



**Review for Mattaceunk Hydroelectric Project  
Certification by the Low Impact Hydropower Institute’s (LIHI)**

Prepared by Gary M. Franc  
June 1, 2022

**Table of Contents**

I. INTRODUCTION ..... 2

II. PROJECT GEOGRAPHIC LOCATION ..... 2

III. PROJECT SITE CHARACTERISTICS ..... 6

IV. ZONES OF EFFECT (ZOE) ..... 10

V. REGULATORY AND COMPLIANCE STATUS ..... 13

    A. Licensing Requirements ..... 13

    B. Compliance Issues ..... 15

VI. LIHI PUBLIC COMMENTS ..... 15

    A. Comment Letters ..... 16

    B. Agency Correspondence ..... 16

VII. DETAILED CRITERIA REVIEW ..... 17

    A. Ecological Flows ..... 17

    B. Water Quality ..... 18

    C. Upstream Fish Passage ..... 19

    D. Downstream Fish Passage ..... 22

    E. Shoreline and Watershed Protection ..... 24

    F. Threatened and Endangered Species Protection ..... 25

    G. Cultural and Historical Resource Protection ..... 27

    H. Recreational Resources ..... 28

VIII. RECOMMENDATION ..... 30

APPENDIX A



## I. INTRODUCTION

The Mattaceunk Hydroelectric Project (MHP or Project) is located 7 river miles (RM) downstream from the confluence of the West and East Branches of the Penobscot River in the towns of Medway, Woodville, Mattawamkeag, and Molunkus in Aroostook and Penobscot Counties, Maine. The MHP is owned by Great Lakes Hydro America (GLHA)<sup>1</sup>, a subsidiary of Brookfield Renewable Partners (BRP) and consists of a dam and integral powerhouse.

The Medway Project<sup>2</sup> is located approximately 8.5 RM upstream on the West Branch of the Penobscot River. The next upstream dam on the East Branch of the Penobscot River is Grand Lake Dam, which impounds Grand Lake Matagamon. This dam is approximately 48 RM upstream of the confluence of the West and East Branches of the Penobscot River. About 29 RM downstream on the Penobscot River is the West Enfield Project<sup>3</sup> followed by the Milford Project<sup>4</sup>, approximately 54 RM downstream.

The Maine Department of Environmental Protection (MDEP) issued a Section 401 Water Quality Certification (WQC) for the Project on June 25, 2020<sup>5</sup>. The Federal Energy Regulatory Commission (FERC) issued a 40 year major license for the MHP as FERC Project 2520 to GLHA, effective February 26, 2021, expiring on January 31, 2061<sup>6</sup>. On September 23, 2021, FERC issued an order granting an amended license clarifying and addressing arguments raised on rehearing<sup>7</sup>.

The Project, which began operation in 1942, has an authorized total installed capacity of 19.2 megawatts (MW). The LIHI application states the Project produced an average annual generation (AAG) of 123,332 megawatt-hours (MWh) for calendar years 2007 through 2015, which corresponds to an annual plant factor of 73.3%. The application states that 5.5% of this generation is currently qualified for Maine's Renewable Energy Portfolio Standard (RPS) Class II program.

GLHA submitted an application for LIHI certification on January 5, 2022. On February 23, 2022, LIHI notified GLHA that the intake review for the Project was complete. The intake review found the current application required only minor additional information, corrections and supporting documentation to perform a full certification review. On March 29, 2022 the LIHI posted the application for public comment. The 60-day public comment period ended on May 28, 2022.

## II. PROJECT GEOGRAPHIC LOCATION

The Penobscot River is 264 miles long, making it the longest river system in Maine. The river drains nearly one third of the state of Maine with a watershed area of 8,670 square miles (SQMI). The basin has a low population density, is largely forested, and contains many large lakes and multiple tributaries.

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1 Kelly Maloney; Manager, Compliance – Northeast, (207) 755-5606, [Kelly.Maloney@brookfieldrenewable.com](mailto:Kelly.Maloney@brookfieldrenewable.com)

2 FERC Project No. 2666 and currently LIHI certified as LIHI #65

3 FERC Project No. 2600

4 FERC Project No. 2534 and currently LIHI certified as LIHI #113

5 WQC - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=0208F043-66E2-5005-8110-C31FAFC91712>

6 License - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=020BF764-66E2-5005-8110-C31FAFC91712>

7 Amended License - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=16BC5C7D-7305-C8AA-8F2A-7C1328F00000>



The Penobscot River’s major tributaries are as follows: the East Branch Penobscot River - 1,150 SQMI, the West Branch Penobscot River - 2,140 SQMI, the Mattawamkeag River - 1,520 SQMI and the Piscataquis River - 1,470 SQMI. The Penobscot River below its confluence of the West and East Branches is 2,400 SQMI. The river is tidal for the first 25 RMs upstream to the former Veazie dam, which was removed in 2013.

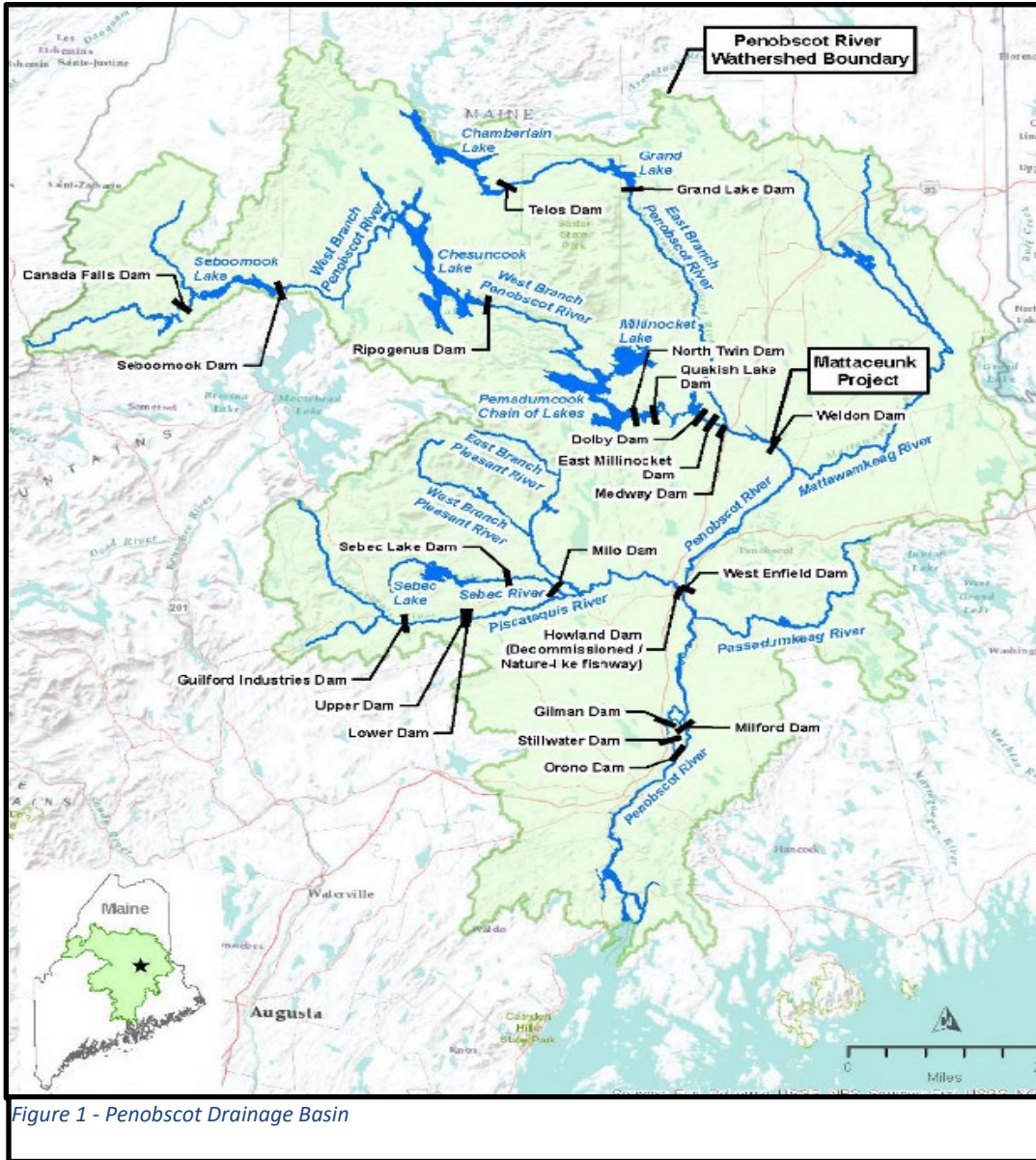


Figure 1 - Penobscot Drainage Basin

The Penobscot River basin contains numerous dams that generate hydroelectric power. In the list below, other developments owned by GLHA are italicized in blue font, while other developments owned by BRP are italicized in purple font. The Project is italicized in red font.



The dams from upstream to downstream on the East branch of the Penobscot River include:

- The Telos Dam which impounds Chamberlain Lake. Releases flow into Grand Lake on the East branch of the Penobscot River.
- The Grand Lake Dam at RM 48 on the East Branch of the Penobscot River which impounds Grand Lake Matagamon.

The dams from upstream to downstream on the West branch of the Penobscot River include:

- *The Canada Falls Dam on the West branch of the Penobscot River which flows into Seboomook Lake, owned by GLHA and licensed as part of FERC 2634.*
- *The Seboomook Dam on the West branch of the Penobscot River, owned by GLHA and licensed as part of FERC 2634.*
- *The Ripogenus Project, owned by GLHA and licensed as FERC Project 2572. Releases from the project enter the North Twin impoundment. The project has no upstream or downstream fish passage.*
- *The Millinocket Lake development at RM 19 on the West Branch Penobscot River, owned by GLHA and licensed as part of FERC Project 2458. The development can pump water into the North Twin impoundment. The development has no upstream or downstream fish passage.*
- *The North Twin development at RM 15 on the West Branch Penobscot River, owned by GLHA and licensed as part of FERC Project 2458 (LIHI #183). The development has an upstream fishway for resident fish species with no downstream fish passage.*
- *The Millinocket development at RM 12.3 on the West Branch Penobscot River, owned by GLHA and licensed as part of FERC Project 2458 (LIHI #167). The development has no upstream or downstream fish passage.*
- *The Dolby development at RM 4.2 on the West Branch Penobscot River, owned by GLHA and licensed as part of FERC Project 2458 (LIHI #167). The development has no upstream or downstream fish passage.*
- *The East Millinocket development at RM 2.5 on the West Branch Penobscot River, owned by GLHA and licensed as part of FERC Project 2458. The development has no upstream or downstream fish passage.*
- *The Medway Project at RM 0.7 on the West Branch Penobscot River, owned by Black Bear Hydro Partners (BBHP) a subsidiary of BRP and licensed as FERC Project 2666 (LIHI #65). The project has upstream and downstream eel passage.*

The dams from upstream to downstream on the main stem Penobscot River include:

- *The MHP is located 7 RMs downstream from the confluence of the East and West Branches, owned by GLHA and licensed as FERC Project 2520.*
- The West Enfield Project is located 36 RMs downstream from the confluence of the East and West Branches, owned by Bangor Pacific Operating Company and licensed as FERC No. 2600.
- *The Milford Project is located 61 RMs downstream from the confluence of the East and West Branches, owned by BBHP and licensed as FERC No. 2534 (LIHI #113).*

There are four US Geological Survey (USGS) gages located upstream of the Project:

- USGS gage 01027240 (GAGE1), located on the West branch Penobscot River immediately below Canada Falls Lake. This gage has a contributing drainage area of 182 SQMI and only started recording streamflow on October 6, 2016;
- USGS gage 01027200 (GAGE2), located on the West branch Penobscot River near Pittston Farm, Maine. This gage has a contributing drainage area of 232 SQMI and started recording streamflow on September 6, 2001.



- USGS gage 01028000 (GAGE3), located immediately upstream of the Medway Dam on the West branch of the Penobscot River near Medway, Maine. This gage stopped recording streamflow in November of 1939.
- USGS gage 01029500 (GAGE4), located on the East branch Penobscot River at Grindstone, Maine. This gage has a contributing drainage area of 837 SQMI and started recording streamflow on October 1, 1902.

Flows from GAGE1 and GAGE2 combine prior to flowing into Seboomook Lake, then continue downstream into Moose Pond, Chesunook Lake, Carbou and Ripogenus Lake, and finally Ambajejus Lake. Additionally, flow into Millinocket Lake is solely from local drainage. The combined flow continues through Twin Lakes into Quakish Lake. Flows can then either pass into the West branch of the Penobscot River through Stone Dam or may pass into Ferguson Lake, through the Millinocket Hydro Development and Millinocket Stream. Both paths converge again downstream at Shad Pond, then flow into Dolby Pond and pass through the Dolby Dam, the East Millinocket Dam and the Medway Dam. As previously stated, GAGE3 recorded flows into the Medway impoundment prior to November of 1939 which would represent this flow.

Flow from upstream GAGE4 on the East branch of the Penobscot River continues downstream and combines with flows released through the Medway Project. These flows represent the available inflow for the Project, which has a contributing drainage area of 3,348 SQMI. Historically, GAGE1, GAGE2 and GAGE4 recorders experience icing problems during the winter making their use in day-to-day operations problematic.

A previous USGS gage 01030000 (GAGE5), located on the Penobscot River near Mattawamkeag, Maine, with a contributing drainage area of 3,356 SQMI, recorded daily streamflows but its operation was terminated on October 1, 1991. This gage today would be a reliable source to estimate the Project's daily releases.

Due to this situation, mass balance equations are used by GLHA to calculate inflows at the Project. Real-time inflows for each development are back-calculated based on changes in impoundment elevation, turbine data, tailwater data and gate curves using Brookfield's Supervisory Control and Data Acquisition (SCADA) system. Real-time outflows are estimated based on net head, wicket gate settings, and gate positions. Real-time inflow is calculated as the estimated real-time outflow plus any slight change in impoundment elevation (expressed in terms of an average flow release or gain).

However, from a historical perspective, period of record (POR) Project inflows can be estimated. The next available USGS gage 01034500 (GAGE6), the Penobscot River at West Enfield, Maine with a drainage area of 6,422 SQMI is operational and has recorded daily flows since October 1, 1902. Rivers flowing into the Penobscot River between the Project and GAGE6 are:

- USGS gage 0130500 (GAGE7), Mattawamkeag River near Mattawamkeag, Maine. This gage has a contributing drainage area of 1,418 SQMI and started recording streamflow on October 1, 1934.
- USGS gage 0134000 (GAGE8), Piscataquis River at Medford, Maine. This gage has a contributing drainage area of 1,162 SQMI and started recording streamflow on June 27, 1924.

POR Project inflows can be estimated by initially subtracting flows from USGS gages that contribute to the flow at the USGS gage at West Enfield and then prorating the remaining flow to the Project. This is calculated as follows:

- GAGE7 flow is prorated to its confluence with the Penobscot River, a drainage area is 1,520 SQMI, as  $(1,520/1,418)$  or 1.0719;



- GAGE8 flow is prorated to its confluence with the Penobscot River, a drainage area is 1470 SQMI, as (1,470/1,162) or 1.2651;
- Both GAGE7 and GAGE8 flows are subtracted from GAGE6 flow record. This adjusted flow record has a contributing drainage of (6,422-1,520-1,470) or 3,432. Flows at the Project can be estimated by prorating this record to the Project location, for the period from January 1, 1995 through December 31, 2015. Minor adjustments to the drainage area ratio (DAR of 0.9755) were required to ensure the calibrated annual flow equaled the reported flow of 6,202 CFS, as shown in Table 1. Differences in monthly flows still occur due to ignored corrections for flow routing.
- After calibration, flow duration and frequency analyses were performed for the POR, which is from October 1, 1934 through November 26, 2021<sup>8</sup>.

Table 1 - Estimated Inflows Calendar 1995 -2015 Flow Records

Flow Range	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Application	5437	5216	5800	9715	9280	6269	5071	4427	5106	6152	5738	6215	6,202
Calibrated	5240	4980	5950	10923	9958	5869	4762	4093	4732	5362	6029	6502	6,202
% Diff	-3.6%	-4.5%	2.6%	12.4%	7.3%	-6.4%	-6.1%	-7.5%	-7.3%	-12.8%	5.1%	4.6%	0.0%

Flow duration analysis results indicate the minimum daily flow of 81 CFS occurred on February 22, 1981. The maximum daily flow of 56,817 CFS occurred on April 30, 1973. The Project’s POR average annual inflow is 5,892 CFS, about 1.76 CFS per SQMI.

A daily flow of 3,089 CFS is exceeded about 90% of the time annually. A daily flow of 4,615 CFS is exceeded about 50% of the time annually. A daily flow of 10,317 CFS is exceeded about 10% of the time annually. The 1% exceeded annual daily flow is 21,821 CFS.

Based on a frequency analysis, the 10-year daily flow is about 36,818 CFS and the 100-year daily flow is 55,731 CFS. The 7Q10<sup>9</sup> flow is estimated to be 2,180 CFS.

### III. PROJECT SITE CHARACTERISTICS

The MHP is located 7 RMs<sup>10</sup> downstream from the confluence of the West and East Branches of the Penobscot River in the towns of Medway, Woodville, Mattawamkeag, and Molunkus in Aroostook and Penobscot Counties, Maine.

As shown in an aerial overview in Figure 2, the MHP consists of a dam with an integral powerhouse. The dam (Latitude - 45° 34.245'N, Longitude - 68° 24.505'W) and powerhouse were originally constructed over a six-year period, from 1937 through 1942 by the Great Northern Paper Company.

The 41-foot-high earthen embankment and concrete gravity dam structure, known as Weldon Dam, is fitted with 4-foot-high flashboards that create a full pond elevation at 240.00 feet mean sea level (FTMSL). At this

<sup>8</sup> GAGE8 icing problems have not been remedied since November 26, 2021, therefore limiting the POR.  
<sup>9</sup> 7Q10 flow is the daily seven-day rolling average flow that is exceeded 90% of the time annually. There is only a 10% chance that a seven-day rolling average flow less than this value will occur in a given year.  
<sup>10</sup> RM 67, as measured from the tidal portion of the Penobscot River downstream of the Project or RM 92 as measured from the confluence of the Penobscot River with the Atlantic Ocean.



elevation, the impoundment surface area is 1,664 acres with a total storage capacity of 20,981 acre-feet (ACFT).

The entire dam (See Figure 3) is comprised of:

- A 657.5-foot-long, 70-foot-high concrete gravity overflow spillway with a discharge capacity of approximately 16,600 cubic feet per second (CFS) at 240.00 FTMSL. In 1976, the crest of the entire spillway was refaced, and new flashboard pin sockets were installed;
- A 114-foot-long roller gate spillway containing a single steel roller gate with a discharge capacity of 25,635 CFS at 240.00 FTMSL. In 1973 and again in 2013, the gated spillway concrete was repaired. In 1984, a new roller gate seal was installed. In 1998, a backup propane generator for emergency operation of the roller gate was installed. Operator mechanism and limit switches were repaired, the roller gate was raised and additional security fencing was added. In 1999, concrete repairs of the gated spillway deck were performed;
- A 10-foot-wide log sluice controlled by an 8-foot-high vertical slide gate;
- Upstream and downstream fishways. In 1983, repairs to the upstream fishway were made (See Figure 4). In 1992, the Project's existing downstream fishway was installed. In 2013, refurbishments to the upstream and downstream fishways were performed;
- A 142-foot-long, 99-foot-wide powerhouse integral with the dam comprised of:
  - A power intake installed with trash racks that have 1-inch clear bar spacing covering the top 16 feet and 2.63-inch clear bar spacing at lower depths. By March of 2023, trash racks are required to have 1 inch clear bar spacing over its entire depth;
  - Two Kaplan and two fixed blade propeller turbine/generating units (See Figure 5). The two Kaplan turbines each have a minimum hydraulic capacity of 471 CFS and a maximum hydraulic capacity of 1,883 CFS with a maximum turbine capacity of 7,344.5 horsepower (hp) or (5,479 kilovolt-amps (kVA)). At a power factor of ~87.5%, the generator output is limited to 4.8 megawatts (MW). The two Francis turbines each have a minimum hydraulic capacity of 1,102 CFS and a maximum hydraulic capacity of 1,836 CFS with a maximum turbine capacity of 7,361 hp or 5,491 kVA. At a power factor of ~87.5%, the generator output is limited to 4.8 MW. The total hydraulic capacity is 7,438 CFS with a total combined capacity output of 19.2 MW.
- A substation adjacent to the powerhouse;
- A 9-mile-long, 34.5-kilovolt (kV) transmission line.

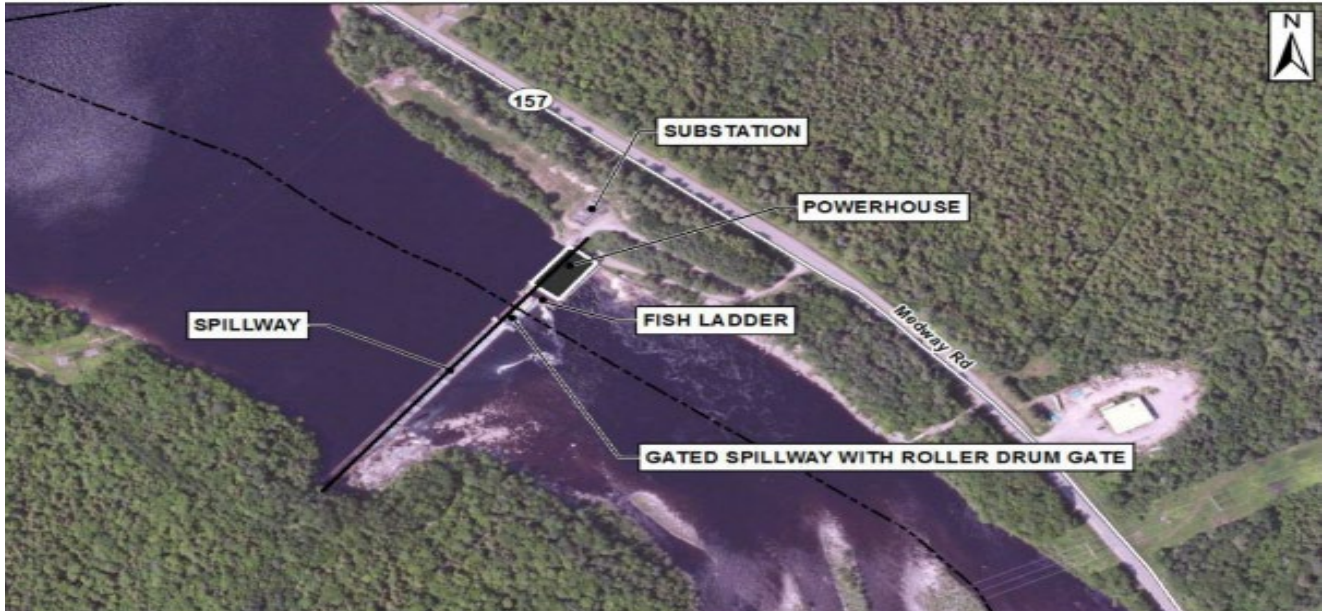


Figure 2 - Project Overview

Based on the flow duration analysis, the maximum hydraulic capacity of the powerhouse (7,438 CFS) is exceeded annually about 19% of the time. During the summer months of August and September this period of excess flow drops to about 4% of the time. All flows in excess of 7,438 CFS are spilled through the log sluice, roll gate, or over the spillway.

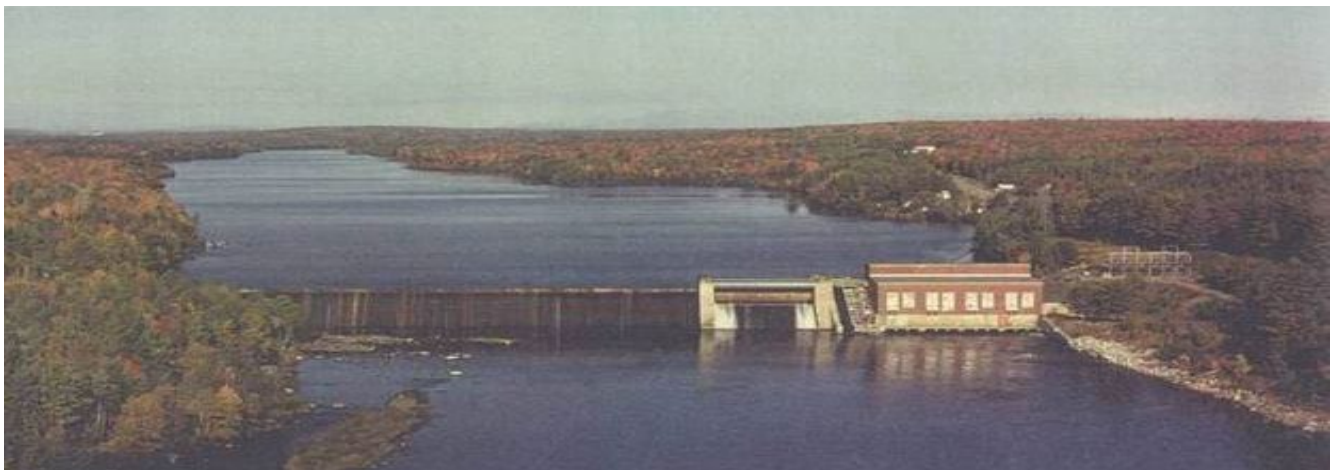


Figure 3 - View of Project's Facilities from Downstream





Figure 4 - Fishway

In 1962, the Project was placed on remote control with operation being handled from the control board at GLHA's upstream Millinocket Development. In 1977, the downstream faces of 13 spillway monoliths (blocks 4, 5, 6, 8, 10, 12, and 14 through 20) were refaced with concrete, and repairs of the spillway piers, wing walls, fish ladder, powerhouse walls, tailrace deck, and retaining walls were performed.



Figure 5 - Powerhouse Units



#### IV. ZONES OF EFFECT (ZOE)s

The Applicant selected three ZOE's for the Project:

- ZOE 1, the impoundment, extends upstream about 8.5 miles, from the Weldon Dam to the Medway Dam on the West branch of the Penobscot River and 1.5 miles upstream on the East branch of the Penobscot River. (See Figure 6);
- ZOE2, the de minimis bypass reach, extends approximately 300 feet below the spillway section of the dam from RM 66.95 to RM 67 on the Penobscot River (See Figure 7), which is backwatered by the tailrace and;
- ZOE 3, the powerhouse tailrace and downstream reach, extends from RM 67 downstream to RM 66.5 on the Penobscot River (See Figure 8). The reach continues 4 miles downstream to the confluence with the Mattawamkeag River (See Figure 9).

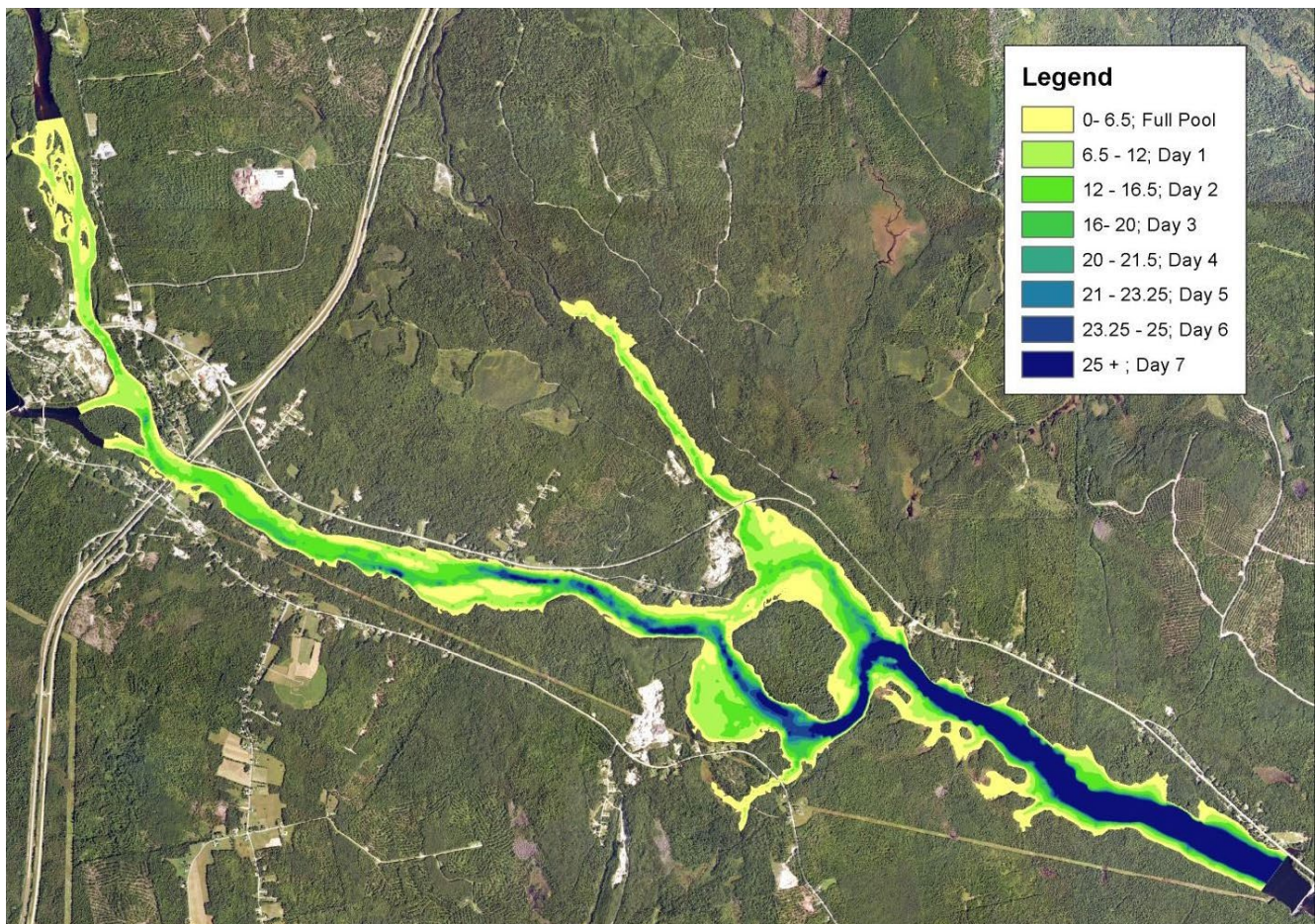


Figure 6 - ZOE 1 - Impoundment



Figure 7 - ZOE 2 - Bypassed Reach



Figure 8 - ZOE 3 - Tailrace/Downstream



Figure 9 - ZOE 3 -Downstream Regulated Reach

The alternative standards selected to satisfy the LIHI certification criteria in each of these ZOE's are identified in Table 2. As part of my review process, I checked and agreed with their selection, with the exception of the changes I have noted in **RED**.

**Table 2: Zones of Effect**

<i>CRITERION and STANDARD SELECTED</i>								
<b>Zone Number and Zone Name</b>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>
	Ecological Flows	Water Quality	Upstream Fish Passage	Downstream Fish Passage	Shoreline and Watershed Protection	Threatened and Endangered Species	Cultural and Historic Resources	Recreational Resources
1. Impoundment	1	2	1	2	1	3	2	2
2. Bypassed Reach	2	2	2	1, 2	1	2, 3	2	2
3. Tailrace Reach	2	2	2	1	1	2, 3	2	2



## V. REGULATORY AND COMPLIANCE STATUS

The MDEP issued a WQC for the Project on March 25, 2020<sup>11</sup> with a minor amendment on July 2020<sup>12</sup>. The FERC issued a 40-year major license for the Project as FERC Project No. 2520 to GLHA, effective February 26, 2021, expiring on January 31, 2061<sup>13</sup>. On September 23, 2021, FERC issued an order granting license clarification and addressing arguments raised on rehearing<sup>14</sup>.

### A. Licensing Requirements

The existing FERC license includes a number of requirements intended to restore, protect, and enhance natural resources and improve public access and recreation. The FERC license contains twelve license articles pertaining to the Project:

- Article 401 – Defines the requirements of the Section 18 fish passage prescriptions by the US Department of the Interior (USDOJ) and WQC conditions as they pertain to fish passage requirements including;
  - Develop an upstream American eel fishway design plan.
  - Develop a downstream American eel fishway design plan which includes installation of a new full depth trash rack with 1 inch clear bar spacing.
  - Develop a fishway operation and maintenance plan for upstream and downstream American eel passage.
  - Develop an upstream alosine fish passage design plan.
  - Develop a downstream anadromous fish passage design plan which includes installation of a new full depth trash rack with 1 inch clear bar spacing.
  - Develop a shakedown plan for newly constructed fishways for American eel and alosines.
  - Develop upstream and downstream diadromous fishway effectiveness study plans for Atlantic salmon, American eel, and alosine.
  - Develop an Atlantic salmon smolt mortality plan for the impoundment.

On September 23, 2021, FERC amended the license based on an August 17, 2021 submittal from GLHA asking for clarification and requesting time extensions for some study plans<sup>15</sup>.

- Article 402 - Requires a revised Operations Monitoring Plan (OMP) as requested by MDEP. On October 12, 2021, FERC approved the OMP filed on May 27, 2021 by GLHA<sup>16</sup>. The OMP requires the Project to be operated in a modified run-of-river (MROR) mode within defined impoundment level fluctuations and the release of required base flows<sup>17</sup>. A year round base flow of 1,674 CFS, or inflow, whichever is less, is required downstream from the Project. A daily average release of 2,392 CFS from July 1 through September 30 or 2,000 CFS from October 1 through June 30, or average inflow, whichever is less, is also required to be released.

<sup>11</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=0208F043-66E2-5005-8110-C31FAFC91712>

<sup>12</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=0208F043-66E2-5005-8110-C31FAFC91712>

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<sup>15</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=0A41B180-CCA8-C66F-8F60-7B55A0100000>

<sup>16</sup> OMP - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=AF31D1AF-8422-CCD4-96BC-7C74DCE00000>

<sup>17</sup> Base flow requirements can be satisfied by spillage and turbine flow releases.



- Article 403 - Requires that the average daily outflow approximates average daily inflow. As such, the Project operates in a MROR mode with average daily outflow equal to the average daily inflow while providing base flows by allowing impoundment water level fluctuations. When flashboards are fully installed, impoundment fluctuations of up to 2.0 feet below the crest of the 4-foot-high flashboards (240.0 FTMSL) are allowed. With no flashboards, impoundment fluctuations of up to 1.0 foot below the sill elevation (236.0 FTMSL) of the dam are allowed. Note that no limits regarding the change in headpond levels is required when drafting or refilling the impoundment.

GLHA must file reports with FERC for planned and unplanned deviation of these operating requirements. For planned deviations exceeding 3 weeks, GLHA must receive agency concurrence and file an application for a temporary variance from operational requirements and receive FERC approval prior to implementation. For unplanned deviations lasting more than 3 hours or results in visible environmental effects such as a fish kill, turbidity plume, bank erosion, or downstream flooding, GLHA must file a report as soon as possible within 14 days. For unplanned deviations lasting less than 3 hours that do not result in visible environmental effects, GLHA must file an annual report by March 1 covering the prior calendar year.

- Article 404 – Defines American Eel downstream passage measures. These measures are consistent with the requirements of Article 401.
- Article 405 – Defines American Eel upstream and downstream Passage Monitoring Plans. These measures are consistent with the requirements of Article 401.
- Article 406 - Requires an update to the Fish Passage Operations and Maintenance Plan that includes provisions for trashrack and downstream surface bypass pipe cleaning, downstream bypass flow monitoring, routine maintenance and startup and shutdown, emergency operations and annual reporting.
- Article 407 - Requires development of an Atlantic Salmon Species Protection Plan.
- Article 408 – Requires development of a plan for Atlantic salmon incidental take monitoring and reporting.
- Article 409 - Defines seasonal restrictions on tree removal conducted in accordance with the Section 4(d) rule for Northern Long Eared Bats (NLEB) using the USFWS’s streamlined consultation process.
- Article 410 - Describes the FERC authority requiring fishways prescribed by the USDOJ.
- Article 411 - Requires the implementation of the Programmatic Agreement between FERC and the state’s Historical Preservation Officer and the development of a Historic Properties Management Plan.
- Article 412 - Gives GLHA authority to grant permission for certain types of use and occupancy of the project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior FERC approval.



## B. Compliance Issues

A review of the FERC docket indicates, to date, three license deviations have occurred since issuance of the new license on February 26, 2021. All deviations were reported to the agencies, generally within 24 hours, and to the FERC within 14 days or in the required annual report in compliance with the provisions of Article 402.

One deviation was for an extended period of time. Through agency consultation, the 3-week period for log sluice flows at the Project, from April 29 through May 18, 2021 was initiated. On April 29, 2021, GLHA opened the log sluice gate 1.9 feet. On May 14, 2021, the log sluice gate was fully opened in response to increased river flow from localized rain events. On May 15, 2021, the gate was fully closed after river flows dropped, however, the gate should have been reset to maintain the required flow for downstream-migrating Atlantic salmon smolt through noon on May 20th. The gate closure was caused by a miscommunication, as the System Operator assumed that the log sluice could be closed after the increased river flow event, which would have been consistent with protocols in place prior to the new FERC license. This error resulted in no flow through the log sluice for approximately 18 hours and 48 minutes. In addition, on May 18, 2021, it was discovered that the 1.9-foot gate setting for the log sluice flow was resulting in about 88 CFS of flow through the log sluice for much of the April 29 to May 18, 2021 period, rather than the intended 225 CFS of flow. The incorrect gate setting was based on mistakenly using a bottom opening gate, and not the top opening gate configuration currently in place.

On October 19, 2021, FERC determined that these deviations in passing flow through the log sluice would be considered a violation of the new license<sup>18</sup> but elected to take no further action due to GLHA's appropriate follow-up actions which included using corrected calculations to verify log sluice gate flows based on instream flow measurements.

On March 1, 2022, GLHA submitted its Annual Excursion Report with details on the other two unplanned deviations at the Project in 2021 lasting less than 3 hours with no visible environmental effects, occurring on March 2, 2021 and September 16, 2021<sup>19</sup>. On March 2, 2021, the Project tripped offline causing outflows to drop below the 1,674 CFS base flow for approximately 26 minutes, with only leakage flows being passed for a portion of that time. The outage was caused by a windstorm passing through the area. On September 16, 2021, all of BRP's hydro stations on the Upper Penobscot, including the Project, tripped offline due to a power line disturbance. The Project trip resulted in an approximate 42 minute deviation of supplying the Project's 1,674 CFS base flow.

## VI. LIHI PUBLIC COMMENTS

GLHA submitted an application for LIHI certification on January 5, 2022. On February 23, 2022, LIHI notified GLHA that the intake review for the Project was complete. The intake review found that a revised application was not needed but additional information was required. LIHI posted the application for public comment on March 29, 2022. The 60-day public comment period ended on May 28, 2022.

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<sup>18</sup> <https://elibrary.ferc.gov/elibrary/filedownload?fileid=9BAA06EF-47DB-C946-9616-7C9868200000>

<sup>19</sup> <https://elibrary.ferc.gov/elibrary/filedownload?fileid=A01303F8-FF5B-CBF5-93B2-7F4873200000>



## A. Comment Letters

On March 29, 2022, LIHI filed notice on their email list that the public comment period for the application has been opened. The notice states, “LIHI is seeking comment on this application. Comments that are directly tied to specific LIHI criteria (flows, water quality, fish passage, etc.) will be most helpful, but all comments will be considered. Comments may be submitted to the Institute by e-mail at [comments@lowimpacthydro.org](mailto:comments@lowimpacthydro.org) with “Mattaceunk Project Comments” in the subject line, or by mail addressed to the Low Impact Hydropower Institute, 1167 Massachusetts Avenue, Office 407, Arlington, MA 02476. Comments must be received at the Institute on or before 5 pm Eastern time on May 28, 2022 to be considered. All comments will be posted to the web site and the applicant will have an opportunity to respond. Any response will also be posted. The project description and complete application can be found [HERE](#)<sup>20</sup>.”

On May 9, 2022, Stephan G. Heinz, Maine Trout Unlimited FERC Coordinator (TU) emailed LIHI<sup>21</sup> stating:

- Upstream American eel passage needs to be operational by the spring of 2023, but the fish passage design detail, in the form of a milestone schedule, in the LIHI application is lacking;
- Atlantic salmon passage effectiveness monitoring was last conducted 1986 and indicated much lower rates of upstream passage than have been required in biological opinions for other dams in Maine;
- Downstream eel passage effectiveness is based on desk top studies that only show approximately 80% successful passage of out-migrating eels;
- Given that the Project is an upstream barrier for American shad and river herring, delaying measures to pass them for 15 years or until February of 2036 seems inappropriate.

On May 12, 2022, GLHA emailed a response to TU’s concerns. GLHA forwarded a milestone schedule for fish passage measures as modified by the FERC which approved the extension of time request for many elements of the fish passage schedule to better align the filings with the implementation deadlines (Appendix A).

## B. Agency Correspondence

On March 29, 2022, LIHI<sup>22</sup> emailed contacts<sup>23</sup> listed in the Project application as knowledgeable about the Project stating, “You may have already received this notice if you are on the Low Impact Hydropower Institute (LIHI) email list. However, you were also identified as an agency contact on the LIHI recertification application recently submitted by Great Lakes Hydro America, LLC (a subsidiary of Brookfield Renewable Energy Group) for the Mattaceunk Hydroelectric Project located on the Penobscot River in Maine. The application reviewer, Gary Franc (copied here), may be in contact with you if he has questions about these projects or wishes to clarify any aspects of the LIHI applications. You may also provide comments directly to LIHI as indicated below. More information about the projects and their application can be found in the link below. If you would like to receive additional notices about these projects or other hydroelectric projects in your region applying for LIHI

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20 <https://lowimpacthydro.org/complete-application-received-mattaceunk-project-me/>

21 <https://lowimpacthydro.org/wp-content/uploads/2022/05/TU-Comments-on-Mattaceunk-LIHI-Application.pdf>

22 Maryalice Fischer – LIHI Certification Program Director - [mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org) - 603-664-5097 office - 603-931-9119 cell

23 [Nick.Livesay@maine.gov](mailto:Nick.Livesay@maine.gov); [Jeff.Murphy@noaa.gov](mailto:Jeff.Murphy@noaa.gov); [Kathy.Howatt@maine.gov](mailto:Kathy.Howatt@maine.gov); [Kevin.Dunham@maine.gov](mailto:Kevin.Dunham@maine.gov); [Kathleen.Leyden@maine.gov](mailto:Kathleen.Leyden@maine.gov); [gail.wippelhauser@maine.gov](mailto:gail.wippelhauser@maine.gov); [Kirk.Mohney@maine.gov](mailto:Kirk.Mohney@maine.gov); [kevin\\_mendik@NPS.gov](mailto:kevin_mendik@NPS.gov); [julianne\\_rosset@fws.gov](mailto:julianne_rosset@fws.gov); [jfowler@achp.gov](mailto:jfowler@achp.gov); [harold.peterson@bia.gov](mailto:harold.peterson@bia.gov); [Dan.mccaw@penobscotnation.org](mailto:Dan.mccaw@penobscotnation.org); [Charlie.Loring.Jr@penobscotnation.org](mailto:Charlie.Loring.Jr@penobscotnation.org); [Dan.Kusnierz@penobscotnation.org](mailto:Dan.Kusnierz@penobscotnation.org); [Jeffrey.Reardon@tu.org](mailto:Jeffrey.Reardon@tu.org)





certification, please sign up for our mailing list<sup>24</sup>.

No responses were received. Throughout my review, I found no reasons to contact any agencies or individuals.

## VII. DETAILED CRITERIA REVIEW

This section contains my review of the Project with regard to the LIHI Certification criteria. As part of my review, I conducted a FERC e-library search to verify claims in the recertification application. My review concentrated on the period since GHLA filed its Notice of Intent to file license application on May 1, 2013.<sup>25</sup>

### A. Ecological Flows

The goal of this criterion is to support habitat and other conditions that are suitable for healthy fish and wildlife resources in riverine reaches that are affected by the facility's operation. The Applicant states the Project satisfies the LIHI flows criterion in ZOE 1 by meeting alternative standard A-1, Not Applicable/De Minimis Effect, and in ZOE 2 and ZOE 3 by meeting alternative standard A-2, Agency Recommendation.

BRP operates all developments on the Penobscot River downstream of the Project and on the West branch of the Penobscot River upstream of the Project. Project inflows are predicated by operations at the upstream Storage, Ripogenus and Penobscot Mills Projects, licensed by FERC. Operations of the developments downstream of the Project are premised on a 2004 Settlement Agreement<sup>26</sup> which affects releases from the Project. This agreement also resulted in the removal of the Great Works and Veazie Dams on the lower Penobscot River.

On October 12, 2021, FERC approved the OMP filed on May 27, 2021<sup>27</sup> which requires the Project to be operated in a MROR mode within defined impoundment level fluctuations and with required base flows. The Project's powerhouse is integral with the dam. The Project's de minimis bypass reach receives water from powerhouse flows and spill flows and is backwatered by the tailrace.

The Project also has a base flow requirement which takes all powerhouse and spill flows into account. A year round base flow of 1,674 CFS, or inflow, whichever is less, is required downstream from the Project. Also a daily average release of 2,392 CFS from July 1 through September 30 or 2,000 CFS from October 1 through June 30, or average inflow, whichever is less is required to be released.

The OMP also requires that the average daily outflow approximates average daily inflow. As such, the Project operates in its MROR mode with average daily outflow equal to the average daily inflow while providing base flows by allowing impoundment water level fluctuations. When flashboards are fully installed, impoundment fluctuations of up to 2.0 feet below the crest of the 4-foot-high flashboards (240.0 FTMSL) are allowed. With no flashboards, impoundment fluctuations of up to 1.0 feet below the sill elevation (236.0 FTMSL) of the dam are allowed. There are no limits regarding the change in headpond levels when drafting or refilling the impoundment.

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<sup>24</sup> <https://form.jotform.com/202176096857060>

<sup>25</sup> NOI - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01CF19-66E2-5005-8110-31FAFC91712>

<sup>26</sup> Lower Penobscot Settlement Accord - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=005CBFC1-66E2-5005-8110-C31FAFC91712>

<sup>27</sup> OMP - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=AF31D1AF-8422-CCD4-96BC-7C74DCE00000>



As detailed in FERC's September 2018 Environmental Assessment<sup>28</sup> (FEA), based on analysis conducted as part of relicensing, impoundment fluctuations from 2008 to 2015 rarely deviated by more than 0.5 foot from the full pond elevation of 240.0 FTMSL when the flashboards were in place. The only exceptions were for flashboard replacement and downstream fishway repairs, which occurred 8 times over 9 years, including several other scheduled maintenance activities.

In addition, GLHA conducted numerous studies during relicensing to determine the effects of impoundment fluctuation on aquatic resources, soil and geology, terrestrial, and cultural resources. Results indicated that impoundment fluctuations resulted in stable habitats within the impoundment and downstream.

According to the FEA, the existing and proposed continuous base flow of 1,674 CFS was based on providing a flow volume approximating the historical, unregulated, median August flow in the Penobscot River. The Minimum Flow Habitat Study (MFHS), conducted for relicensing, demonstrated that aquatic habitat and a zone of passage for fish migration remain suitable during base flow conditions. Based on the habitat mapping and transect profile data, which show extensive connectivity of deep water along both shorelines, the deep water habitats extend well into the channel. The 1,674-CFS base flow was almost always exceeded at the Project during months when eel and Atlantic salmon migrations typically occur (May to November). The rare occurrences when flows dropped below 1,674 CFS typically represented drought conditions within the watershed that were out of the GLHA's control. No alternative base flow recommendations were made by the agencies.

BRP's National System Control Center (NSCC) monitors the Project operations, including impoundment elevations, turbine releases, flow through the log sluice, roller gate, and over the spillway, in order to maintain compliance with requirements of the OMP. A review of the FERC docket indicates, to date, three license deviations have occurred since issuance of the new license on February 26, 2021. All deviations were reported to the agencies, generally within 24 hours, and to the FERC within 14 days or in the required annual report in compliance with the provisions of Article 402.

My review indicates that GLHA has generally operated the Project in accordance with its current license requirements pertaining to reservoir levels and base flows that were based on habitat studies. The Project satisfies the Ecological Flows criterion.

## **B. Water Quality**

The goal of this criterion is to ensure water quality is protected in water bodies directly affected by facility operations, including downstream reaches, bypassed reaches, and impoundments above dams and diversions. The Applicant states the Project satisfies the LIHI water quality criterion in all ZOE's by meeting alternative standard B-2, Agency Recommendation.

According to the most recent final approved report, MDEP's 2016 Integrated Water Quality and Assessment Report (305(b))<sup>29</sup> and 303(d) list to the U.S. Environmental Protection Agency (USEPA), the main stem of the Penobscot River above the confluence of the Mattawamkeag River, including the Project waters, was classified by MDEP as Category 4B water, impaired by pollutants where pollution control requirements are reasonably expected to result in attaining DO concentrations and nutrient biological indicators which are

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28 FEA - <https://elibrary.ferc.gov/elibrary/filedownload?fileid=01F9CFC2-66E2-5005-8110-C31FAFC91712>

29 [https://www.maine.gov/dep/water/monitoring/305b/2016/28-Feb-2018\\_2016-ME-IntegratedREPORT.pdf](https://www.maine.gov/dep/water/monitoring/305b/2016/28-Feb-2018_2016-ME-IntegratedREPORT.pdf)



not influenced or caused by project operations.

Impairments were attributed to discharges from the former paper mills in Millinocket and East Millinocket. The closure of the mills resulted in an upgrade of the Penobscot River, from the confluence of the West and the East Branches of the Penobscot River to the confluence of the Mattawamkeag River, including the Project waters, to Class B by the MDEP in 2019.

On June 25, 2020, the MDEP issued a WQC for the Project<sup>30</sup> which included this river reach reclassification. Accordingly, Class B waters must be suitable for drinking water supply after treatment, fishing, agriculture, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation, navigation, and habitat for fish and other aquatic life.

Additionally, water quality standards for Class B waters require that dissolved oxygen (DO) be maintained at not less than 7 parts per million (ppm) or 75 percent saturation, whichever is higher, except that for the period from October 1 to May 14, when the 7-day mean DO concentration must not be less than 9.5 ppm and the 1 day minimum DO concentration must not be less than 8.0 ppm in identified spawning areas in order to ensure spawning and egg incubation of indigenous fish species.

Class B water quality standards also include *Escherichia coli* criteria. From April 15 to October 31, Class B waters must maintain the level of *Escherichia coli* bacteria from human and domestic animals below a geometric mean of 64 CFU per 100 milliliters over a 90-day interval or less than an instantaneous level of 236 CFU per 100 milliliters in more than 10% of the samples in any 90-day interval.

Water quality studies conducted as part of relicensing and subsequent water quality reclassification activities indicate that the water quality in the Project impoundment meets Class B criteria<sup>31</sup>. All designated uses were deemed to have been met as outlined in the WQC. Specific to aquatic habitat, this designated use was deemed to be met though MROR operations which attempts to minimize impoundment level fluctuations. Water quality monitoring conducted by the Penobscot Indian Nation (PIN) as part of the 2019 water quality classification upgrade indicated that Project waters are in compliance<sup>32</sup>.

Any deviations from OMP operations are reported to the resource agencies and to FERC. My review indicates that GLHA has operated the Project in accordance with its current license requirements, does not adversely impact water quality, and satisfies LIHI's water quality criterion.

### C. Upstream Fish Passage

The goal of this criterion is to ensure safe, timely and effective upstream passage of migratory fish so that migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the Project's facilities. The Applicant states the Project satisfies the LIHI upstream fish passage criterion in ZOE 1 by meeting alternative standard C-1, Not Applicable/De Minimis Effect and in ZOE 2 and ZOE 3 by meeting alternative standard C-2, Agency Recommendation.

The National Marine Fisheries Service's (NMFS) biological opinion<sup>33</sup>, dated August 6, 2020, states on page

30 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=0208F043-66E2-5005-8110-C31FAFC91712>

31 [https://www.maine.gov/dep/water/monitoring/classification/DEP\\_2018\\_ReClassProposals.pdf](https://www.maine.gov/dep/water/monitoring/classification/DEP_2018_ReClassProposals.pdf)

32 <https://www.maine.gov/dep/water/monitoring/classification/PIN-ReclassificationProposals-20171129.pdf>

33 NMFS - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=02096DBF-66E2-5005-8110-C31FAFC91712>



1 that the Project is located within a section of the Penobscot River that is critical habitat for Atlantic salmon and that the agency considered the effects of operating the Project for a term of up to 40 years. In the opinion, the NMFS concluded the Project operations may adversely affect, but is not likely to jeopardize the continued existence of the Gulf of Maine distinct population segment (GOM DPS) of Atlantic salmon.

The current upstream fish passage facility at the Project allows for diadromous fish, including American shad, blueback herring, alewife, American eel, and Atlantic salmon to migrate into the impoundment after passing upstream through downriver projects. The Project does not present an impediment to further passage upstream of the dam.

The fishway (see Figure 4) is a pool and weir design that has 36 pools with a drop of approximately 14 inches between pools. The fishway is typically operated from May 1 through November 10. The impoundment experiences minimal fluctuation when the flashboards are in place, thereby stabilizing the fishway inflows. Fish are able to ascend the fishway by using submerged orifices or weir notches. Flows through the fishway consist of a 6 to 8 CFS transport flow with an additional attraction water flow of 7 CFS for a total flow of 13 to 15 CFS.

Assuming the 4-foot-high flashboards typically become unstable when two feet of water is passing over them, then failure starts at an inflow of (powerhouse flow of 7,438 CFS plus spillway flow of ~8,300 CFS plus roller gate flow of ~12,000 CFS) or 27,738 CFS. Based on a flow duration analysis using POR flows as discussed in Section II, an inflow of this magnitude or higher occurs about 0.5% of the time from May 1 through November 10 of a given year. Under this rare condition flashboard replacement or repair is required and the upstream fishway ceases operation. As such, the impoundment is temporarily drawn down about 1 foot below the permanent crest of the dam typically for 1 to 3 days. License article 401<sup>34</sup> requires the installation of a new second upstream fishway in year-15 of the Project license specifically targeted for alosines.

There are also designated upstream eel passage facilities at the lower Penobscot River Projects, but not currently at the Mattaceunk Project, although eels are known to pass through the Project's current upstream fishway.

American eels are present in the de minimis bypass reach of the Project, as documented during relicensing studies. As stated in the FEA<sup>35</sup>, the eels observed during the nighttime surveys ranged from an estimated 4 to 24 inches in length. Approximately 366 eels were 5 to 8 inches in length, which were the most abundant sizes observed. The majority of the eels were observed staging or in the process of migrating up the face of the dam, along the right descending bank (looking downstream from the dam), in leakage flow at the upper portion of the toe of the dam, or within the two upper pools of the bedrock habitat (See Figure 10). Eels were also observed within crevices along the lower portion of the toe of the dam, either climbing directly up the spillway or toward the upper portion of the toe. License article 401 also requires a new upstream eel passage facility within 2 years of license issuance or by September 23, 2023.

GLHA developed a conceptual design for seasonal upstream passage for eels at the Project. The design consists of a seasonal upstream eel ladder located adjacent to the right descending bank, along the west abutment of the spillway. This type of eel passage is similar to upstream eel ramps installed at other hydropower facilities in Maine.

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34 Amended License - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=16BC5C7D-7305-C8AA-8F2A-7C1328F00000>

35 FEA - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01F9CFC2-66E2-5005-8110-C31FAFC91712>



The facility would include:

- A siphon or pump system installed in the headpond to provide attraction and conveyance flow;
- A sloped aluminum or wooden eel ramp with Enkamat<sup>36</sup> attached as the climbing substrate;
- A temporary trapping component (i.e. holding tank) and;
- A small-diameter flexible conduit extension leading directly into the headpond for future volitional passage.



Figure 10 - American Eel Migration

My review indicates no issues pertaining to upstream fish passage have arisen since license issuance. On February 28, 2022, GLHA submitted its upstream American eel fishway design to FERC<sup>37</sup>. It is my recommendation that the Project satisfies the upstream fish passage criterion, however, if granted LIHI

<sup>36</sup> Enkamat is a dense permanent turf reinforcement mat used when naturally grown vegetation cannot prevent soil erosion on its own. It functions as a protective reinforcing layer to the root system increasing the hold of the plants to the ground below. Once a layer of vegetation is established, it provides root systems with permanent reinforcement. It is commonly used in eel ladders <https://www.geofabrics.co/products/enkamat>  
<sup>37</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=A78D1785-99E7-C5C4-9836-7F45FA700000>



certification, GLHA will be required to provide status updates on the design and installation of the new upstream eel passage facility such that its operation can begin as required by September 23, 2023. LIHI may re-evaluate compliance with this criterion if deemed appropriate.

## D. Downstream Fish Passage

The goal of this criterion is to ensure safe, timely and effective downstream passage of migratory fish and for riverine fish such that the facility minimizes loss of fish from reservoirs and upstream river reaches affected by facility operations. Migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the facility. The Applicant states the Project satisfies the LIHI downstream fish passage criterion in ZOE 1 by meeting alternative standard D-2, Agency Recommendation, and in ZOE 2 and ZOE 3 by meeting alternative standard D-1, Not Applicable/De Minimis Effect. However, I changed the alternative standard for ZOE 2 to D-2 since fish could use the bypass reach. Fish moving from through ZOE 3 are unobstructed.

The Project operates in a MROR mode where flows upstream and downstream of the Project are similar. Average flows during the peak upstream migration of Atlantic salmon adults and peak downstream migration of Atlantic salmon smolt is 5,366 CFS and 9,664 CFS, respectively. Flows at the Project rarely fall below 2,943 CFS and 3,409 CFS during the peak upstream migration of adults and peak downstream migration of smolts.

Fish passage conditions in the bypass reach are generally the same as in the tailrace/downstream reach. The bypass is very limited and only American eels and Atlantic salmon smolts and kelts that may pass with spill flow during high flows are present in this reach and then, only for a very short time. This reach is unimpeded to its confluence with the tailrace/downstream reach.

There is a downstream fish passage facility that was installed in 1992. The fishway consists of single surface inlets integral with the 1-inch clear bar spacing trash racks in turbine intakes 3 and 4. The facility is currently operated from April 1 to June 15 and from October 17 to December 1 for salmon smolt/kelt passage.

In addition, a buried 42-inch diameter stainless steel pipe is available for passing fish to the tailrace area at a maximum flow capability of 140 CFS. A trapping and monitoring facility is present at the outlet of the pipe. The monitoring facility includes an entrance chamber, an inclined dewatering system, and a holding chamber. Water flows passing through the downstream passage system empty into the monitoring facility's entrance chamber from the underground passage pipe inlets.

There are currently Atlantic salmon and American eel upstream of the dam that traverse the impoundment during downstream migration. As discussed in the FEA<sup>38</sup>, several studies of smolt whole station survival (i.e., combined survival through all passage routes) have been conducted. Stich (2015b), estimated survival past the dam from 2010 to 2014 for wild and hatchery smolts. Mean survival was estimated to be 84 percent and 91 percent for wild and hatchery smolts, respectively.

In 2014 and 2015, GLHA estimated total survival past the dam using point estimates<sup>39</sup>. In 2014, GLHA used a paired release study that included a control group released downstream from the dam for estimating

38 FEA - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01F9CFC2-66E2-5005-8110-C31FAFC91712>

39 Point Estimate Percent - the percent of a population determined by dividing the number of viable fish found by the number of total fish released.



background mortality. The total survival past the dam was estimated to be 95.8 percent with a 95 percent confidence interval. GLHA did not use a paired release design in 2015, but instead released all smolts upstream of the Project. Total survival past the dam was estimated to be 95.9 percent with a 95 percent confidence interval.

With low adult returns, salmon kelt studies have not been conducted recently at the Project. However, as part of relicensing, GLHA included an analysis of whole station survival of salmon smolt and kelt past the dam in a desktop entrainment and impingement study. The results estimated that:

- 97.4 percent, 96.6 percent, and 96.6 percent of smolts would survive passage past the dam at 25 percent, 50 percent, and 75 percent exceedance flows, respectively, and:
- 96.6 percent, 94.2 percent, and 93.9 percent of kelts would survive passage past the dam at 25 percent, 50 percent, and 75 percent exceedance flows, respectively.

In addition, as part of relicensing, GLHA estimated whole station survival for American eel, using parameters that included operations, hydrology, downstream migration periodicity, turbine blade strike survival rates, empirical spillway survival, bypass survival, and bypass effectiveness data. The whole station survival was determined for each month of the out-migration season, then combined for an overall whole station out-migration survival estimate for the species. Varying inflows representing dry, wet, and normal years were applied to this evaluation, which translated into developing individual estimates for the 75, 50, and 25 percent monthly exceedance flows. The estimated whole station survival for adult eels (24-30 inches in length, and during flow out-migration months of July-November) was 80.2, 80.6, and 80.3 percent for the 75, 50, and 25 percent exceedance flows, respectively.

By September 23, 2023, GLHA is required to implement protection measures for downstream migrating eels, including nighttime turbine shutdowns and roller gate openings, together with installation of full depth 1-inch clear spaced trashracks.

As part of a 2014 relicensing study, GLHA evaluated entrainment risk for two resident species at the Project, white sucker and smallmouth bass. Results of the study indicated that many smallmouth bass and white suckers were of sufficient size to be impinged; however, they had a low impingement risk, because these species have swim speeds greater than the approach velocity of 1.7 feet per second (fps) in front of the trash racks.

The current upstream fish passage facilities at the Project are not being utilized by American shad, blueback herring and alewife, therefore these species are likely not traversing the impoundment during downstream migration. License article 401<sup>40</sup> requires the installation of a new second upstream fishway in year fifteen of the Project license specifically targeted for American shad, blueback herring and alewife. Once new upstream alosine passage facilities are in place, GLHA will expand the operating season for downstream passage of herring and shad (see milestone schedule in Appendix A)

Even with the installation of 1-inch clear trashracks, most out-migrating juvenile alosines will likely be entrained through the Project turbines during their downstream migration. Nevertheless, entrainment survival is expected to be high for them.

As discussed in the FEA, the sizes of out-migrating juvenile alosines expected at the Project are 1.5 to 5.0 inches across. The USFWS blade strike model indicates that at least 95 percent of juveniles will survive

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passage through the turbines. In addition, studies conducted in the 1990s found that 97 to 98 percent of juvenile American shad survived passage through Kaplan units with characteristics similar to those at the Project. Therefore, even if juvenile alosines are found to predominantly pass through the turbines, whole station survival at the Project should be at least 95 percent.

My review of the FERC docket indicates no issues pertaining to downstream fish passage have arisen since license issuance. It is my recommendation that the Project satisfies the downstream fish passage criterion, however, if granted LIHI certification, GLHA will be required to provide status updates on the design and installation of the new downstream eel passage protection measures such that its implementation can begin as required by September 23, 2023. LIHI may re-evaluate compliance with this criterion if deemed appropriate.

## **E. Shoreline and Watershed Protection**

The shoreline and watershed protection criterion is designed to ensure that sufficient action has been taken to protect, mitigate or enhance environmental conditions of soils, vegetation, and ecosystem functions on shoreline and watershed lands associated with the facility. The Applicant states the shoreline and watershed protection criterion in all ZOE is satisfied by meeting alternative standard E-1, Not Applicable/De Minimis Effect.

The Project does not require a Shoreline Management Plan (SMP). The Project's MROR operation and license requirements for minimal impoundment fluctuation help in providing protection for the shoreline areas within all Projects ZOEs.

Lands to the north of the Project are largely the developed areas of adjacent municipalities, road networks, and industrial sites, such as the municipal wastewater treatment plant. Some forested areas exist to the south of the Project, but they are actively managed for timber harvesting and are bifurcated by roads and transmission lines.

The Project boundary encloses the dam and integral powerhouse and follows the impoundment up to the full pond elevation of 240 FTMSL elevation. There are no shoreline lands along the impoundment, except for a small parcel adjacent to the spillway that includes the egress of the canoe portage trail, the trail itself, and the ingress downstream of the dam providing access to the bypass reach.

Because GLHA's owns specific lands within the Project boundary which generally house the Project structures and two small recreation sites, GLHA has the ability to manage only the limited shoreline and submerged lands below the corresponding full pond elevation. GLHA conducts vegetation maintenance around Project facilities, recreation sites and the transmission line right-of-way by mowing. GLHA staff inspect Project facilities for hazardous trees, which are trimmed or cleared periodically as necessary.

State laws and local regulations mandate any development or ground disturbance on private lands adjacent to the Project require appropriate permits and must adhere to the design and development standards of the appropriate town zoning regulations.

My review of the FERC docket indicates no issues pertaining to shoreline and watershed protection have arisen since license issuance and the Project does not impact the shoreline other than minimally within the small 20-acre footprint. The Project satisfies the LIHI shoreline and watershed protection criterion.





## F. Threatened and Endangered Species Protection

The threatened and endangered species protection criterion is designed to ensure that the facility does not negatively impact state or federally-listed threatened or endangered species. The Applicant states the LIHI threatened and endangered species criterion is satisfied in ZOE 1 by meeting alternative standard F-3, Recovery Planning and Action, and in ZOE 2 and ZOE 3 by meeting alternative standard F-2, Finding of No Negative Effect. However, I changed the alternative standard for all ZOEs to F-3 due to ongoing study negotiations and the NMFS issuing a biological opinion as part of the recent relicensing of the Project which was designed to be a long term solution for species protection.

On February 28, 2013, GLHA filed an Interim Species Protection Plan (ISPP) and draft biological assessment for Atlantic salmon with the FERC<sup>41</sup>. The ISPP describes the measures taken from 2013 through 2018 to avoid and minimize impacts to Atlantic salmon during operation of the Project.

On September 26, 2013, the FERC approved a modified ISPP<sup>42</sup> requiring submittal of upstream and downstream passage effectiveness study plans and the filing of annual ISPP reports. The annual reports to FERC must also be distributed to NMFS, the USFWS, the Maine Department of Marine Resources (MDMR), and the PIN. These reports were filed by March 31 of each year following years in which Atlantic salmon passage studies were conducted. Atlantic salmon downstream passage studies were conducted in 2014<sup>43</sup> and 2015<sup>44</sup> as per the approved study plan, and the results were reported in the annual ISPP reports.

An Information for Planning and Consultation (IPaC) report and USFWS Official Species List were developed for the Project as part of relicensing. On September 9, 2020<sup>45</sup>, FERC staff accessed the USFWS' ECOS-IPaC website (<https://ecos.fws.gov/ipac/>). Federally listed Endangered or Threatened species that may be present in the Project vicinity include:

- Canada Lynx (Threatened) - not affected by the Project, as there are no habitats or significant lands within the project boundary and the Project is not located within critical habitat of the species;
- Northern Long Eared Bat (NLEB) (Threatened)<sup>46</sup> – may be affected by vegetation management activities, but for which a Final Section 4(d) rule has been published for activities that may affect the species for streamlined consultation. License article 409 requires seasonal restrictions on non-hazardous tree removal to November 1 to March 31, outside of pupping and rearing season. These activities would be extremely limited, given how little land is located within the Project boundary. As such, no negative effects are anticipated by this periodic activity;
- Atlantic salmon (Endangered) - documented as historically occupying the Penobscot River and for which critical habitat has been designated in the Project area including upstream and downstream of the dam.

On June 19, 2009, the USFWS and NMFS issued a final rule for anadromous Atlantic salmon as endangered in the state of Maine. A final rule issued by NMFS on August 10, 2009 designated critical habitat for the Gulf

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41 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01ACC8B1-66E2-5005-8110-C31FAFC91712>

42 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01CFFB51-66E2-5005-8110-C31FAFC91712>

43 March 24, 2015- Annual ISPP Report - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01D01489-66E2-5005-8110-C31FAFC91712>

44 March 31, 2016- Annual ISPP Report - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01DE5ADA-66E2-5005-8110-31FAFC91712>

45 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=0209E017-66E2-5005-8110-C31FAFC91712>

46 The USFWS has proposed changing the listing for NLEB from threatened to endangered, and a determination could be made in the next few months. See <https://www.govinfo.gov/link/fr/87/16442>



of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon inhabiting the Penobscot River watershed upstream, including the East Branch of the Penobscot River.

In NMFS' August 6, 2020, biological opinion<sup>47</sup> for Atlantic salmon at the Project the agency states, *"The Project is located within a section of the Penobscot River that is critical habitat for Atlantic salmon and that they considered the effects of operating the Project for a term of up to 40 years. The NMFS concluded the Project operations may adversely affect but are not likely to jeopardize the continued existence of the GOM DPS of Atlantic salmon"*.

The Maine Department of Inland Fisheries and Wildlife (MDIFW) identified species potentially occurring or having been documented within the vicinity of the Project. Four bird species, all of which have not been documented to be present within the Project vicinity include the Least Bittern (Endangered), the Black Tern (Endangered), the Sedge Wren (Endangered) and the Common Gallinule (Threatened).

Three mussel species are listed. The Brook Floater (Threatened) were documented upstream in the East and West Branches of the Penobscot River by GLHA in a 2014 study. The Tidewater Mucket (Threatened) and the Yellow Lampmussel (Threatened) were documented in the Project impoundment in 2012 and 2014.

A single insect species, the Boreal Snaketail (Threatened) is also listed and has been documented downstream of the Project boundary.

Additionally, during relicensing, the Maine Natural Areas Program (MNAP) Project Review identified Orono Sedge as a rare botanical feature within the Project area. According to the FEA, Orono Sedge is considered an early successional species, and GLHA's current maintenance activities along the transmission line keeps the successional stage in this early state. This management is likely conducive to the existing and continued success of the Orono sedge in the right of way.

GLHA conducted a macroinvertebrate survey in riffle habitat downstream of the dam in 2014 consistent with MDEP protocols as part of a water quality assessment study. No protected macroinvertebrate species, were observed.

On March 16, 2021, BRP submitted the last annual ISSP report and an interim Atlantic Salmon Species Protection Plan (ASSPP) schedule for the Project<sup>48</sup>. On April 19, 2021<sup>49</sup>, GLHA requested an extension of time to file the ASSPP pursuant to license article 407 from May 27, 2021 to 90 days after FERC issues a determination in response to NMFS' March 26, 2021 requesting clarification or rehearing regarding aspects of license articles 401 through 407. On December 21, 2021, GLHA filed a revised ASSPP pursuant to article 407 and an Atlantic Salmon Incidental Take Monitoring and Reporting Plan (ASITMP) pursuant to article 408<sup>50</sup>.

On January 31, 2022, GLHA filed a supplemental reply to the USFWS comments pertaining to the ASSPP<sup>51</sup>. GLHA provided a matrix of responses to the comments and adopted most but not all comments stating that given the revisions defined by Article 407 are specifically identified in the FERC license, some comments

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47 NMFS - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=02096DBF-66E2-5005-8110-C31FAFC91712>

48 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=020C2E9F-66E2-5005-8110-C31FAFC91712>

49 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=020CD3B3-66E2-5005-8110-C31FAFC91712>

50 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=560E28A9-53FE-C9ED-9CD2-7DDF02600000>

51 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=8883E4EF-6C0B-C7A5-8750-7EB218300000>



were beyond the scope of the FERC's specified revisions; and other USFWS suggested text revisions were previously developed in consultation with the NMFS, USFWS, MDMR, and the PIN or were otherwise codified by the NMFS biological opinion. To date, no further actions (submittals or FERC issuances) have occurred pertaining to the ASSPP according to the FERC docket.

In summary, the Project is operated in a MROR mode. Limited impoundment fluctuations are not expected to produce impacts to threatened and endangered species that may be present, and for Atlantic salmon plans are in place to protect that species. The Project satisfies the LIHI threatened and endangered species protection criterion; however, it is my recommendation that if granted LIHI certification, GLHA will be required to provide updates on the revised ASSPP negotiation process and final approval as part of its annual compliance statements and LIHI will re-evaluate compliance with this criterion when appropriate.

## G. Cultural and Historical Resource Protection

The cultural and historic resource protection criterion is designed to ensure that the facility does not unnecessarily impact cultural and historic resources associated with the facility's lands and waters, including resources important to local indigenous populations. The Applicant states the LIHI cultural and historic resources criterion in all ZOE is satisfied by meeting alternative standard G-2, Approved Plan.

One pre-contact period archaeological site and five post-contact sites were identified within the Project's area of potential effects (APE). The pre-contact site and the Project dam (Weldon Dam) and powerhouse were determined by the Maine State Historic Preservation Officer (SHPO) to be eligible for listing on the National Register of Historic Places. Other sites were not able to be investigated as they are submerged in the impoundment.

License article 411 requires GLHA to implement the Programmatic Agreement (PA) between FERC and the SHPO. On September 27, 2018, the FERC issued a request for all parties to confirm acceptance of the Final PA for the Project<sup>52</sup>. On October 2, 2018, the PIN provided documentation in support of the PA<sup>53</sup>. On October 31, 2018, GLHA provided documentation in support of the PA<sup>54</sup>. On December 19, 2018, FERC issued the executed PA<sup>55</sup>.

The PA requires GLHA to develop a Historic Properties Management Plan (HPMP) within 1 year of license issuance that addresses:

- Measures necessary to assist in the identification or management of historic properties within the Project's APE;
- Phase IB archaeological investigations of the submerged Medway Village Sawmill Complex when the impoundment is lowered 24 feet or more;
- Potential effects on historic properties resulting from the continued operation and maintenance of the Project;
- Management and treatment measures for historic properties;
- Procedures for the review of proposed future ground-disturbing activities or other activities within the Project's APE which would have the potential to adversely affect historic properties;

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52 PA issued - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01F9ECF7-66E2-5005-8110-C31FAFC91712>. A copy of the PA -

<https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01FC1E58-66E2-5005-8110-C31FAFC91712>

53 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01FA14FC-66E2-5005-8110-C31FAFC91712>

54 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01FAE88E-66E2-5005-8110-C31FAFC91712>

55 <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01FC1E57-66E2-5005-8110-1FAFC91712>



- Protection of historic properties threatened by direct or indirect project related activities, including routine maintenance;
- Resolution of unavoidable adverse effects on historic properties;
- Treatment and disposition of any human remains that may be discovered within the Project's APE;
- Provisions for unanticipated discoveries of previously unidentified cultural resources within the Project's APE;
- A dispute resolution process;
- A list of categorical exclusions from further review of effects;
- Project-specific measures and a schedule for implementing the HPMP;
- Roles and responsibilities for GLHA, SHPO, PIN's Tribal Historic Preservation Officer (THPO), and other individuals and organizations in regards to implementation of the HPMP; and
- Coordination with the SHPO, THPO and other consulting parties during implementation of the HPMP.

The development and implementation of the HPMP ensures the Project does not affect, or minimizes and mitigates unavoidable effects on eligible properties. On February 28, 2022, GLHA filed the HPMP for the Project<sup>56</sup> as a privileged document. To date, no further actions (submittals or FERC issuances) have occurred pertaining to the HPMP according to the FERC docket.

GLHA is required to make some minor improvements to a downstream recreation site and to install fish passage facilities at the dam, which have the potential to affect eligible resources.

The Project satisfies the LIHI Cultural and Historical Resource Protection criterion; however, it is my recommendation that if granted LIHI certification, GLHA will be required to provide status updates on HPMP compliance as part of its annual compliance statements and LIHI will re-evaluate compliance with this criterion when appropriate.

## H. Recreational Resources

The goal of this criterion is to ensure that recreation activities on lands and waters controlled by the facility are accommodated and that the facility provides recreational access to its associated land and waters without fee or charge. The Applicant states that the recreation criterion in all ZOE's is satisfied by meeting alternative standard H-2, Agency Recommendation.

GLHA maintains a portage trail around the dam with a take-out upstream of the dam and a put-in immediately downstream of the dam spillway. The canoe portage trail is only accessible from the water. The canoe take-out is located on the western shore of the impoundment, approximately 650 feet upstream of the dam. The canoe portage trail follows a compacted gravel road that is approximately nine feet wide and used occasionally by GLHA staff to access the west side of the dam. The canoe portage trail includes signs indicating the put-in and take-out locations, as well as signs to guide users of the trail and information related to public safety. The signage is managed under GLHA's sign management program, which includes periodic inspection and maintenance as part of the Project's Public Safety Plan.

A boater barrier is deployed annually upstream of dam. In addition to the FERC approved recreation areas, the town of Medway owns and operates a recreation complex on the East Branch of the Penobscot River

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<sup>56</sup> HPMP <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=277B5ABE-5474-C8DC-BC4F-7F42FDA00000>



adjacent to the Project, which includes a trailered boat ramp for accessing the impoundment. This complex includes:

- A swimming beach;
- One baseball field;
- One basketball court;
- One playground;
- Two tennis courts;
- Bathrooms;
- Grills for picnic use;
- An ADA-accessible boat ramp;
- Eleven marked trailer spots (including one ADA designated spot);
- Six marked car spots, and;
- A large overflow parking lot.

The canoe put-in is located on the western shore of the Project just downstream from the dam. Signage directs boaters following the canoe portage trail to the location of ingress.

The Project also includes the “Downstream Recreation Site” currently consisting of:

- Angler access comprised of wooden stairs that lead from the top of the bank to the river’s edge located on the eastern bank downstream of the tailwater area of the dam.
- A compacted earth parking area located at the riverbank adjacent to the angler access stairs that can handle approximately six to eight vehicles; and
- A covered picnic area adjacent to the parking area and angler access area downstream of the dam. This area consists of a picnic table with shelter located on the south side of the parking area. Signage includes public safety signs that are managed by GLHA and periodic inspection and maintenance.

License article 401 requires GLHA to implement some recreation improvements within three years of license issuance (February 26, 2024) does not include specific recreation monitoring requirements at the Project and the FERC Form 80 process has been discontinued. Improvements planned at the Downstream Recreation Site (DRS) include:

- A pulley system to assist boaters with moving car top boats and other small watercraft up and down the existing stairs, and;
- A ramp adjacent to the existing recreation pavilion to provide wheelchair access to the pavilion and its associated picnic table.

My review indicates no issues pertaining to LIHI recreational resources have arisen since license issuance. The Project satisfies the LIHI recreational resources criterion, however it is my recommendation that if granted LIHI certification, GLHA will be required to provide updates on the facility improvements required at the Downstream Recreation Site as part of its annual compliance statements and LIHI will re-evaluate compliance with this criterion when appropriate.



## VIII. RECOMMENDATION

My review comprised a thorough assessment of the certification application and its supporting documentation, a search of the FERC docket, comments received, and other publicly available information.

It is my recommendation that the Project be certified for a ten (10) year term with the following condition:

- **Condition 1:** The facility Owner shall provide updates to LIHI in annual compliance statements on the ongoing status of post-licensing activities, including any studies, FERC filings, agency consultations, prescriptions and recommendations, agency comments on study results, implementation schedule changes, and final FERC approvals, as applicable. In particular, LIHI must be kept abreast of the following:
  - a) Design and installation of the new upstream eel passage facility and downstream eel passage protection measures such that operation can begin as required in 2023.
  - b) Upstream and downstream anadromous fish passage and protection measure implementation.
  - c) Negotiation process and finalization of the Atlantic Salmon Species Protection Plan.
  - d) SHPO consultation and activities related to the Historical Properties Management Plan.
  - e) Installation of the pulley system and the wheel chair access ramp at the Downstream Recreation Site by February 2024.

LIHI reserves the right to modify the Certificate or conditions based on progress being made and the outcome of these items.

- **Condition 2 (Optional):** If, at any time prior to one year before the expiration of the Certificate term, the facility Owner voluntarily completes the design, installation, initial operation, and initial shakedown of upstream and downstream anadromous fish passage facilities and protection measures, the facility Owner may request a three-year extension of the LIHI Certificate term.

**Gary M. Franc**



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Licensing & Compliance  
Hydropower Consulting & Modeling

**APPENDIX A**

**FISH PASSAGE MILESTONE SCHEDULE**

**From:** [Maloney, Kelly](#)  
**To:** [mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org)  
**Cc:** [Gary Franc](#); [Bernier, Kevin](#)  
**Subject:** RE: Mattaceunk comment letter  
**Date:** Thursday, May 12, 2022 1:52:47 PM

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Hi, Maryalice,

The license had an error in it. In one place, FERC indicated the Downstream Passage Effectiveness Study Plan was due within 2 years of license issuance; in another, FERC said 6 months. This was corrected by FERC in the letter approving all of the extensions of time sent previously. It is 2 years from license issuance.

Thanks!

**Kelly Maloney**  
*Senior Manager, Compliance – Northeast*

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**From:** [mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org) <[mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org)>  
**Sent:** Thursday, May 12, 2022 1:44 PM  
**To:** Maloney, Kelly <[Kelly.Maloney@brookfieldrenewable.com](mailto:Kelly.Maloney@brookfieldrenewable.com)>  
**Cc:** Gary Franc <[francllogic@verizon.net](mailto:francllogic@verizon.net)>  
**Subject:** RE: Mattaceunk comment letter

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Thanks Kelly –

I have one question in the table below. In the 4<sup>th</sup> row from the bottom about effectiveness testing, I'm confused over the discrepancy between the 2-year versus 6-month post-license deadlines. Can you please clarify that? Has FERC said anything about that or is Brookfield seeking an article amendment or anything?

Maryalice

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**From:** Maloney, Kelly <[Kelly.Maloney@brookfieldrenewable.com](mailto:Kelly.Maloney@brookfieldrenewable.com)>  
**Sent:** Thursday, May 12, 2022 8:16 AM  
**To:** [mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org)  
**Subject:** RE: Mattaceunk comment letter

Maryalice,

Good morning. For LIHI's benefit, please find the "milestone schedule" for fish passage measures that TU is seeking as modified by the FERC by order approving extension of time on November 1, 2020 (attached). I would be remiss if I did not point out that any modification of any aspect of the implementation schedule requires agency consultation and approval by FERC. There is no opportunity for "failure to complete any milestone on time" for this reason. And it's for this reason that GLHA sought and received, with agency concurrence, FERC approval of the extension of time request for many elements of the fish passage schedule to better align the filings with the implementation deadlines. For example, upstream eel passage is not required to be installed until 2023 so it did not make much sense for FERC to require design drawings within 6 months of license issuance, which would not have allowed adequate time for agency consultation.

Please let me know if you have any questions or concerns.



Thank you,

**Kelly Maloney**  
Senior Manager, Compliance – Northeast

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Updated fish passage implementation schedule

Conditions	Plan Name	Commission Due Date	EOT
Interior prescription 12.1 and 12.3 (Article 401)	Upstream American eel fishway design plan (eel passage ramp at the west abutment of the spillway)	Within 6 months of license issuance	Conceptual Design and review schedules within 1 year of license (Feb 2022); Final designs to be filed 60 days prior to start of construction; the upstream eel passage is to be operational by June 1, 2023 (first season after 2 years from license issuance)
Interior prescription 12.1 and 12.4 (Article 401 and 404)	Downstream American eel fishway design plan (includes new full-depth trash rack with 1-inch clear bar spacing, night time shut downs and opening roller gate from Aug 1 to Oct 31)	Within 6 months of the issuance date of this license	Conceptual Design and review schedules within 1 year of license (Feb 2022); Final designs to be filed 60 days prior to start of construction; the operational date for the downstream eel passage measures is August 1, 2023 (first season after 2 years from license issuance)
Interior prescription 12.5.2 (Article 401); 12.5.1 (Operating Dates)	Fishway operation and maintenance plan for upstream (June – Aug) and downstream American eel passage (Aug 1 – Oct 31)	Within 6 months of the issuance date of this license	O&M Plan is due within 60 days of final design approval from FERC
NMFS prescription 7.3.1.c (Article 401)	Upstream alosine fish passage design plan	December 31, 2035	N/A
NMFS prescription 7.3.2.a & 7.3.2.b (Article 401)	Downstream anadromous fish passage design plan (includes new full-depth trash rack with 1-inch clear bar spacing)	Within 6 months of the issuance date of this license	Conceptual Design and review schedules within 1 year of license (Feb 2022); Final designs to be filed 60 days prior to start of construction; the operational date for the downstream anadromous fish passage measures is April 1, 2023 (first season after 2 years from license issuance)
NMFS prescription 7.3.2.d	Annual extended seasonal operation of downstream fishway and log sluice – June 1 to Dec 1	Year 16 of new license term	
Maine DEP condition C.7.a & NMFS prescription 7.3.4 (Article 401)	Shakedown plan for newly constructed fishways for American eel and Alosines	Within 6 months of license issuance for eels December 31, 2035 for alosines	Shakedown Plan is due within 60 days of final design approval from FERC N/A for alosines
MDEP Condition 7.b. (Article 406)	Fish Passage O&M Plan	Within 1 year of license issuance	O&M Plan is due within 60 days of final design approval from FERC
USFWS prescription 12.5.1 and NMFS Prescription 7.3.3.	Seasonal migration windows/fishway operational dates	O&M Plan updated as fishways come online	
Maine DEP condition C.1.d.1.a, C.2.b, & C.3.b (Article 401)			Upstream eel passage effectiveness plan is due within 60 days of final design approval from FERC (2023 shakedown, 2024 study)
NMFS prescription 7.3.1.d & 7.3.4 (Article 401)	Upstream diadromous fishway effectiveness study plan(s) for: Atlantic salmon (95%), American eels (90%), and Alosines (90%)	Within 2 years of the issuance date of this license for Atlantic salmon Within 6 months of the issuance date of this license for eels December 31, 2035 for alosines	N/A for salmon and alosines
Interior prescription 12.6.1 (Article 401 and 405); 12.2.2 (Efficiency)			
NMFS condition 2 for implementing RPM 1 (Article 401)			
NMFS prescription 7.3.2.c & 7.3.4 (Article 401)	Downstream diadromous fishway effectiveness study plan(s) for: Atlantic salmon (96%), American eels (76%), and Alosines (95%)	Within 2 years of the issuance date of this license for Atlantic salmon Within 6 months of the issuance date of this license for Atlantic salmon & eels December 31, 2035 for alosines	Downstream eel passage effectiveness plan is due within 60 days of final design approval from FERC (2023 shakedown, 2024 study) Downstream salmon passage effectiveness plan is due within 2 years of license issuance (license also says 6 months) N/A for alosines
Interior prescription 12.6.2 (Article 401 and 405); 12.2.2 (Efficiency)			
NMFS condition 1 for implementing RPM 1 (Article 401)			
NMFS condition 1 for implementing RPM3 (Article 401)	Atlantic salmon smolt mortality in the impoundment plan	Within 2 years of the issuance date of this license	N/A
Article 407		Within 90 days of the issuance date	The revised SPP was due within 90 days of FERC's determination

	Revised SPP	of this license	regarding a NMFS filing dated March 26, 2021; the revised SPP was filed on December 21, 2021
Article 408	Incidental Take Monitoring Plan	Within 6 months of license issuance	The Incidental Take Monitoring Plan was due within 90 days of FERC's determination regarding a NMFS filing dated March 26, 2021; the Monitoring Plan was included with the SPP filed December 21, 2021

**From:** [mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org) <[mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org)>  
**Sent:** Monday, May 9, 2022 1:21 PM  
**To:** Maloney, Kelly <[Kelly.Maloney@brookfieldrenewable.com](mailto:Kelly.Maloney@brookfieldrenewable.com)>  
**Subject:** Mattaceunk comment letter

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Hi Kelly – here's a TU letter we received. I'll forward any more comments as we receive them. For this project as well as Brassua.

Maryalice Fischer  
Certification Program Director  
Low Impact Hydropower Institute  
[mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org)  
603-664-5097 (New Hampshire)