Great River Hydro

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March 15, 2021

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

Re: Great River Hydro, LLC; FERC Project Nos. 1855-050, 1892-030 and 1904-078
Response to License Application Additional Information Requests

Dear Secretary Bose:

Great River Hydro, LLC ("Great River Hydro"), owner and licensee of the Vernon (P-1904), Bellows Falls (P-1855) and Wilder (P-1892) Projects respectfully provides the enclosed responses (including spreadsheet data files) to additional information requests ("AIR") issued by the Federal Energy Regulatory Commission ("FERC" or "Commission") in letter dated January 14, 2021. The Commission's letter was in response to Great River Hydro's December 7, 2020 filing of Amended Final License Applications for the Vernon, Bellows Falls, and Wilder Projects. Great River Hydro is seeking no more than two additional weeks to respond to AIR 1 and complete a final task and submission for AIR 3.

In its letter, the Commission identified one deficiency and eight AIRs. At the request of Great River Hydro, a phone call with Commission staff took place on January 27, 2021, for the purpose of seeking clarification on the deficiency and AIR's 2 and 3. As noted in its January 27, 2021 Memorandum, FERC staff indicated that, upon further review of the filing requirements, the maps filed meet the requirements of the regulations and information necessary for FERC to prepare the NEPA document.

While clarity was reached for AIR 2, a follow-up discussion, occurring on February 3, 2021, was required for AIR 3 and on February 12, 2021 FERC issued a revision to the AIR. Due to processing time required to generate the requested data, Great River Hydro was unable to complete the development of nodal water surface elevations in the impoundments and riverine reaches between the projects for current operations in time to submit the data with this response. It will provide this data as soon as it is received from its consultant and has been reviewed. Great

River Hydro anticipates completing this task and filing its remaining data for AIR 3 by March 29, 2021.

AIR 1 asked Great River Hydro to provide revised Exhibit D Table D-1s for the three projects that would specify environmental measures, state the cost for each in current dollars and specify timing. The revisions are to include a list of all proposed measures, both environmental and non-environmental, with any associated capital and annual costs in the year anticipated to occur. Great River Hydro would like to address this AIR after a planned meeting with Federal and State fishery agencies, scheduled for March 16, 2021 to discuss plans and schedules for fish passage enhancements. Because of the magnitude of potential costs and the stakeholders concerns regarding timing and implementation, it makes sense to wait for the outcome of this discussion, and to the extent practicable, represent the discussion in the revised Table D-1s. Great River Hydro proposes to provide its response to AIR 1 by March 29, 2021.

If there are further questions regarding this matter, please contact me at 603-498-2851 or jragonese@greatriverhydro.com. Thank you for your consideration.

Sincerely,

John L. Ragonese
FERC License Manager

Cost of Environmental Measures

AIR 1: In Exhibit D for each project, in table D-1, costs are provided for proposed environmental measures. To ensure that staff apply these costs accurately in the economic analysis, please provide the capital and annual costs for each proposed measure in 2020 dollars in the years in which they would be incurred. If other measures are proposed that are not listed in table D-1, but are discussed elsewhere in the FLAs, costs need to be provided for them as well. Please provide a revised table D-1 for each project that lists all proposed measures, both environmental and non-environmental, with any associated capital and annual costs. If the measures are considered to have no appreciable cost, please provide a brief explanation.

GRH Response: Pending. Will provide response and revised Table D-1s by March 29, 2021

AIR 2: In section 9 of Exhibit D for each project, Great River provides a list of proposed operational changes and their combined effects on annual generation (table D-3). For each proposed operational change (e.g., operate in accordance with operational flow regime; maintain continuous minimum flow), please provide an estimate of the associated effect on annual generation. This will allow staff to isolate effects of individual measures in the event that resource agencies, stakeholders, or staff identify alternatives to the proposed measures that have different effects on annual generation.

GRH Response:
The proposed operational change as described in the application include two basic elements:

1.) **IEO/Flex operation** in which the projects operate in an inflow equals outflow (IEO) mode plus specified allowable hours in each month for discretionary flexible generation that would allow discharge to deviate from IEO. Full electrical system grid support, reserves and other ancillary services would be allowed without limitations.
2.) **Guaranteed minimum flow of 300 cfs in Bellows Falls bypassed reach** provided through spill at the Bellows Falls dam.

The GRH proposed IEO/Flex operation was discussed in Section 1.3 of Exhibit B and in Section 9 of Exhibit D. Under Section 2 of Exhibit B, 10-year average generation was presented for each project and the effect on generation as a result of the proposed operation was described as negligible. In Section 9 of Exhibit D the cost of the proposed operational change was quantified in terms of percent increases and decreases; however, there was no estimate of the associated effect on annual generation in terms of MWs. Below is an estimate of the effect of the two elements listed above based on annual 10-year average generation at each project.

	Wilder	Bellows Falls	Vernon
Annual 10-year average MWh (Exh B 2.1)	156,303	239,070	158,028
Annual MWh due to GRH Proposed IEO/Flex operation	4,689	3,586	3,161
Annual MWh due to GRH Proposed 300 cfs minimum flow in Bellows Falls bypassed reach	N/A	(9,650)	N/A
Total estimated annual average MWh	160,992	233,006	154,189

GRH notes that in the Vernon Exhibit D under Section 9, it mistakenly refers to the Wilder Project where it states an estimated annual increase. The numbers are correct only the project name is wrong. It should state Vernon not Wilder.

Aquatic Resources

AIR 3. Please provide the following information to assist staff with its analysis of the effects of the proposed projects:

1) WSELs for each project impoundment and flow releases from each project dam and powerhouse in 2009, 2015, 2016, and 2017, including:

a) year-round, hourly WSELs and flow releases for current operations and simulated run-of-river operations (i.e., outflow equals inflow); and

b) hourly WSELs and flow releases for modified run-of-river operations for February, June, August, and November of each of the specified years; and

2) documentation of the development, use, and limitations of GRH's spreadsheet simulation model, referenced on page 3-17 of Exhibit E of the license applications.

GRH Response:

GRH developed a spreadsheet simulation model to demonstrate and evaluate the effects of an inflow equals outflow (IEO) operation at the dam and IEO plus limited discretionary flexible generation (IEO/Flex) as specified in the GRH proposal. GRH shared the output of the model with stakeholders involved in discussions designed to develop an acceptable operating proposal. Stakeholders and GRH were interested in comparing current operation WSELs at the dam and discharge below the dam with IEO and IEO/Flex operations.

As described in Section 3.3 of the common Exhibit E, the evaluations used datasets of hourly inflow at each dam. The data sets were developed based on actual and estimated flows for calendar years 2009, 2014, 2015, 2016 and 2017, which represented high, high-medium, low-medium, and low water based on corresponding energy generation at the Wilder Project:

Year	Annual MWH (Wilder)	Rank
2009	185,552	High
2014	150,346	Low Medium
2015	140,060	Low
2016	144,234	Low
2017	166,334	High Medium
Past 10-yr average	156,303	
Average 1978-2019	152,238	

From this data set, the simulation matched discharge to inflow and WSEL was stabilized under IEO operation or guided IEO/Flex operation within the constraints specified in the GRH proposal. The decisions to use discretionary generation (i.e., to Flex), including the associated operational requirements for up-ramping, down-ramping and impoundment refills were made based on available inflow and actual hourly energy clearing prices for these years to determine the economic benefit of doing so. Because of the time intensive

nature of manual decision making when applying discretionary flexible generation in the GRH proposed IEO/Flex operation, representative months rather than full years were selected for evaluation and comparison purposes. The months selected were those with the various maximum number of available flex hours. For each of the years evaluated, the months (and maximum hours of discretionary flexible generation) were: February (65); June (10); August (20); November (42 hours; maximum of 15 between Nov. 1 and Nov. 15).

Because of the spatially sequential nature of the three hydro projects, the considerable length of each impoundment and the riverine portions that separate each of the projects, accurate representation of inflows at each dam required use of the Study 5 Operations model to route inflow within impoundments and between projects. In order to determine WSELs in the impoundments and riverine reaches between projects, the flow routing function of the Study 5 operations model was used to post-process stage-flow relationships at all cross-sections or nodes delineated in the Study 4 hydraulic model resulting in a set of node-specific WSELs. Thus, evaluating IEO and the proposed IEO/Flex operations at the three projects required the following processing sequence for each year evaluated:

1. Using the inflow routing functionality of the Study 5 operations model, actual historic McIndoes discharge plus historic gage and back-calculated intermediate inflow below McIndoes (using Wilder discharge and change in Wilder impoundment storage based on elevation) was routed through the Wilder impoundment and produced attenuated inflow at the Wilder Dam.
2. Simulation of IEO and IEO/Flex operations at Wilder producing WSELs and discharge for each of the two operating modes.
3. Based on the simulated WSEL at the Wilder dam the same attenuated inflow was processed through the Study 5 operations model to produce nodal WSELs within the Wilder impoundment.
4. Using the inflow routing functionality of the Study 5 operations model, simulated Wilder discharge plus historic gage and back-calculated intermediate inflow below Wilder (using Bellows Falls discharge and change in Bellows Falls impoundment storage based on elevation) was routed through the Bellows Falls impoundment and produced attenuated inflow at the Bellows Falls Dam.
5. Simulation of IEO and IEO/Flex operations at Bellows Falls dam producing WSELs and discharge for each of the two operating modes. Note: a constant 300 cfs in the Bellows Falls bypass was not simulated.
6. Based on the simulated WSEL at the Bellows Falls dam the same attenuated inflow was processed through the Study 5 operations model to produce nodal WSELs within the riverine reach below Wilder and in the Bellows Falls impoundment.
7. Using the inflow routing functionality of the Study 5 operations model, simulated Bellows Falls discharge plus historic gage and back-calculated

intermediate inflow below Wilder (using Bellows Falls discharge and change in Bellows Falls impoundment storage based on elevation) was routed through the Bellows Falls impoundment and produced attenuated inflow at the Vernon Dam.

8. Simulation of IEO and IEO/Flex operations at Vernon dam producing WSELs and discharge for each of the two operating modes.
9. Based on the simulated WSEL at the Vernon dam the same attenuated inflow was processed through the Study 5 operations model to produce nodal WSELs within the riverine reach below Bellows Falls and in the Vernon impoundment.

In response to the additional information request for WSELs for current operations, GRH will provide historic data on WSEL at the dams and project discharge information. To provide comparable WSEL information in impoundment and riverine sections between the projects for current operations, GRH will apply the flow routing functionality of the Study 5 operations model using the historic inflow, with the historic WSEL and discharge at the dam to produce WSELs throughout the impoundments and riverine reaches.

In order to ensure realistic comparison between current operation and simulated IEO and IEO/Flex operations, historic operation records were checked to determine if significant station outages were represented in the data. As a result of this validation, the year 2014 was eliminated due to an extended outage associated with a unit overhaul at the Bellows Falls station.

The purpose for and application of the simulation model was to demonstrate the GRH proposed IEO/Flex operation to stakeholders and provide a comparison of resulting WSELs and discharge to current operation. GRH has stated that due to inherent elements of the simulation, it should be considered a reasonable demonstration but likely overstates the application and some of the opportunity for discretionary generation. As mentioned above, current operation reflects actual operating data – including any unscheduled and schedule outages. Whereas the simulation results reflected neither. While the historic data for current operations reflects a degree of price and inflow forecasting, neither were certain or known at the time unit dispatch decisions were made. The simulation provides absolute precision and foresight in terms of energy prices and inflow. For demonstration purposes, simulation decisions were made based on the knowledge and opportunity that inflows and prices provided. Energy production in the simulation was based on a unit-specific look-up table of flow and MWs at a single specified net head (unaffected by tailwater rating curve). Change in impoundment elevation due to discharge was based on impoundment stage-storage relationships. Representative years and months used in the simulation exercise cannot be expanded to other years or full years for the purpose of precisely forecasting generation or economic gains or losses relative to current; however, the simulation model provides reasonable insight into energy and valuation impacts associated with discretionary generation

decisions while demonstrating the limited incremental impact of discretionary flexible operation (IEO/Flex) over IEO and the significant improvement in resource protection over current operation.

WSELs at each project for each respective impoundment, and discharge below each respective dam for the years 2009, 2015, 2016, and 2017, for current operations simulated IEO operation and simulated IEO/Flex operation during the months of February, June, August and November are provided in the files listed below.

AIR3_2009_FERC
AIR3_2015_FERC
AIR3_2016_FERC
AIR3_2017_FERC

Nodal WSELs for IEO and the GRH proposed IEO/Flex operation in the impoundments and riverine reaches between the project dams and downstream project impoundments for the years 2009, 2015, 2016 and 2017 are provided in the spreadsheets listed below and accompanying this response. GRH is still developing the same nodal WSEL for the years representing current operations and will provide this information to the Commission as soon as it is available.

IEONodeWLResults_2009
IEONodeWLResults_2015
IEONodeWLResults_2016
IEONodeWLResults_2017
IEOFLEXNodeWLResults_2009
IEOFLEXNodeWLResults_2015
IEOFLEXNodeWLResults_2016
IEOFLEXNodeWLResults_2017

AIR 4. In section 3.6.2.7 of Exhibit E, Great River discusses observations of adult sea lamprey utilizing the upstream fish passage facility at the Vernon Project (n = 2,440) in 2015. In Study 16 (Sea Lamprey Spawning Assessment),[1] Great River states that 18 of the radio-tagged sea lamprey from FirstLight's Turners Falls Hydroelectric Project and Northfield Mountain Pumped Storage Project relicensing studies were subsequently detected at the Vernon Project. Please confirm the total number of radio-tagged sea lamprey that utilized the Vernon Project's fish ladder, the date/time they were first detected near the ladder entrance, the data and time they entered the ladder, and the date/time they exited the ladder.

GRH Response:
Radio transmitter frequencies used by FirstLight as a part of the Turners Falls Hydroelectric Project and Northfield Mountain Pumped Storage Project sea lamprey (*Petromyzon marinus*) FERC relicensing studies in 2015 were the same as those used in Great River Hydro (GRH, formerly TransCanada) ILP Study 21 (American Shad Telemetry Study) and ILP Study 16 (Sea Lamprey Spawning Assessment) conducted at the Vernon Hydroelectric Project. Manual tracking data collected by GRH during ILP Study 16 and 21 identified 18 FirstLight tagged sea lamprey at locations both downstream and upstream of Vernon Dam that were reported on as part of ILP Study 16. Although 2,440 sea lamprey were counted using the Vernon fish passage facility as part of ILP Study 17 (Upstream Passage of Riverine Fish Species), no assessment of passage efficiency was originally requested as part of the GRH relicensing studies. To address FERC's additional information request, GRH instructed its consultant, Normandeau Associates, to assess adult sea lamprey upstream passage efficiency through the Vernon fishway using stationary telemetry detections collected at receivers installed at Vernon as part of the American Shad Telemetry Study (Study 21).

In addition to the 18 radio-tagged sea lamprey originally released by FirstLight and reported on in ILP Study 16, an additional eight radio-tagged sea lamprey originating at FirstLight were detected approaching the Vernon study area based on detections at Station 1 (i.e., the monitoring station immediately upstream of Stebbins Island). These eight individuals were not originally included as part of Study 16 due to a lack of subsequent detections at upstream spawning locations but have been included here as part of the fishway efficiency assessment. The inclusion of these eight additional lamprey results in a total of 26 radio-tagged individuals from the FirstLight study which were determined to have approached the Vernon telemetry array.

Monitoring stations used during the American shad telemetry study at Vernon are presented in Figures 1 and 2. Descriptions and functionality for each of the monitoring stations during the fish passage study period are described within the ILP Study 21 report. The fishway monitoring stations in ILP Study 21 (Figure 2) were set up with both PIT and radio receivers to evaluate upstream passage efficiency for American shad. Unlike the dual-tagged American shad released as part of Study 21 (i.e., individuals

carrying both a PIT and radio transmitter), sea lamprey originally released by FirstLight did not carry a PIT transponder, limiting any fishway use and passage efficiency assessment to radio-telemetry data. Radio antennas were positioned to detect fish in the tailrace near the fishway entrance (i.e., the "fishway attraction flow" or "near field area"), the fishway entrance, the counting house window, and the fishway exit. The fishway attraction flow monitoring station was configured to detect fish in the vicinity of the fishway entrance, in the attraction water flow field. This receiver was coupled to a switchbox using an underwater dropper antenna at the fishway entrance and to a 4-element antenna with a detection area of approximately 30 feet paralleling the attraction flow to provide coverage within the immediate zone of attraction. Together these two antennas were able to identify the presence of radio-tagged sea lamprey within the vicinity of the fishway entrance and immediately inside. The date and time of the first detections on the dropper antenna were used as the initial entry into the fishway. In the case that there were no detections on the dropper antenna, duration and signal strength of detections on the aerial antenna covering the "fishway attraction flow" were used as the initial approach into the entrance. Date and time of the initial detections at the counting window and fishway exit receivers were also recorded.

Additional fixed station receivers set up as part of the American shad telemetry study (ILP Study 21) at the Bellows Falls Project and manual tracking data were used to confirm upstream passage of radio-tagged lamprey. These detections out of the Vernon Project area were used to confirm upstream passage for two lamprey that were not detected by the stationary receiver covering the exit from the Vernon Dam fishway.

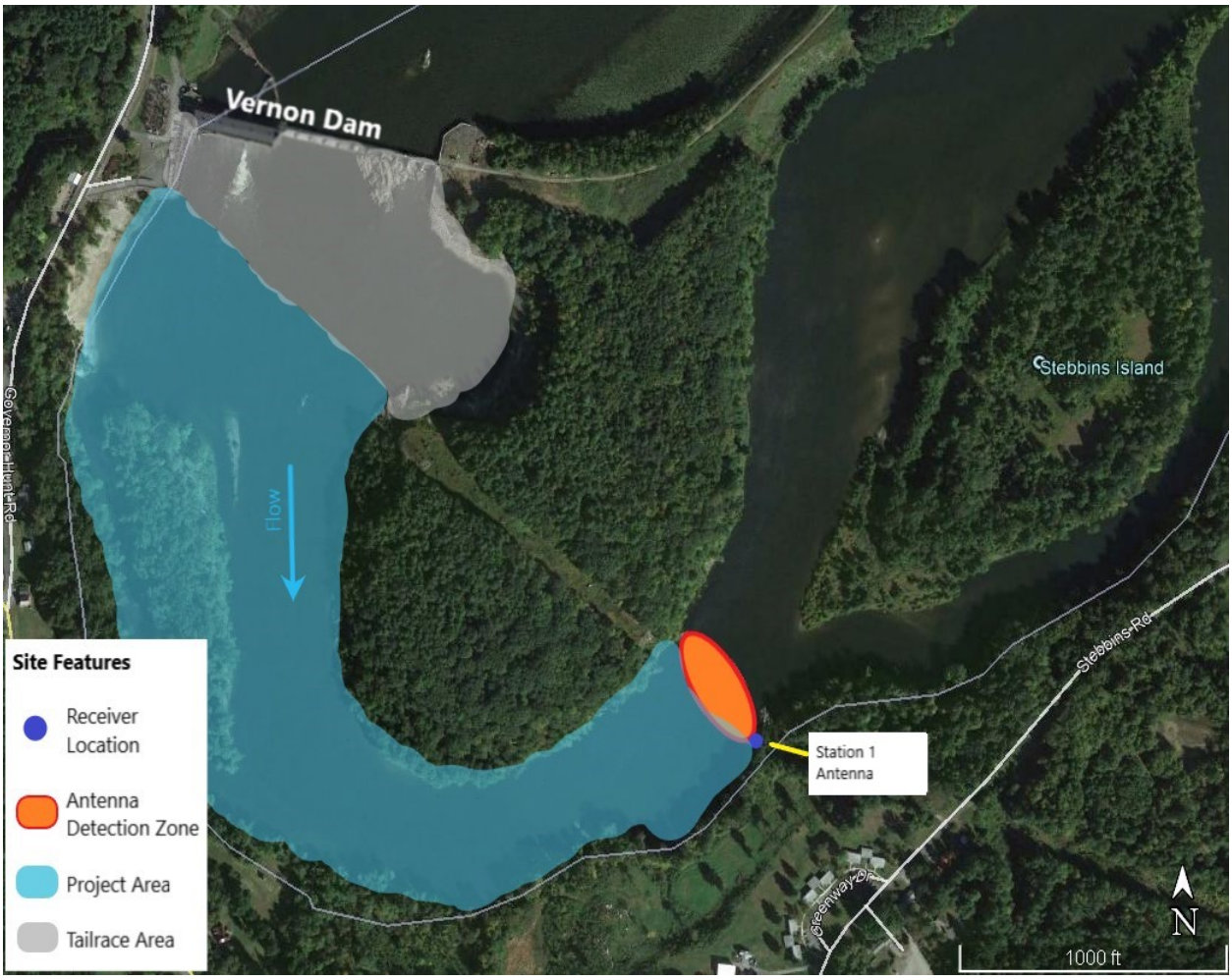
A summary of the upstream progression at Vernon for the 26 radio-tagged sea lamprey originally released by FirstLight is provided in Table 1. Of the 26 radio-tagged sea lamprey which were detected upstream of Stebbins Island at Station 1, 25-individuals continued upstream and were detected by at least one of the receivers in the tailrace array. The nearfield attraction, entrance efficiency, and internal efficiency for upstream sea lamprey passage at the Vernon fish ladder were assessed using the same definitions for those metrics as was applied for upstream American shad passage as part of Study 21. Nearfield attraction was calculated as the proportion of individuals detected in the fishway attraction flow in relation to the total number of individuals available (i.e., number in the tailrace). Entrance efficiency was calculated as the proportion of individuals detected in the fishway attraction flow which were subsequently detected in the fishway entrance. The internal efficiency was calculated as the proportion of individuals detected in the fishway entrance which were subsequently determined to have passed upstream of the exit receiver. The calculations result in estimates of the nearfield attraction, entrance efficiency, and internal efficiency of the Vernon fishway for adult sea lamprey of 80%, 90%, and 56%, respectively.

A summary of the time between receiver stations for radio-tagged lamprey are presented in Table 2. The date/time of first detections for all 26 radio-tagged lamprey originally

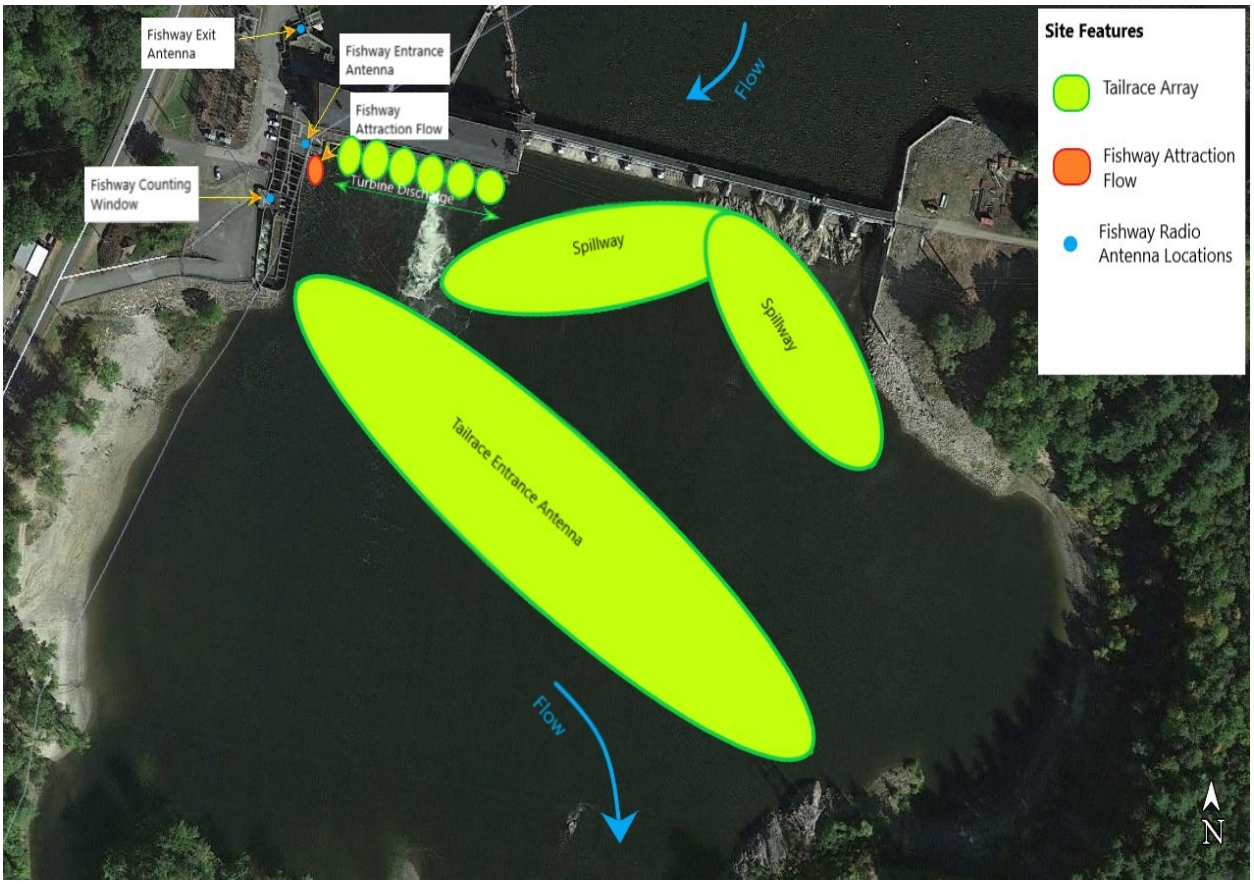
released by First Light are provided in Table 3. Movement of radio-tagged sea lamprey from Station 1 to the tailrace array occurred over a median travel time of 44 minutes. Recorded durations of time for radio-tagged sea lamprey to locate the attraction flow and entrance of the fishway occurred more slowly with median times of 1 day, 11 hours and 2 days, 20 hours respectively.

Movement through the Vernon fishway (i.e., entrance to exit) ranged from just over 7 hours to almost two days (median time 9 hours, 9 minutes). Sea lamprey appeared to navigate the fishway from the entrance to the counting window in a shorter duration of time (median time of 3 hours, 41 minutes) than from the counting window to the exit (median time of 5 hours, 37 minutes).

Although this review was able to utilize available radio-telemetry data collected at Vernon for the subset of radio-tagged adult sea lamprey originally released by FirstLight to determine movement rates and passage efficiency, it should be noted that there are limitations. The 18 radio-tagged sea lamprey which entered the Vernon fishway comprise a relatively small sample size compared to that which would normally be used to assess passage effectiveness at a fishway and as such may underestimate upstream passage efficiency at Vernon. The overall study design (i.e., telemetry equipment, antenna types and antenna locations) used in this passage assessment was designed to provide coverage based on the behavior of surface oriented migrating adult American shad, not for migrating sea lamprey. Observations of lamprey movement within the fish ladder show an inclination to travel on or near the bottom or sides of the fishway which may have reduced detection at some of the fishway dropper antennas.



AIR 4, Figure 1. Detection zone of monitoring station downstream of Vernon Dam. Receiver location designed for ILP Study 21 (American Shad Telemetry) in 2015.



AIR 4, Figure 2. Detection zones for the Vernon tailrace array (tailrace entrance, spillway and turbine discharge antennas) and fishway monitoring stations used in 2015 as part of ILP Study 21 (American Shad Telemetry) and used in this assessment of FirstLight tagged sea lamprey movement at Vernon.

AIR 4, Table 1. Upstream progress of radio-tagged sea lamprey originally released by FirstLight following their arrival at Vernon Project during 2015.

Monitoring Station	Number of Fish Detected
Station 1	26
Tailrace Array	25
Attraction Flow	20
Fishway Entrance	18
Fishway Counting Window	14
Fishway Exit/Pass	10

AIR 4, Table 2. Travel time (minimum, quartile (1st, median, and 3rd) and maximum) for radio-tagged sea lamprey originally release by First Light between radio-telemetry stations downstream of Vernon Project during 2015.

Monitoring Station	N	Min	1st Quartile	Median	3rd Quartile	Max
From Station 1 to Tailrace Array	25	0 h 26 m	0 h 35 m	0 h 44 m	0 h 57 m	6 h 29 m
From Station 1 to Attraction Flow	20	1 h 25 m	4 h 22 m	1 d 11 h 41 m	4 d 18 h 50 m	19 d 19 h 54 m
From Station 1 to Fishway Entrance	18	1 h 50 m	1 d 2 h 56 m	2 d 20 h 30 m	6 d 17 h 59 m	14 d 10 h 33 m
From Tailrace Array to Attraction Flow	20	0 h 48 m	3 h 24 m	1 d 4 h 41 m	3 d 17 h 29 m	10 d 3 h 9 m
From Attraction Flow to Fishway Entrance	18	0 h 0 m	0 h 4 m	0 h 21 m	2 d 12 h 34 m	13 d 6 h 38 m
From Fishway Entrance to Counting Window	14	1 h 44 m	3 h 13 m	3 h 41 m	4 h 9 m	7 h 19 m
From Counting Window to Fishway Exit[1]	8	2 h 35 m	3 h 52 m	5 h 37 m	6 h 54 m	1 d 14 h 33 m
From Tailrace Array to Fishway Exit[1]	8	12 h 34 m	1 d 20 h 19 m	3 d 3 h 20 m	5 d 12 h 21 m	10 d 11 h 23 m
From Fishway Entrance to Fishway Exit[1]	8	7 h 1 m	8 h 5 m	9 h 9 m	10 h 6 m	1 d 21 h 52 m

[1] Eight of the ten lamprey that passed Vernon Dam were detected on the fishway exit receiver, the remaining two lamprey where confirmed as passed by detections on stationary telemetry receivers setup at the Bellows Falls Project (ILP Study 21-American Shad Telemetry).

AIR 4, Table 3. Date and time of first detection at Vernon Study 21 (American Shad Telemetry) monitoring stations for 26 radio-tagged sea lamprey released by FirstLight, 2015.

Lamprey ID	Station 1		Tailrace Array		Attraction Flow		Fishway Entrance		Counting Window		Fishway Exit	
	Date	Time	Date	Time	Date	Time	Date	Time	Date	Time	Date	Time
46	5/25/15	23:11	5/26/15	0:01	5/26/15	0:57	5/26/15	1:01	5/26/15	8:21	5/27/15	22:54
47	5/31/15	17:16	5/31/15	17:50	6/7/15	1:45	6/7/15	2:00				
50	6/1/15	7:34	6/1/15	8:43	6/7/15	16:27	6/13/15	21:20				
51	6/1/15	5:50	6/1/15	6:47								
52	5/22/15	21:14	5/22/15	21:55	5/27/15	3:31	5/28/15	3:48	5/28/15	6:34	5/28/15	13:20
55	5/23/15	2:55	5/23/15	3:34	5/23/15	7:14	5/23/15	7:21	5/23/15	11:05	5/23/15	16:08
56	5/23/15	2:59	5/23/15	3:34	5/23/15	8:53	5/30/15	0:04	5/30/15	3:25		
57	5/22/15	23:20	5/22/15	23:46	5/23/15	0:45	5/24/15	1:34	5/24/15	5:06	5/24/15	12:24
58	5/23/15	0:15	5/23/15	0:53								
59	5/22/15	23:42	5/23/15	0:09	5/25/15	1:07	5/28/15	1:37	5/28/15	5:17	5/28/15	11:29
60	5/24/15	2:07	5/24/15	2:42	5/27/15	8:03	5/27/15	8:22	5/27/15	13:35	5/27/15	16:10
61	5/22/15	15:26	5/22/15	16:23	5/22/15	17:13	5/22/15	17:32	5/22/15	20:09		
62	5/29/15	0:00	5/29/15	0:45	5/30/15	18:09	5/30/15	18:32	5/30/15	22:44		
63	5/24/15	16:25	5/24/15	17:00	5/27/15	3:11	5/27/15	3:11	5/27/15	7:06	5/27/15	10:13
99	5/31/15	8:07	5/31/15	9:22	5/31/15	12:31	5/31/15	12:31	5/31/15	14:15	Passed[1]	Passed[1]
102	5/31/15	23:15	6/1/15	0:00								
105	5/31/15	23:45	6/1/15	0:31	6/1/15	1:19	6/10/15	23:33				
107	5/31/15	2:29	5/31/15	3:01	6/1/15	7:42	6/1/15	7:45	6/1/15	12:14		
110	5/30/15	15:12	5/30/15	20:23	6/9/15	23:32	6/9/15	23:35	6/10/15	3:38	6/10/15	7:46
111	5/31/15	4:01	5/31/15	4:50	5/31/15	21:40	6/1/15	9:05	6/1/15	12:16	Passed[1]	Passed[1]
112	5/30/15	23:56	5/31/15	3:36								
113	5/30/15	22:04	5/30/15	22:41	6/19/15	17:58						
114	5/30/15	16:29	5/30/15	17:06	5/31/15	20:24	6/14/15	3:02				
115	5/31/15	5:32	5/31/15	12:01	6/7/15	23:36						
116	5/30/15	14:50	5/30/15	15:49								
117	6/3/15	18:11										

[1] Lamprey exited fishway without detection; later detected on telemetry receivers at Bellows Falls Project, confirming passage at Vernon Dam.

AIR 5. In section 3.6.2.8 of Exhibit E, Great River provides a summary of passage route selection of emigrating American eel at its Wilder Project. The number of eels that utilized Unit 3 to pass downstream is different between tables 3.6-36 and table 3.6-37. To assist staff's understanding of American eel passage route selection and survival at the Wilder Project, please explain the discrepancy between the two tables, and file revised tables and correct the supporting text as applicable.

GRH Response:
Seven eels entered Unit 3 but only five of those seven were detected in the tailrace; the two undetected eels were considered mortalities. The first objective of Study 19 (American eel downstream passage assessment) was to assess downstream movement and timing of radio tagged eels as they approached and passed the Project. Data collected to meet the objective included approach duration, forebay residency time, tailrace residency time, and total time in the Wilder study area. Approach times were calculated as the duration of time from release into the river until initial detection at the forebay monitoring stations. Forebay residency times were calculated as the duration of time from initial detection at the forebay monitoring stations until final detection at either a confirmed passage route receiver (for individuals passing by a known route) or the last forebay monitoring station (for individuals passing by an unknown route). Tailrace residency times were calculated as the duration of time from initial to final detections at monitoring areas immediately downstream of Wilder, and total project time was calculated as the sum of forebay and tailrace residency.

To calculate the last two data points - tailrace residency time and total project time - the two eels not detected in the tailrace were considered not to have passed the Project and therefore omitted from these calculations.

On page 3-397 of the Exhibit E under Route Selection the second paragraph states:

> The majority of eels (33 eels, 73.3 percent) passed via Unit Nos. 1 and 2. Seven individuals (14.9 percent) entered Unit No. 3, and 5 of those (11.1 percent of the 45 passing eels) were later detected in the tailrace.

Table 3.6-36 tallies the passage fate of eels released upstream of the Project. The two eels that entered Unit 3 but were not detected in the tailrace are included in the "did not pass" column of the table. While footnote (a) was intended to clarify this accounting, on reflection it could have been more illuminating. Great River Hydro offers the following replacement language for Table 3.6-36 footnote (a): Seven eels entered Unit 3, five were detected in the tailrace indicating passage, two were not detected to have passed and were considered mortalities.

Table 3.6-36. Eel passage routes at Wilder, 2015.

Passage Route	No.	Percent of All Passed	Percent of All Released

Turbine Units 1 and 2	33	73.3	66.0
Turbine Unit 3	5[a]	11.1	10.0
Trash/ice sluice	2	4.4	4.0
Unknown	5	11.1	10.0
Total passed	**45**	**100.0**	**90.0**
Did not pass	3[a]		6.0
Did not approach	2		4.0
Total released	**50**		**100.0**

Source: ILP Study 19, *American Eel Downstream Passage Assessment*

a. Seven eels entered Unit 3, five were detected in the tailrace indicating passage, two were not detected to have passed and were considered mortalities.

The second objective of Study 19 was to assess survival/mortality through the Project. This assessment used both the in situ Turb'N tag method conducted under Study 19, and results of the desktop method used in Study 23 (Fish Impingement, Entrainment, and Survival Study) to compare estimated and predicted survival rates. Table 3.6-37 in Exhibit E totals seven eels entering Unit 3 to include the two probable mortalities in the survival/mortality calculation. Footnote (b) in Table 3.6-37 calls out the two eels that entered Unit 3 but were not detected in the tailrace.

Table 3.6-37. Passage route distribution and associated route-specific survival estimates for adult American Eel at Wilder.

Passage Route	No.	Proportion	Estimated and Predicted Survival Rates (%)		
			HI-Z (48-hour)	Conservative Radio Telemetry, Estimate	Franke Formula (30-inch Fish)[a]
Units 1 and 2	33	.702	62.0	66.7	44.6-90.6
Unit 3	7[b]	.149	NA	28.6	0.0-46.9
Trash/ice sluice	2	.043	NA	50.0	NA
Unknown	5	.106	NA	60.0	NA
Total passed	**47**	**1.0**		**59.6**	

Source: ILP Study 23, *Fish Impingement, Entrainment, and Survival Study Report Supplement*

a. Calculated at typical full load for Units 1 and 2, and at minimum flow for Unit 3.
b. Includes two eels detected entering Unit No. 3 but not later detected and presumed mortalities.

AIR 6. On pages 3-413 through 3-420 of Exhibit E, Great River discusses the findings of the 2017 downstream adult American shad passage assessment, which are more thoroughly described in ILP Study 21 (American Shad Telemetry Study – Vernon Supplement to Final Study Report). However, it is unclear in Great River's Exhibit E and the study report which fish successfully passed downstream through Vernon and were subsequently detected at the MS-01 station just upstream of Stebbins Island. Please indicate which fish in the 2017 study were subsequently detected at the MS-01 monitoring station to facilitate staff's understanding of adult American shad downstream passage at the Vernon Project.

GRH Response:
The table below provides the requested data. In addition, tables provided in Great River Hydro's response to comments dated May 22, 2017 plot the detection and location history of the 61 tagged adult American Shad that returned to the study area at Vernon Dam in 2017.

Passage route and radio tag ID of adult American Shad detected at monitoring station MS-01 during Study 21, American Shad Telemetry Study – Vernon Supplement to Final Study Report, 2017.

Tag ID	Passage Route		Tag ID	Passage Route
54:107	Spill		58:157	Spill
54:108	Units 9-10		58:159	Spill
54:109	fish ladder		58:160	East fish pipe
54:114	East fish pipe		58:161	Spill
54:116	Spill		58:162	Spill
54:117	East fish pipe		58:166	Sluice
54:118	Spill		58:169	Units 5-8
54:125	Units 9-10		58:172	Unknown
54:127	East fish pipe		58:173	Spill
54:134	East fish pipe		58:176	Spill
54:137	East fish pipe		58:177	East fish pipe
54:138	East fish pipe		58:178	East fish pipe
54:139	East fish pipe		58:181	Units 1-4
54:140	East fish pipe		58:187	East fish pipe
54:141	East fish pipe		58:189	Spill
54:142	Spill		58:190	Units 5-8
58:150	fish ladder		58:193	Units 5-8
58:151	Spill		58:197	East fish pipe
58:152	Units 9-10			

AIR 7. In section 3.11.2.2 of Exhibit E, Great River states that the Vermont State Historic Preservation Officer (SHPO) has not yet issued its opinion regarding effects on architectural resources located in Vermont. Please file documentation of any additional consultation with the Vermont and New Hampshire SHPOs that has not already been filed on the record, including National Register of Historic Places eligibility recommendations of evaluated properties, assessment of effects to these properties, and consultation on measures to resolve adverse effects.

GRH Response:
Great River Hydro has filed all correspondence received from the Vermont and New Hampshire SHPOs relative to Study 33 – Cultural Resources. Concurrence with GRH's Phase II assessment for sites in NH was received from NH SHPO on August 18, 2016; to date VT SHPO has not responded to GRH's Phase II assessment for sites in VT. We are currently preparing a draft Programmatic Agreement (PA) that will provide a statement of effect regarding the issuance of the new licenses. The SHPOs will have an opportunity to concur or disagree with the finding at that time and all correspondence resulting from that consultation will be filed with FERC. GRH intends to have the Commission review the draft PA prior to sending it to the SHPOs and other participating signatories.

AIR 8. Great River's May 16, 2016 Traditional Cultural Properties (TCP) report states that additional tribal consultation would be necessary to identify TCPs. Great River's progress reports (filed on May 15, 2018, August 13, 2018, November 13, 2018) indicate that Great River was continuing consultation with tribes to identify TCPs. In section 3.11.1.4 and 3.11.2.4 of Exhibit E, Great River states that no project effects to TCPs have been identified and that no further consultation is being sought. Please provide documentation of consultation with Native American tribes regarding TCPs since May 2016, and information on any additional TCPs or project effects on TCPs identified through consultation with the tribes.

GRH Response:
Great River Hydro met with representatives of Abenaki tribes located in NH and VT, and the Nolumbeka Project representing the Narragansett Tribe located in RI, on October 25, 2016, and with John Moody representing the Abenaki Nation Coalition on October 26, 2016. Neither of these meeting resulted in further identification of Traditional Cultural Properties. GRH requested comments on the TCP be provided by January 15, 2017. Comments were filed with FERC on January 17, 2017 by Rich Holschuh for the Elnu Abenaki Tribe (Elnu) in collaboration with and as proxy for the Nulhegan Band of the Coosuk-Abenaki Nation (Nulhegan) and the Koasek Traditional Band of the Koas Abenaki Nation (Koasek), and by Doug Harris, Deputy Tribal Historic Preservation Officer, Narragansett Indian Tribal Historic Preservation Office. The letters did not offer comments on the TCP, nor did they specifically identify TCP's. Instead they specified mitigation and related costs (Mr. Harris) and a consultation proposal and related costs (Mr. Holschuh).

As no particular additional information was proffered relative to the TCP, GRH made no revision to the final report filed on May 16, 2016. As mentioned in our response to AIR 7, GRH is drafting a PA. Although GRH recognizes Abenaki tribal interests as the most directly affected by the projects, these groups are not cohesively bound by one officer or leadership structure. GRH will continue engagement with the Abenaki as consulting parties and signatories to the PA and subsequent Historic Properties Management Plan HPMP should they choose. The draft PA will stipulate that the HPMP include provisions for supporting awareness, identification, and education of traditional cultural properties and histories through local tribal group initiatives and activities.