spatial and temporal distribution of adult river herring and American shad presence within the tailwater downstream of the project during the period of residence time prior to successful passage in the upstream fish lift or downstream departure from the study area; and (5) describe the extent of mortality that occurs to adult river herring and American shad during upstream passage.

The study results showed generally poor upstream passage efficiency for all species. For river herring, the nearfield attraction<sup>3</sup> effectiveness was 92.6 percent, but the overall fish lift effectiveness was 19.8 percent. The results indicate that most adult river herring entered the fish lift however, many did not remain in the hopper long enough to be raised over the dam. For American shad, nearfield attraction effectiveness was estimated at 32 percent, while overall fish lift effectiveness was 0 percent. Analysis of the cumulative residence time suggests that most of the tagged adult American shad spent most of their time (99 percent) below the spillway, rather than at the entrance to the fish lift. According to Topsham Hydro, this suggests that most shad were not able to locate

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<sup>3</sup> Nearfield attraction is defined as the probability of an upstream-migrating fish moving from the tailrace region into the downstream entrance of the lift.

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the fishway entrance and may have been falsely attracted to the spillway area, even though spill events were infrequent during the study.

Topsham Hydro theorizes that underwater noise from pumps that provide attraction water to the fish lift or poor hydraulic conditions within the fish lift could be why such a low percentage of fish that approached and entered the fish lift remained in the hopper long enough to be raised over the dam. Consequently, Topsham Hydro now proposes to conduct two new studies, a Project Sound Study and a Computational Fluid Dynamics (CFD) Modeling Study, to determine if noise and flow conditions are adversely affecting upstream passage effectiveness.

In addition, in its license application, Topsham Hydro proposes to change the frequency of operation of the fish lift under the term of a new license to improve fish passage. Currently, Topsham Hydro operates the upstream fish passage from April 15 to November 15 annually. The fish hopper is lifted every two hours beginning at 8 a.m. and ending at 6 p.m. for a total of five lifts per day. Topsham Hydro proposes to operate the existing fish lift on the following lift cycle frequency beginning in the first full passage season after the effective date of a new license: 1) from April 15 to May 15 and following upstream passage of the first fish at the downstream Brunswick project, the lift would be operated once every two hours; 2) from May 16 through June 15, the lift would be operated once every hour; 3) from June 16 through July 1, the lift would be operated every 2 hours; and 4) from July 2 through November 15, the lift would be operated once a day following the passage of salmon at the downstream Brunswick project.

#### Requested Study

NMFS and FWS agree that sound and flow hydraulics within the fish lift could be affecting passage effectiveness, and therefore, support Topsham Hydro's proposed sound and CFD modeling studies. However, in addition to these two new studies, NMFS and FWS request that Topsham Hydro conduct an additional radio telemetry study to collect empirical data on upstream passage effectiveness and migratory delay under Topsham Hydro's new proposed fish lift operating protocol. The study methods and objectives would generally be the same as the 2019 telemetry study, but would also include collecting data on fish lift operational settings and environmental conditions to help determine whether these factors are affecting fish passage. This would include collecting data on the following parameters: (1) elevation of the entrance gate; (2) drop, or headloss, at the entrance; (3) elevation of water within the entrance channel; (4) total attraction water supplied via pumps; (5) headpond elevation; (6) river flow; (7) river temperature; (8) flow through units; (9) approximate amount of spill; and (10) v-trap setting.

In support of their request, NMFS and FWS argue that Topsham Hydro's proposed changes in fish lift operation represent significant changes in the project

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proposal and that these changes warrant a new telemetry study. Additionally, NMFS and FWS state that because Topsham Hydro did not collect certain operational data during the 2019 telemetry study, it is impossible to determine whether operational parameters contributed to the poor passage results. NMFS and FWS add that, while they agree that Topsham Hydro's new proposed sound and CFD modeling studies are necessary to evaluate reasonable hypotheses regarding the mechanisms responsible for the poor and ineffective fish passage, "they are not intended to, nor are they sufficient, to evaluate the hypotheses associated with the new proposal for additional lift cycles." NMFS and FWS assert that without an empirical evaluation of the new operational proposal, there will be no way to determine whether or to what extent additional lift cycles affect the safe, timely, and efficient passage of target species.

#### Comments on the Study

Topsham Hydro is opposed to repeating the telemetry study. Topsham Hydro states that the new fish lift operating protocol is intended to be a post-licensing measure to improve passage and that it was informed by the 2019 telemetry study results. Topsham Hydro believes that it is incorrect to interpret its proposed modifications to the fish lift operational cycle as a significant change in the project proposal in the context of section 5.15(e) of the Commission's regulations. Topsham Hydro believes that the most accepted and effective practice would be to implement any protection, mitigation, or enhancement (PME) measure(s) during the new license term, and then to conduct post-license efficiency testing to determine the level of improvement from all related proposed PME measures adopted as part of the new license. If the sound or CFD modeling studies show that internal and external attraction flow hydraulics and acoustics may be affecting upstream fish passage, Topsham Hydro proposes to develop a plan and schedule for additional physical or operational changes to be implemented within three years of license issuance to address these issues. After any physical or operational changes are made, Topsham Hydro would conduct one season of fish lift efficiency testing for adult river herring during the fourth full passage season after the issuance of a new license.

Additionally, Topsham Hydro states that a study of lift cycle effects on fish passage success would be predicated on the assumption that none of the other issues that have been raised by the NMFS and FWS as potential impediments to successful passage (i.e. sound and fish lift hydraulics) are valid. Topsham Hydro suggests that repeating the telemetry study prior to evaluating sound and hydraulic conditions within the fish lift would be premature and inconclusive.

#### Discussion and Staff Recommendation

Hydraulic conditions and noise are two likely factors affecting the performance of the fish lift. The fish lift was constructed in the late 1980s and it is not known which hydraulic criteria were used in its design or whether it is still operating within those

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criteria. In addition, the fish lift uses pumps to provide attraction water, which are known to produce noise and could be causing fish to reject the fishway (FWS, 2019). Evaluating noise effects and hydraulic conditions, and comparing current operating conditions to known hydraulic conditions that are shown to effectively pass fish is a common practice and efficient means to evaluate fish passage facility performance at hydroelectric projects (section 5.9(b)(6)), and should provide sufficient information to inform any potential measures to improve upstream fish passage at the project (section 5.9(b)(4)).

Although Topsham Hydro's proposed changes to the fish lift cycle frequency could also affect fish passage performance, the most relevant proposed change to alosine passage is the decrease in cycle frequency from 2 hours to 1 hour during the peak alosine upstream passage season from May 16 to June 15 annually. A one-hour change in cycle frequency could improve fish passage effectiveness; however, shad appear to mostly avoid entering the fishway entrance at all, suggesting that something else besides cycle frequency is affecting fish passage effectiveness for at least one of the target species. Therefore, we believe that it would be more reasonable to first evaluate noise and hydraulic conditions in the fish lift, prior to completing any additional telemetry studies that would cost approximately \$100,000 (section 5.9(b)(7)).

We recommend that Topsham Hydro complete its proposed noise and CFD modeling studies and provide the results by April 1, 2021. We agree with Topsham Hydro that a new telemetry study would be premature until these study results are available. For these reasons, we do not recommend requiring Topsham Hydro to conduct NMFS's and FWS's requested Anadromous Fish Upstream Passage Efficiency Study.

### ***Large Woody Debris Sub-Sampling Study***

#### **Background**

The study plan determination required Topsham Hydro to conduct a LWD study "to determine the quantity and quality of LWD typically collected at the dam and whether opportunities exist to improve downstream aquatic habitat by altering Topsham Hydro's management of LWD at the project." The determination specifically required Topsham Hydro to "record for one year the number of logs equal or exceeding 4 inches in diameter and 6 feet in length that it collects and removes from the project." LWD of this size was singled out because it is particularly beneficial as aquatic habitat.

In its USR, Topsham Hydro reported that from July 2019 to June 2020, it removed five 30-yard containers of debris from the collection site at the dam. On average, a 30-yard container holds 30 cubic yards of debris. Topsham Hydro considers this volume of debris to be representative of a typical year. Topsham Hydro did not provide the number of logs equal to or exceeding 4 inches in diameter and 6 feet in length that it collected and



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removed from the river because it did not allocate the staff or resources necessary to do so.

### NMFS's and FWS's Study Request

NMFS and FWS request that Topsham Hydro conduct a sub-sampling study to extrapolate the amount of biologically-relevant LWD removed from the project on an annual basis. Specifically, NMFS and FWS request that Topsham Hydro sample the contents of a full 30-yard debris container to determine the number of logs equal to or exceeding 4 inches in diameter and 6 feet in length. NMFS and FWS request that Topsham Hydro do this twice: once immediately following spring flows and once following lower late-summer or early-fall flows. Using the results of the sampling effort, Topsham Hydro could then extrapolate the total amount of this relevant size class of LWD removed on an annual basis, while also providing some insight as to the seasonality of LWD recruitment.

### Comments on the Study

In its reply comments filed on October 9, 2020, Topsham Hydro states that, while it did not provide a precise estimate of LWD removed at the project, the LWD study provided sufficient information to inform the development of an appropriate measure to address LWD removal. In its license application, Topsham Hydro proposes to install a trash boom as part of the proposed downstream fish guidance system. The trash boom would sluice the majority of debris, including LWD, downstream past the dam which should benefit aquatic habitat in the project tailwater and downstream reaches. Topsham Hydro states that the additional information requested by NMFS and FWS is unnecessary as the majority of LWD would now be passed downstream regardless of size class.

### Discussion and Staff Recommendation

The objective of the LWD study was to determine if project maintenance activities were resulting in a significant amount of LWD suitable as fish habitat being removed from the Androscoggin River system. While the study conducted by Topsham Hydro did not provide the exact information sought by the study, the proposal to no longer remove LWD but instead allow it to pass downstream makes the need for precise estimates of the proportion of LWD that is the most suitable as fish habitat, moot. Moreover, the study results providing the total volume of LWD currently collected at the project is sufficient for determining the need for and the benefits of the proposal to pass all LWD downstream using the trash boom (section 5.9(b)(4)). Therefore, we do not recommend requiring Topsham Hydro to conduct a LWD sub-sampling survey as requested by NMFS and FWS.

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## *Pejepscot Upstream Eel Survey*

### Background

The study plan determination required Topsham Hydro to conduct an eel survey. The objectives of the eel survey were to document eel presence/abundance at the project to identify where eels concentrate when staging in pools or attempting to ascend wetted structures, and to identify of potential locations that may be viable sites for a permanent eel trap/pass structure.

Topsham Hydro conducted a total of 14 surveys from June 17 to August 26, 2019. Field crews conducted all surveys after sunset and used spotlights and binoculars from vantage points in an attempt to observe juvenile eels. Topsham Hydro observed no juvenile eels during any of the fourteen surveys.

Field crews identified a number of locations where juvenile eels may congregate including: (1) at the vicinity of the downstream bypass outflows where plunging flow conditions are present; (2) along the banks, especially near the attraction flow of the existing fishway, due to the availability of the bankside substrate that can be used for resting areas during periods of upstream movement; and (3) locations along the spillway which may receive regular amounts of leakage resulting in a consistently wetted surface.

### NMFS's and FWS's Study Request

NMFS and FWS state that the known presence of American eel both upstream and downstream of the Pejepscot project indicates that the survey methods were ineffective at detecting upstream migrating eels. Therefore, NMFS and FWS recommend that Topsham Hydro develop a new upstream eel study, in consultation with the resource agencies, that employs new methods to improve eel detections and satisfy the original study's goals and objectives.

### Comments on the Study

Topsham Hydro did not respond to the agencies' requests for a new eel survey.

### Discussion and Staff Recommendation

Topsham Hydro's eel study was designed using accepted practices for evaluating eel presence and relative abundance at hydropower projects (section 5.9(b)(6)), and the study was conducted as required by the approved study plan and met the study objectives (section 5.9(b)(1)). A lack of eel detections does not mean that the study was inadequate, but rather that eel abundance during the sampling period was low. This is consistent with

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other available information that suggests that although eels use the Androscoggin River in the project area, abundance is generally low overall. Though eels have been captured in the fishway at Brunswick Dam downstream of the Pejepscot project, the licensee operates no specific eel passage facilities. However, eels do pass Brunswick Dam by climbing over the spillway, as they often do at many low-head dams. In 2012, the licensee of the Worumbo project directly upstream of Pejepscot installed upstream eel passage measures. They captured 17 eels in 2012, 131 eels in 2013, and 25 eels in 2018 according to annual fish passage reports filed with the Commission.

In its license application, Topsham Hydro proposes to install and operate a temporary portable eel ramp for three passage seasons (June 1 through September 15) to identify a suitable location for a permanent upstream ramp. The temporary portable eel ramp would be installed during the first full passage season after the effective date of the new license. Topsham Hydro proposes to then install and operate a permanent upstream eel ramp (June 1 through September 15) based on the results of the temporary portable ramp evaluation. The permanent ramp would be installed when upstream eel passage facilities are constructed at the downstream Brunswick Hydroelectric Project. There is sufficient information on eel use of the project area to evaluate the effects of the project on eel passage, including any potential eel passage measures (section 5.9(b)(4)). For these reasons, we do not recommend requiring Topsham Hydro to conduct a new eel survey as requested by NMFS and FWS.

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**Literature Cited**

FWS (U.S. Fish and Wildlife Service). 2019. Fish Passage Engineering Design Criteria. USFWS, Northeast Region R5, Hadley, Massachusetts.

Document Content(s)

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