United States Department of the Interior

FISH AND WILDLIFE SERVICE

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April 20, 2018

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

In Reply Refer To: Great River Hydro, LLC
Vernon Hydroelectric Project, FERC No. 1904
Connecticut River
COMMENTS ON UPDATED STUDY REPORTS

Dear Secretary Bose:

This responds to supplemental study reports filed by Great River Hydro, LLC (GRH) on February 9, 2018. These reports are part of the relicensing of the Vernon Hydroelectric Project (Project), located on the Connecticut River in New Hampshire and Vermont. We offer the following comments based on the filed reports as well as information provided at the Updated Study Report (USR) meeting held on March 8, 2018.

Study 18: American Eel Upstream Passage

The goal of this study was to provide baseline data on the presence of American eels (*Anguilla rostrata*) attempting to move upstream of the Wilder, Bellows Falls, and Vernon Projects and identify locations where eels congregate while attempting upstream passage. In 2015, eel passage monitoring consisted of night-time visual surveys, setting of eel pots in locations below the three projects, and monitoring eel passage through the existing fishways.

In 2016, GRH repeated the upstream eel survey conducted in 2015 at the Vernon Project with one main difference: in 2015, the upstream anadromous fish ladder operated all summer long, while in 2016, it closed down on July 16. This afforded the opportunity to survey the area downstream of Vernon Dam for concentrations of eels attempting to move upstream when the fish ladder option was not available. In addition to conducting periodic night-time surveys along the dam face and near the powerhouse, GRH installed an eel ramp in close proximity to the fish ladder entrance.

The goal of the 2017 supplemental eel survey effort was to collect information on upstream migrating eels at the Vernon Project throughout the upstream migration season when the fish ladder was operated on a normal seasonal schedule (mid-April to mid-July). Systematic surveys of eel presence/abundance along the dam face and in the tailrace were conducted and a temporary eel ramp trap again was deployed near the fish ladder entrance and monitored for usage.

Comments

Although the purpose of the 2017 survey was to collect information on areas of eel concentration during a "normal" fish ladder operational period, the ladder was kept open for 3 weeks longer than usual (i.e., until August 7 rather than July 15). This extended operational period confounded results of the survey; eels were able to use the ladder during a period when it would otherwise be closed. Therefore, we do not know where eels that used the ladder (n=194) would have concentrated (would they have used the eel ramp trap, tried to ascend the ledges below the stanchion bays, etc.?).

In the report, GRH's consultant (Normandeau Associates, Inc. [Normandeau]) states that the majority of eels observed in the fish ladder were 12 to 18 inches long, while eels collected from the eel ramp trap ranged from 6.5 to 14.2 inches long. However, over 30 percent of the eels in the ladder were 6 to 12 inches long. Although the size distribution is skewed towards larger-sized eels in the ladder, smaller eels appear capable of entering and passing (or attempting to pass) the ladder.

As in previous years, the 2017 night-time survey results showed the greatest number of eels observed in the fish ladder, followed by the submerged flood gates below the tainter gates closest to the powerhouse, and then the bedrock outcrop below the stanchion bays. Normandeau believes that eels observed near the flood gates are not actively migrating, unlike eels observed in the ladder or near the bedrock ledges. In 2017, the eel ramp trap collected 123 eels during the period June 1 to November 8, with 72 percent of those eels collected on two days (August 21 and August 23).

Though not discussed in the report, at the March 8, 2018 USR meeting, GRH described proposed modifications it intended to make prior to the fish ladder opening in 2018 to enhance eel passage and count reliability, including installing a mesh floor at the counting window and diffuser outlet and testing substrate (eel tiles) at the exit weir orifice and other locations within the ladder. We support these measures and recommend that dedicated monitoring take place to validate their effectiveness.

In addition, GRH indicated at the March 8, 2018 meeting that it would reach out to the fishery agencies to consult on the value of continuing eel monitoring either below the Vernon Dam or within the fish ladder during the upcoming 2018 season, as well as how the ladder operation should be specified to adequately capture and monitor eel passage or use during the 2018 migration season. We agree that additional consultation would be beneficial and recommend that GRH convene a meeting in May.

Study 21: American Shad Telemetry

The purpose of this study was, in part, to characterize the effects of project operations on adult American shad (*Alosa sapidissima*) behavior, approach routes, passage success, survival, and residency time as they move through the Vernon Project during their upstream and downstream migration. However, due to the relatively small sample size able to be used for analyzing downstream passage data, the agencies requested that the study be repeated. In response, GRH undertook a supplemental field study during the spring and summer of 2017, focusing solely on downstream passage route selection at the Vernon Project.

Of the 99 shad tagged and released 11 miles upstream of the Vernon Dam, 61 entered the study area, with 48 of those fish eventually passing the Project. Of the 48 shad that passed Vernon Dam, 16 went through the fish pipe, 12 went through the turbines, 3 used the fish ladder, 3 passed through the sluice gate, 13 went over the dam in spill, and 1 passed via an unknown route.

Comments

Additional receivers were deployed during the 2017 study, subsequent findings indicated a substantial reduction in the number of shad passing via an unknown route (1 fish in 2017 versus 14 in 2015). Below is a table summarizing the results from both study years (Table 1).

Table 1. Summary of passage route selection for radio-tagged adult American shad moving through the Vernon Project. Data for 2017 was extracted from Appendix A of the supplemental study report.

	2015		2017					
Passage Route	#	% of all passed	#	% of all passed	# passed w/ spill	% passed w/ spill	# passed, no spill	% passed, no spill
Units 1-4	0	0.0	2	4.2	1	3.6	1	5.0
Units 5-8	3	10.7	5	10.4	2	7.1	3	15.0
Units 9-10	2	7.1	5	10.4	3	10.7	2	10.0
Fish Ladder		0.0	3	6.3	3	10.7	0	0.0
Fish Pipe	8	28.6	16	33.3	4	14.3	12	60.0
Fish Tube	0	0.0	0	0.0	0	0	0	0.0
Sluice Gate		0.0	3	6.3	1	3.6	2	10.0
Spill	15	53.6	13	27.1	13	46.4	0	0.0
Unknown	14		1	2.1	1	3.6	0	0.0
did not return from u/s	6		38					
approached but no pass	16		13					
excluded due to data iss.	1							
Total released	65		99		28		20	

The study began on May 30 and ended on August 2 in 2017. During that period, spill conditions occurred 33 percent of the time. In 2015, spill occurred less than 1 percent of the study period in May, 39 percent of the time during June, and 46 percent of the time in July. Based on flow exceedance curves contained in GRH's Pre-Application Document (PAD; page 3-20) for the Vernon Project, flows greater than station capacity occur less than 13 percent of the time during

the month of June and less than 8 percent of the time in July. The above average flow conditions that prevailed during both study years likely resulted in more shad passing via spill than would be expected in "normal" or low water years.

In the 2015 study year, Normandeau states that spill only occurred through the tainter gates and trash/ice sluice gate. While not specified in the supplemental report, Appendix A indicates that in 2017, spill occurred through the tainter gates, trash/ice sluice gate and (on at least two occasions) flood gates. In addition, on a number of occasions when shad were detected passing the Project, flows were within the station's hydraulic capacity, yet one or more spill gates were open. For example, on June 21, 2017 at 08:01 hours, the combined flow through all structures was 14,943 cfs, including 2,348 cfs from Tainter Gate 2. Similarly, on June 25, 2017 at 15:09 hours, the combined flow through all structures was 15,316 cfs, including over 1,000 cfs released from Tainter Gate 2.

This mode of operation appears to deviate from the protocol described in Table 2.5-3 of the PAD, whereby the spill gates are used only when flows exceed 17,000 cfs. We would appreciate GRH providing an explanation for why spill gates were used during those periods, as well as clarifying if these were unusual or typical occurrences.

Along with the tabular data provided in the report and its appendices, it would be helpful if individual plots showing the movements for each of the 61 shad identified as returning to Vernon (i.e., all fish detected at receiver MS-26) were included. Plots should show time on the x-axis, river kilometer (rkm) on the y-axis, and include any detections on receiver MS-01. These plots are important to understanding each fish's complete history of movement within the project area.

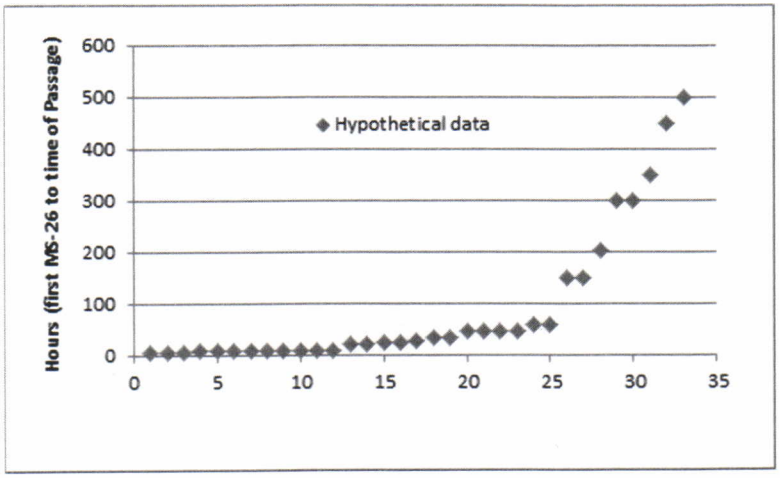
Also, we recommend supplementing the results of the forebay residency analysis with a data plot of tagged fish by the total period of time from first detection at MS-26 until passage (by any route) on the y-axis (see Figure 1, below). This figure will help better illustrate the range of observations.

In addition, we request that GRH provide a table that summarizes the number of movements and overall residence time for fish that ultimately passed the Project versus those that never passed. The data provided in the supplemental report and Appendix A do not provide a level of detail sufficient for us to conduct our own analysis. This information may help in understanding if there is a relationship between number of movements within the lower impoundment and/or total residency time on ultimate disposition of the fish.

We appreciate GRH providing both unadjusted and adjusted forebay residency duration (Table 4.4-3). In the report, Normandeau states that only reporting the unadjusted residency duration, which includes fish that left the "project area" (i.e., downstream of MS-26) one or more times, would be a biased representation of the data, presumably because those individuals may not have been ready to migrate downstream. We agree that it is possible that some fish detected at MS-26 may have moved back upstream for reasons other than project-related delay (e.g., to continue to spawn); however, upstream movements also could be related to conditions in the project area not being favorable for passage. Therefore, providing both unadjusted and adjusted residency durations is appropriate. The additional data representation requested above could provide

further insight into potential reasons for some fish moving into and out of the project area one or more times before passing (or not passing) the Project.

Figure 1. Hypothetical example of graphically portraying forebay residency of each individually tagged fish in the supplemental study.



Lastly, we note that the specific objective of the 2017 supplemental analysis was to evaluate passage routing and residency, although one of the overall objectives was to also assess route-specific survival. GRH's predecessor TransCanada has stated that the radio telemetry data were not intended to be used to assess survival. While GRH did complete a desktop impingement, entrainment and survival analysis that included turbine survival estimates for adult shad-sized fish, that analysis does not (and cannot) provide survival estimates for non-turbine routes of passage. One way to fill this information gap would be for GRH to undertake a balloon tag study for adult shad (similar to ones it undertook for juvenile shad and adult eels), assessing all potential passage routes.

Thank you for this opportunity to comment on these study reports. If you have any questions regarding these comments, please contact Melissa Grader of this office at (413) 548-8002, extension 8124.

Sincerely yours,

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