

# **REVIEW OF APPLICATION FOR RE-CERTIFICATION BY THE LOW IMPACT HYDROPOWER INSTITUTE OF THE STILLWATER HYDROELECTRIC FACILITY, LIHI #67**

Prepared by Patricia McIlvaine  
March 5, 2021

## **I. INTRODUCTION**

This report summarizes the review findings of the recertification application submitted by Black Bear Hydro Partners, LLC (BBHP), a subsidiary of BBHP Renewable Energy Group, and affiliate of Brookfield Renewable (Brookfield) for the Stillwater Project (FERC No. 2712). Brookfield Renewable purchased BBHP in November 2013. The Stillwater Project, LIHI #67 is a 4.179 MW, run-of-river hydroelectric generating facility located on the Stillwater Branch of the Penobscot River in Stillwater, Maine. The Stillwater Project was one of several hydropower facilities incorporated into the Lower Penobscot River Basin Comprehensive Settlement Accord (“Agreement”), a settlement agreement which represented a collaboration of the licensee, numerous state and federal agencies, the Penobscot Indian Nation (PIN) and several non-governmental organizations, to restore 11 species of sea-run fish, while rebalancing hydropower generated on the Penobscot River and several tributaries. A detailed summary of the Settlement Agreement can be found in the original certification reports available on the LIHI website.<sup>1, 2</sup>

The original Stillwater Project, which only involved Powerhouse A, was certified by LIHI as Project #67 from June 1, 2010 to June 1, 2015. A second certification application was submitted by BBHP, for the newly constructed Powerhouse B, which also received LIHI certification from August 7, 2013 to August 7, 2018 as LIHI Project # 110. It was agreed that combining both projects into one would make sense for recertification consideration, and the two are now referred to as the Stillwater Project, LIHI #67. The combined Project was recertified for the period of June 1, 2015 - June 1, 2020, which was extended to April 30, 2021.

The Stillwater Project has been owned and operated by the same entity, BBHP, since initial certification by LIHI, although the parent company of BBHP has changed. The two past review reports can be found on the LIHI website.<sup>3</sup> A detailed discussion of this Settlement Agreement can be found in the original Reviewer’s Reports dated September January 2011 (Powerhouse A) and September 2013 (Powerhouse B).

The Project’s 2015 recertification had four conditions:

- Condition 1. The Owner shall notify LIHI within 30 days of receipt of USFWS certification of the downstream anadromous fishway and of the up and downstream eel passage facilities as required by the Lower Penobscot River Multiparty Settlement Agreement. This certification requires affirmation that a) the facilities were designed and

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<sup>1</sup> [https://lowimpacthydro.org/wp-content/uploads/2020/12/Final-Stillwater-PH2-Certification-Report-\\_PBM.pdf](https://lowimpacthydro.org/wp-content/uploads/2020/12/Final-Stillwater-PH2-Certification-Report-_PBM.pdf)

<sup>2</sup> <https://lowimpacthydro.org/wp-content/uploads/2020/08/Stillwater-Report.pdf>

<sup>3</sup> <https://lowimpacthydro.org/lihi-certificate-67-stillwater-hydroelectric-project-maine/>

installed as prescribed, b) the facilities are ready for routine operation as evidenced by approved Operating Manuals and electronic data collection systems and c) one year of testing and any required “fine tuning” has been completed. If such USFWS certification is not received by the end of 2017, the Owner shall provide LIHI documentation as to why the certification has not been received and the plan and schedule to remedy deficiencies identified by USFWS preventing such certification.

*Condition was satisfied with the submission of the US Fish and Wildlife Service (USF&WS) certification letter on September 11, 2018.*

- Condition 2. If the requirement for re-initiation of studies of downstream passage of juvenile alosine species occurs within this LIHI certification period, the Owner shall notify LIHI within 60 days of receipt of such study re-initiation. This notification shall include the study schedule including the expected report issuance date. A copy of the final report, along with agency comment as to whether or not the testing results prove that safe downstream passage has been demonstrated, shall be provided to LIHI within 60 days of issuance of the final report.

*Condition remains open as studies conducted in 2018 and 2019, provided to LIHI in 2019 and 2020, have not yet received agency concurrence that downstream passage is effective. Results of studies planned for 2020 have not yet been provided.*

- Condition 3. The Owner shall notify LIHI within 60 days of receipt of, NMFS and MDMR acknowledgement that the standards specified in the Biological Opinion for safe downstream passage of Atlantic salmon have been met. Currently, effectiveness testing should be completed by 2018 based on the three-year testing requirement, unless advancement to the third level flow enhancement sequence is found to be necessary. Should this occur, the Owner shall notify LIHI in the annual compliance report as to the new date by which such continuing testing to meet passage standards is expected to be completed.

*Condition remains open as studies conducted in 2018 and 2019 indicate that the required downstream passage standard in the Biological Opinion is not yet met.*

- Condition 4. The Owner shall provide LIHI a summary of the results of the 2016 quantitative downstream effectiveness study for American eel, along with comments received from USFWS, NMFS and MDMR as to whether or not the testing results prove that safe downstream passage for American eel has been demonstrated. Also, the Owner shall provide a summary of the annual American eel upstream passage results, along with confirmation that any changes to the passage facilities recommended by the resource agencies have been implemented or are scheduled for implementation. The noted upstream and downstream passage results shall be provided within 60 days of report finalization.

*The results of the 2016 downstream effectiveness study for American eel were submitted to LIHI on April 13, 2017, although no data was provided indicating that the agencies confirmed that safe and effective downstream passage was demonstrated. Upstream*

*passage studies were conducted in 2017 which showed improved eel ladder usage, but no further studies have been performed since and passage effectiveness has not yet been demonstrated. No eel studies were performed in 2020 at Stillwater.*

All conditions remain open except Condition #1. More detail on the status of these Conditions is discussed under the applicable criteria.

## **II. RECERTIFICATION PROCESS AND MATERIAL CHANGE REVIEW**

Under the current LIHI Handbook (Revision 2.04: April 1, 2020), recertification reviews are a two-phase process starting with a limited review of a completed LIHI application, focused on three questions:

- (1) Is there any missing information from the application?
- (2) Has there been a material change in the operation of the certified facility since the previous certificate term?
- (3) Has there been a change in LIHI criteria since the Certificate was issued?

In accordance with the Recertification Standards, all Projects currently applying for renewal must go through a full review unless their most recent certification was completed using the 2016 version of the Handbook. Thus, this Stage II report was required for the Stillwater Project.

A review of the initial application, dated July 6, 2020, resulted in a Stage I or Intake Report, dated August 5, 2020. The Stage I report noted that data was missing for a number of criteria that was required to complete a full review. As a result, a revised application was submitted to LIHI on November 12, 2020.

This Stage II assessment included review of the application package, public records in FERC's eLibrary since the last LIHI certification in 2015 through February 11, 2021, and annual compliance statements received by LIHI during the past term of Certification. Also, follow-up communication with the Applicant, and outreach to several stakeholders was conducted for this review. Appendix A contains copies of these email communications.

## **III. PROJECT'S GEOGRAPHIC LOCATION**

The Stillwater Project is located on the Stillwater Branch of the Penobscot River, about 2.25 miles (River Mile (RM) 2.41) upstream of the Orono Project (RM 0.15), and about three miles downstream of the Gilman Falls dam (which is part of the Milford Project), in the town of Stillwater in Penobscot County, Maine. The Stillwater Branch is 10.5 miles (mi) long and serves as a channel of the Penobscot River as it flows around the western side of Orson and Marsh Islands. The Penobscot River Basin ("Basin") is New England's second largest river system with a drainage area of 8,570 square miles extending from its West Branch near Penobscot Lake, upstream of Seboomook Lake, near the Maine/Quebec border and its East Branch at East Branch Pond near the headwaters of the Allagash River with the mainstem emptying into Penobscot Bay near the Town of Bucksport.

Figure 1 shows the location of the Stillwater Project and other dams in the river basin. Upstream

storage dams on both the West and East Branches control a large portion of flows within the drainage area.

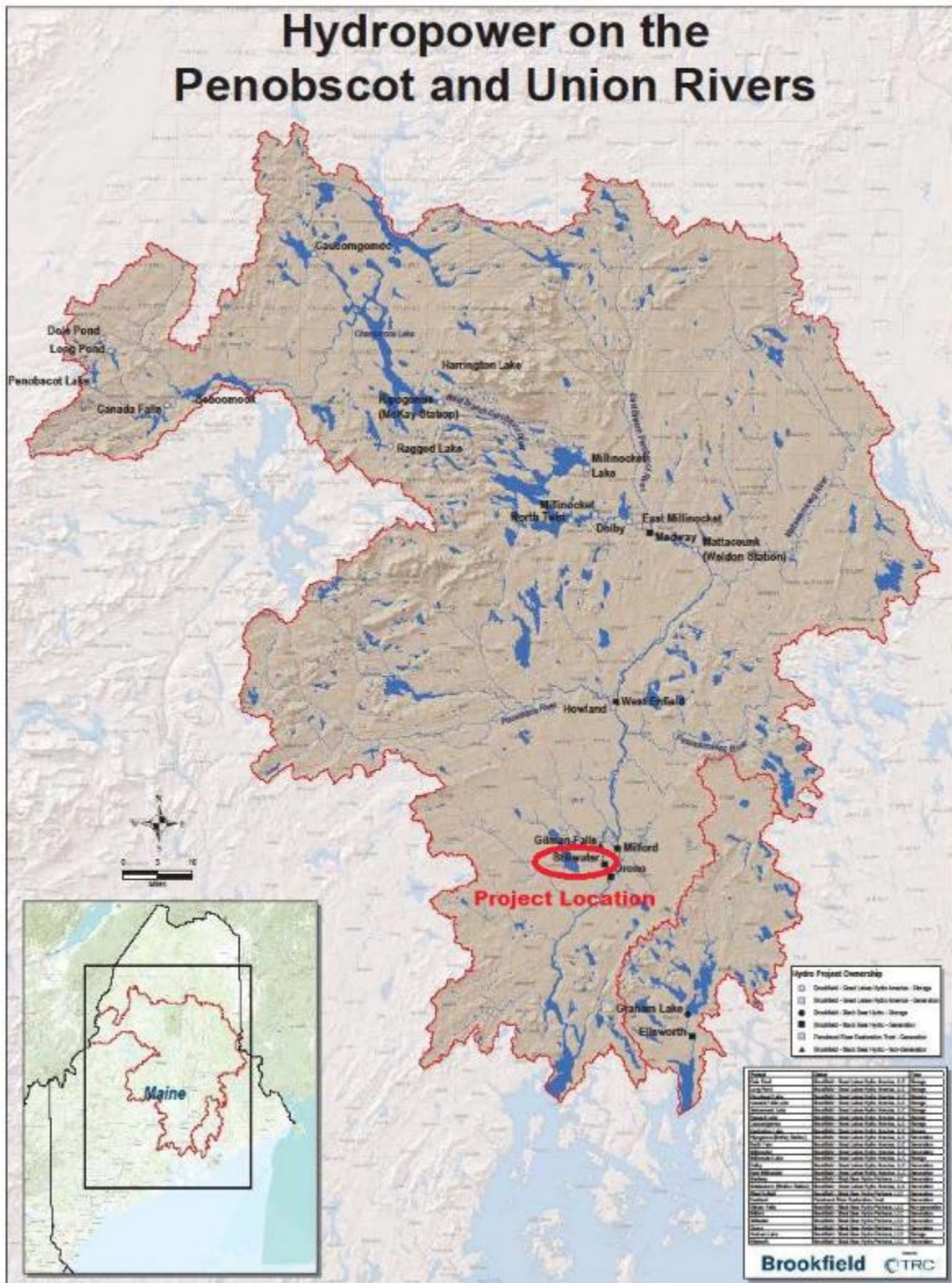
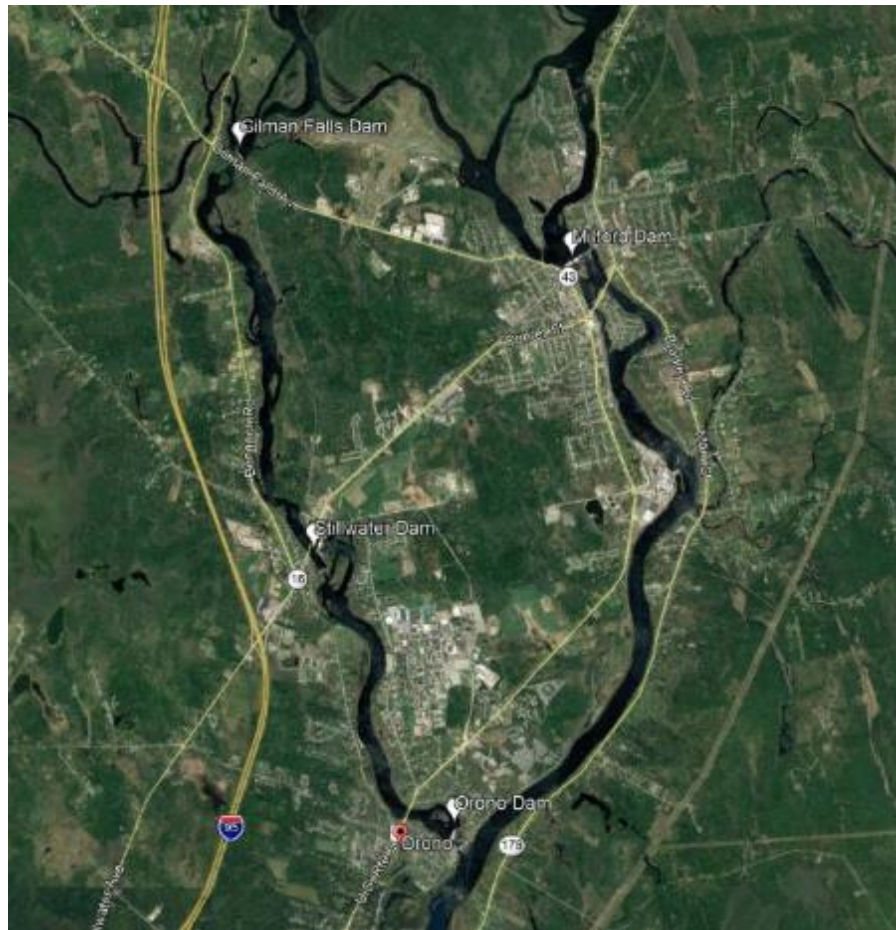


Figure 1 – Location of the Stillwater Project and Upstream and Downstream Dams





**Figure 2 – Aerial of Stillwater Branch and Stillwater and Orono Projects**

Brookfield operates the following five hydropower facilities on the Stillwater Branch, West Branch and mainstem of the Penobscot River:

<b>Project</b>	<b>River Branch</b>	<b>FERC License</b>	<b>LIHI Certified?</b>
Medway	West Branch	P-2666	# 65 on 6/1/15. In review now.
West Enfield	Mainstem	P-2600	No
Milford	Mainstem	P-2534	# 113 on November 13, 2018.
Orono	Stillwater Branch	P-2710	# 66 on 6/1/15. In review now.
Stillwater	Stillwater Branch	P-2712	# 67 on 6/1/15. In review now.

The Orono Project, downstream of Stillwater, is the first dam on the Stillwater Branch, and now the most downstream dam on the entire Penobscot River, with the Settlement Agreement driven removal of the Great Falls and Veazie Dams, formally located on the mainstem of the Penobscot River.

#### **IV. PROJECT AND IMMEDIATE SITE CHARACTERISTICS**

The Stillwater Project consists of a main concrete gravity dam, about 1,720 feet (ft) long, with a normal full pond elevation of 94.65 ft National Geodetic Vertical Datum (NGVD), consisting of 13 sections of various heights; Powerhouse A containing four turbine-generator units with a total nameplate capacity of 1,929 kW and a hydraulic capacity range from 100 to 1,700 cfs; Powerhouse B containing three turbine-generator units with a total nameplate capacity of 2,250 kW and total hydraulic capacity of approximately 1,758 cfs with a minimum hydraulic capacity of 160 cfs; a 191-acre reservoir; transmission facilities and appurtenant facilities. The Stillwater Project has an upstream eel passage channel in the west channel of the bypassed reach, west of Powerhouse B (see Figure 5). Both Stillwater powerhouses have downstream fish and eel passage facilities.

Although the Project operates as run-of-river, the application states that the impoundment has an estimated gross storage capacity of 1,900 acre-feet and allows for a one-foot variation from full pond for operational flexibility. An increase of the headpond full elevation by 0.6 inches was part of the 2004 Settlement Agreement, and amended 2005 FERC license and Water Quality Certification (WQC). Currently there is a 70 cfs minimum flow requirement released to the east bypass channel.

The Project boundary encloses the dam, the reservoir up to the 94.65 ft NGVD elevation, the powerhouses, and dam. Land area within the Project boundary is noted as 4.7 acres. The watershed area at the Stillwater dam is approximately 7,600 sq. miles.

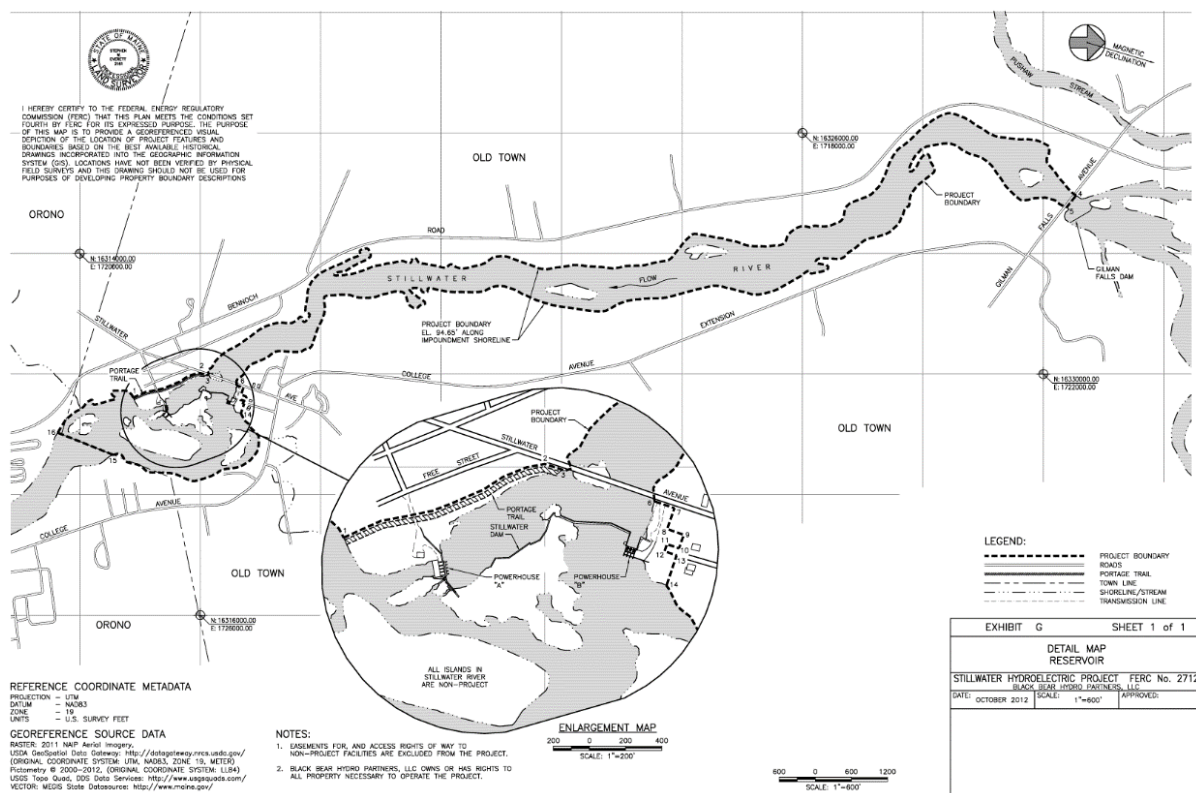
The Stillwater Project is located at a former logging and milling site, near the City of Old Town. The site was developed into an operating hydroelectric facility in 1902 by the Orono Pulp and Paper Company. A second powerhouse (now Powerhouse A) was constructed on the south side of the dam in 1932, and by 1942, the original powerhouse was abandoned, with the remains still visible on the southeast portion of the dam. Powerhouse B was constructed in 2013. The new downstream fish passage facility and eel ladder began operations in 2014 and 2016, respectively. The Stillwater Project has a gross nameplate generating capacity of 4.179 MW. K. Maloney of Brookfield reported an average annual generation of 22,183 MWh (Period of Record: 2014 to 2019) in a follow-up conversation<sup>4</sup>. Key features are shown on Figures 3 through 10.

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<sup>4</sup> See Appendix A



### Figure 3 – Aerial and Schematic of the Stillwater Project



### Figure 4 – Project Boundary





**Figure 5 – Location of Powerhouses and Fishway Facilities**



**Figure 6 – Stillwater Spillway**





**Figure 7 – Powerhouse A and Downstream Fish Passage**



**Figure 8 – Powerhouse B**



**Figure 9 – Location of Eel Ladder at Spillway**

**Figure 10 – Close-up of Eel Ladder**



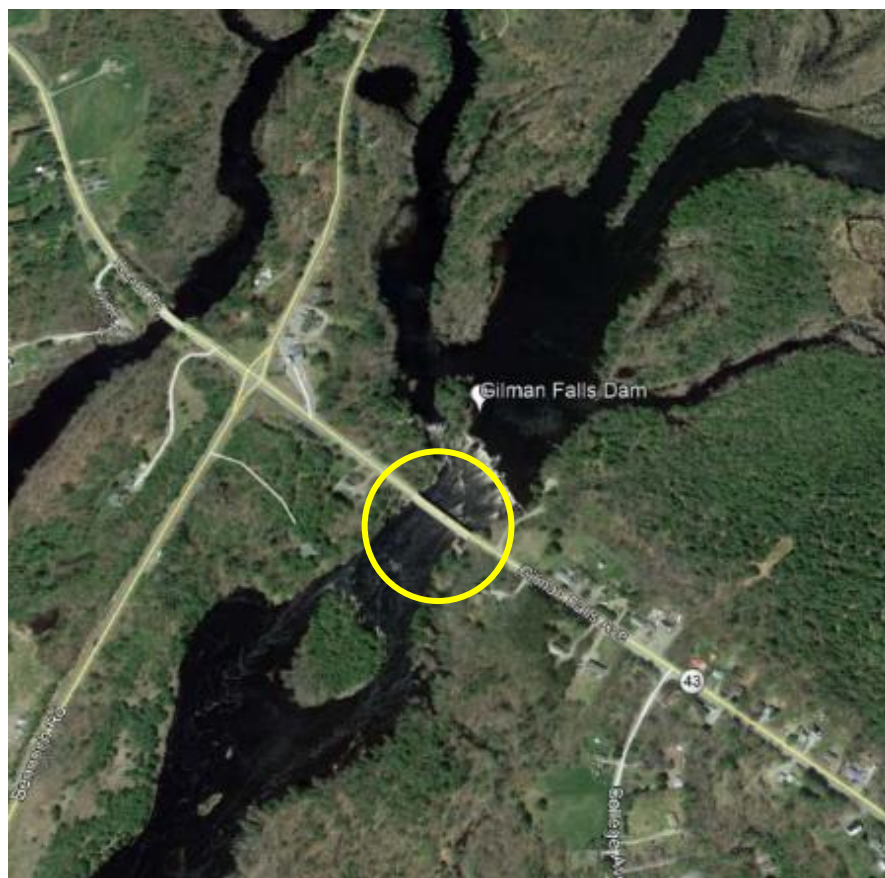
**Figure 11 – Powerhouse B Downstream Fish Passage**



## **V. ZONES OF EFFECT AND STANDARDS SELECTED**

Five Zones of Effect (ZOE) were appropriately designated by the Applicant. They are illustrated on Figures 12 through 15.

- ZOE #1 – Upstream Regulated Reach – RM 6.18 to 6.00 (from the discharge of the Gilman Falls Dam to the upstream limit of the Stillwater impoundment)
- ZOE #2 – Impoundment – RM 6.00 to 2.96 (upstream limit of the Stillwater impoundment to Stillwater Dam)
- ZOE #3 – Bypass Reach – RM 2.96 to 2.94 (Stillwater Dam spillway to the zone of mixing with the Powerhouse B tailrace)
- ZOE #4 – Powerhouse B Tailrace – RM 2.96 to 1.96 (from the discharge point of Powerhouse B to the confluence of the Powerhouse A tailrace including the flows from the confluence of the bypass reach)
- ZOE #5 – Powerhouse A Tailrace – RM 2.30 to 1.96 (from the discharge point of Powerhouse A to the upstream limit of the Orono impoundment including the flows from the Powerhouse B tailrace)



**Figure 12 – ZOE #1 – Upstream Regulated Reach**





**Figure 13 – Project Zone of Effect #2 - Impoundment**



**Figure 14 – ZOE #3 – Bypass Reach**



**Figure 15 – ZOE #4 (Red) Powerhouse B Tailrace (also called East Channel) and ZOE #5 (Yellow)– Powerhouse A Tailrace**

The Standards shown below were selected by the Applicant with the exception of those in red which were Reviewer assigned. I also recommend that Standard F-2 be eliminated as noted for Criterion F. Details of my standard recommendations and compliance with the criteria are presented in Section VIII.

#### **Standards for Upstream Regulated Reach (ZOE #1)**

<b>Criterion</b>		<b>Alternative Standards</b>				
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Plus</b>
A.	Ecological Flow Regimes	X				
B.	Water Quality		X			
C.	Upstream Fish Passage	X				
D.	Downstream Fish Passage	X				
E.	Watershed and Shoreline Protection	X				
F.	Threatened and Endangered Species Protection		X	X		X
G.	Cultural and Historic Resource Protection	X				
H.	Recreational Resources	X				

**Standards for the Impoundment (ZOE #2)**

Criterion		Alternative Standards				
		1	2	3	4	Plus
A.	Ecological Flow Regimes		X			
B.	Water Quality		X			
C.	Upstream Fish Passage	X	X			
D.	Downstream Fish Passage		X			
E.	Watershed and Shoreline Protection	X				
F.	Threatened and Endangered Species Protection		X	X		X
G.	Cultural and Historic Resource Protection		X			
H.	Recreational Resources		X			

**Standards for the Bypass Reach (ZOE #3)**

Criterion		Alternative Standards				
		1	2	3	4	Plus
A.	Ecological Flow Regimes		X			X
B.	Water Quality		X			
C.	Upstream Fish Passage		X			
D.	Downstream Fish Passage		X			X
E.	Watershed and Shoreline Protection	X				
F.	Threatened and Endangered Species Protection		X	X		X
G.	Cultural and Historic Resource Protection		X			
H.	Recreational Resources	X				

**Standards for the Powerhouse A Tailrace (ZOE #4) and Powerhouse B Tailrace (ZOE #5)**

Criterion		Alternative Standards				
		1	2	3	4	Plus
A.	Ecological Flow Regimes		X			
B.	Water Quality		X			
C.	Upstream Fish Passage		X			
D.	Downstream Fish Passage	X	X			
E.	Watershed and Shoreline Protection	X				
F.	Threatened and Endangered Species Protection		X	X		X
G.	Cultural and Historic Resource Protection		X			
H.	Recreational Resources		X			



## VI. REGULATORY AND COMPLIANCE STATUS

Copies of the FERC license, amendments and Water Quality Certification (WQC) and amendments referenced below are contained in the LIHI application.

### FERC License

The original Stillwater Project Federal Energy Regulatory Commission (FERC) license was issued to Bangor Hydro Electric Company (Bangor Hydro) in 1978, which expired in 1993. The Project was operated under annual licenses until license renewal was approved on April 20, 1998. A 40-year term was approved by FERC to coordinate expiration dates for projects in the same river basin, in support of their policy to consider cumulative impacts of projects in the same river basin collectively at relicensing. Thus, the Stillwater license was issued with the same expiration date (2038) as for the Milford and Veazie Projects. The Stillwater license was transferred to Penobscot Hydro LLC, which later became PPL Maine, LLC, (PPL Maine) in October 2000. Only Powerhouse A existed at this time of licensing.

The 1998 license Article 402 established temporary minimum flow releases to the bypass reach and Article 404 required an inflow-stream analysis to determine permanent requirements based on habitat availability for target species. That study resulted in adoption of permanent flow releases in a FERC order dated June 29, 2001. Further details are provided under Criterion A - Ecological Flow Regime.

The Stillwater Project is part of the Lower Penobscot River Multiparty Settlement Agreement (Settlement Agreement), signed on June 25, 2004<sup>5</sup>, the goal of which is to restore self-sustaining populations of 11 native species of sea-run fish along the Penobscot River in Maine. The Settlement Agreement involved the purchase and removal of the lower-most dams on the Penobscot River, Veazie (FERC No. 2403) and Great Works (FERC No. 2312), and installation of a fish bypass at, and decommissioning of the Howland dam (FERC No. 2721) on the Piscataquis River, a tributary of the Penobscot River. The Settlement Agreement was jointly entered into by:

- PPL Maine, PPL Great Works, PPL Generation (the owners of Orono at that time)
- the Penobscot River Restoration Trust (PRRT)
- Penobscot Indian Nation (PIN)
- United States Department of Interior, acting through the Fish and Wildlife Service (USF&WS), Bureau of Indian Affairs (BIA) and the National Park Service (NPS)
- Maine State Planning Office
- Maine Atlantic Salmon Commission (MASC)
- Maine Department of Inland Fish and Wildlife (MIF&W)
- Maine Department of Marine Resources (MDMR)
- American Rivers, Inc
- Atlantic Salmon Federation
- Maine Audubon Society
- Natural Resources Council of Maine (NRCM), and
- Trout Unlimited (TU).

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<sup>5</sup> <https://lowimpacthydro.org/wp-content/uploads/2020/09/Penobscot-Agreement-6-04.pdf>

Notably, NMFS was not a signatory and has issued mandatory fish passage requirements for the Project, which were incorporated into the FERC license.

As part of the Settlement Agreement, the signatories agreed to amend the license for the Stillwater Project to increase the authorized maximum elevation of the Project reservoir by one foot, reduce the required minimum flows in both the east (from 155 cfs to 50 cfs) and west (from 40 cfs to 20 cfs) bypassed channels, and extend deadlines relating to the installation of upstream and downstream fish passage facilities. FERC approved that amendment allowing these changes on April 18, 2005. In response to a May 12, 2005 letter from National Oceanic and Atmospheric Administration (NOAA) Fisheries (i.e. the National Marine Fisheries Service (NMFS)), FERC issued an Order dated May 16, 2005 correcting Article 409, noting that that NOAA Fisheries' prescription is consistent only with Attachment A of the Settlement Agreement. Attachment A contains the fish passage enhancements agreed to by the signatories to the Settlement Agreement, while the main body of the document addresses administrative issues and non-fish passage items.<sup>6</sup> The Stillwater Project was purchased by BBHP and the license transferred on September 17, 2009.

On September 14, 2012, FERC issued an Order Amending License to authorize the construction of Powerhouse B and incorporate the provisions for fish passage pursuant to the Settlement Agreement. The Stillwater Powerhouse B was commissioned on September 21, 2013.

Pursuant to a FERC environmental inspection of the Project conducted on July 9, 2018 which identified a discrepancy between the authorized and installed capacities, an Order revising the authorized installed capacity listed for the Project was issued by the FERC on February 11, 2019.

Following Maine Department of Environmental Protection's (MDEP) October 28, 2019 revision of the WQC, FERC issued a license amendment for the Stillwater Project on June 8, 2020 approving the discontinuation of the 20 cubic feet per second (cfs) west channel minimum flow in favor of the total 70 cfs minimum flow being discharged into the east channel via the downstream fish passage or through Powerhouse B.

#### Water Quality Certification (WQC)

A WQC was initially issued for the Project, associated with the new license, on December 29, 1992. The WQC was amended as noted below:

- January 13, 2005 – Incorporated the Settlement Agreement requirements, including raising the headpond level by one foot and reducing minimum flow requirements to the bypass channels, and was incorporated into the April 18, 2005 FERC License amendment.
- August 23, 2011- Authorized Powerhouse B and fishway construction and associated operational changes and was incorporated into the September 14, 2012 FERC License amendment.
- October 28, 2019 - Authorized modification of the Project's minimum flow requirements by eliminating the requirement to split minimum flows into two conveyance locations.

FERC also incorporated the provisions of the Contingent Mitigation Fund of Attachment B of the

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<sup>6</sup> <https://lowimpacthydro.org/wp-content/uploads/2020/09/Penobscot-Agreement-6-04.pdf>

Settlement Agreement into the license as Article 414, and via incorporation of the WQC. The Contingent Mitigation Fund would provide mitigation for habitat impacts if the Veazie, Great Works and Howland projects are not acquired by the Trust and their respective dams not subsequently removed or the bypass at Howland not constructed. Under the Fund, annual contributions due to the effects of the headpond increase at Stillwater would be \$1000; the changes in the minimum flow requirements would require an additional \$1000 annually for the term of the license. These fees would be adjusted annually in accordance with the Consumer Price Index. The disposition of the monies would be determined upon mutual agreement among many of the signatories to the Settlement Agreement for replacing the fish and wildlife habitat lost or degraded by habitat effects, compensating for loss or degradation of fish and wildlife habitat due to habitat effects by means other than replacement, and supporting efforts directed at restoring to the Penobscot River fisheries and the habitat on which these fisheries rely. However, as the Veazie and Great Works dams were removed and the Howland bypass constructed, the funding requirement was not implemented.

No deviations from FERC license requirements were found during the review of the FERC eLibrary from June 1, 2015 through February 11, 2020. This lack of deviations was also reported in the application.

## **VII. PUBLIC COMMENT RECEIVED OR SOLICITED BY LIHI**

The deadline for submission of comments on the LIHI recertification application was January 30, 2021. Agency outreach via email was made to the following stakeholders focusing on fish passage questions. Direct responses were received from MDIF&W. MDMR and USF&WS responses were incorporated in their comments submitted to LIHI.

- Maine Department of Inland Fisheries and Wildlife (MDIF&W), Kevin Dunham, Regional Fisheries Biologist
- Maine Department of Marine Resources (MDMR), Gail Wippelhauser, Marine Resources Scientist
- National Marine Fisheries Service (NMFS), Jeff Murphy, Penobscot SHRU
- US Fish and Wildlife Service (USF&WS), Julianne Rosset, Migratory Fish/Hydropower Biologist
- Penobscot Indian Nation (PIN) - Dan McCaw, Fisheries Program Manager

The MDMR submitted combined comments on the Medway, Orono, and Stillwater applications, addressing my inquiries, with which the USF&WS concurred. Kevin Durham of MDIF&W also submitted limited comments, saying he has had limited interaction with the Applicant. MDMR stated that Jeff Murphy of NMFS would not be responding as he did not believe it would be appropriate to comment on projects with which he would be involved in regulatory proceedings in the near future. However, the Stillwater license will not expire until 2038. BBHP also submitted a response to the agency comments, which refuted the statements in the MDMR comments, and should be reviewed for the details which are not completely enumerated in my discussion. All comments are incorporated into the two fish passage criteria discussions and are available on the LIHI website.



## VIII. DETAILED CRITERIA REVIEW

### A. ECOLOGICAL FLOW REGIMES

**Goal:** The flow regimes in riverine reaches that are affected by the facility support habitat and other conditions suitable for healthy fish and wildlife resources.

#### **Assessment of Criterion Passage**

The Applicant selected **A-1 - Not Applicable/De Minimis Effect** for the ZOE #1 - Upstream Reach and **A-2 – Agency Recommendation** for the other three ZOE's, including the impoundment as there are headpond limits, bypass minimum flows and run-of-river operational requirements. A-1 may also be suitable for the Impoundment (ZOE #2) per the LIHI Handbook. BBHP also applied for PLUS certification for this criterion for ZOE#3 – Bypass Reach.

The Stillwater Project is operated with inflow from the Milford impoundment, which is discharged into ZOE #1 – upstream regulated river reach, by the Gilman Falls dam, pursuant to the Settlement Agreement and Milford FERC license. (Details of the flow allocations between the Stillwater Branch and mainstem of the Penobscot River can be found on page 78 of the application.) Thus, while there are enforceable agency-driven flow requirements for ZOE #1, those requirements are associated with the separate Milford Project FERC license, and not the Stillwater Project license, although both projects are under the same ownership. Stillwater is operated as run-of-river facility with a stable headpond managed for headpond levels, monitored pursuant to the FERC-approved Operations and Flow Monitoring Plan to ensure Project outflows are equal to inflows. Headpond fluctuations are allowed up to 1 ft from normal full pond for operational flexibility, but the one-ft is not used for power production or any other operational consideration. If headpond elevation maintenance cannot be met through the turbines (i.e., inflows exceed station capacity and/or units are out of service), spill is provided over the flashboard system at the dam to discharge excess flows to the bypass reach. Flows are conveyed through the powerhouses to the two tailraces (ZOE's #4 and #5) and/or provided as spill at the dam (discharging to the bypass reach ZOE#3) in times of high flows or unit outages. The bypass reach, as defined in the license and WQC, consists of a 390-foot-long east channel and a 100-foot-long west channel.

The 1998 license Article 402 required a release of 40 cfs to the west channel and an interim release of 190 cfs to the east channel. Article 404 of the license required performance of studies to assess optimal flows, having [sic] “target habitat units of the combined areas of the east bypassed reach are an additional 80.6 salmon nursery habitat units, 176.6 smallmouth bass spawning/incubation habitat units, 268 smallmouth bass young-of-year habitat units, 434.9 smallmouth bass juvenile habitat units, 311.4 smallmouth bass adult habitat units, 60 shad spawning/incubation habitat units, and 328.2 shad larvae/juvenile habitat units. These target habitat units are to be attained with flows into the bypassed reach no greater than 230 cfs and no less than 70 cfs.” The results of those studies established flows of 155 cfs and 40 cfs to the east and west channels, respectively, which were adopted as modification to Article 402 of the license on June 29, 2001.

Effective with the 2005 license amendment, the flows were again reduced to 50 cfs in the east channel and 20 cfs in the west channel, with this reduction requested, and eventually approved, to enhance generation output as proposed in the Settlement Agreement.

The application noted that these minimum flows were established using data developed in a 1991 instream flow study conducted during the Project relicensing. The weighted usable area (WUA) for target species and life stages was determined for both bypass channels, at various flows. The tables below provide the WUA estimates comparing leakage to the proposed flows in each channel used to set the 2005 limits.

**TABLE 1: WEST BYPASS CHANNEL WUA AT LEAKAGE AND 20 CFS**

Species/Lifestage	Leakage	20 cfs
Atlantic salmon juvenile	0.0	17.6
Smallmouth bass spawning/incubation	3.3	2.1
Smallmouth bass young-of-year	14.1	8.9
Smallmouth bass juvenile	6.9	13.3
Smallmouth bass adult	2.4	2.3
Shad spawning/incubation	0.0	0.7
Shad larval	3.5	4.1
Total available WUA	30.2	49

**TABLE 2: EAST BYPASS CHANNEL WUA AT LEAKAGE AND 50 CFS**

Species/Lifestage	Leakage	50 cfs
Atlantic salmon juvenile	17.6	66.7
Smallmouth bass spawning/incubation	122.3	133.9
Smallmouth bass young-of-year	212.4	270.6
Smallmouth bass juvenile	317.8	367.6
Smallmouth bass adult	243.3	264.4
Shad spawning/incubation	18	27.7
Shad larval	249.3	277.1
Total available WUA	1180.7	1408.0

The purpose of these flows is to provide bypass reach habitat for migratory and resident species, but the flows also provide habitat for downstream Atlantic salmon smolt passage. Based on follow-up information provided by K. Bernier of Brookfield, the 20 cfs (west channel) and 50 cfs (east channel) minimum flows provide 71 and 80 percent of total maximum WUA for all target species in the west and east channels, respectively. The noted 25.6 and 3.8 percent of total maximum WUA values shown in the application are for juvenile Atlantic salmon only<sup>7</sup>.

Applications were submitted to FERC and MDEP in 2019 to eliminate the need to release 20 cfs to the west channel (shown as ZOE #3) and instead release the full 70 cfs to the east channel via the downstream fish passage during the salmon passage season in May, or via Powerhouse B the

<sup>7</sup> See Appendix A Brookfield email

rest of the time (this tailrace is noted as ZOE#5) (see the LIHI application page 22 and FERC Order of June 8, 2020<sup>8</sup>). An amended WQC and license were issued authorizing these changes on October 28, 2019 and June 8, 2020, respectively. Now, only leakage of 1 to 2 cfs is released to the shorter west channel. This change was based on the results of several years of study to improve upstream eel passage, and it was found that the 20 cfs flows were apparently negatively affecting use of the upstream eel passage. The proposed flow modifications were reported by BBHP as being developed in consultation with the resource agencies and PIN, and the amendments remain consistent with the Penobscot River Multiparty Settlement Agreement (filed with the Commission on July 2, 2004) which requires a 70 cfs minimum flow to the Stillwater bypass reach and does not designate conveyance locations. It is important to note that when the Settlement Agreement was signed and the original license was issued, there was only Powerhouse A, leaving the area downstream of the dam truly a “bypass”. However, with the construction of Powerhouse B, the east channel is now predominantly the tailrace of Powerhouse B. It was noted by K. Bernier<sup>9</sup>, that flows from the powerhouse B tailrace also backwater portions of the bypass reach (ZOE#3). As noted in the amended license, this change did result in the agency finding that:

*“Based on the available information, the reduction of flow in the west channel to leakage (approximately 1-2 cfs) is expected to result in an overall reduction of the usable habitat for anadromous fish, but may slightly increase habitat for young-of-the year and adult smallmouth bass. However, relatively minimal suitable habitat for anadromous species exists in the west bypass channel, even at the current flows. Due to the availability of habitat in the east bypass channel and elsewhere in the Stillwater Branch of the Penobscot River, the change in conveyance location for minimum flow is not expected to have a significant effect on habitat for those species.”*

In compliance with the amended June 8, 2020 FERC Order, BBHP filed a revised Operations and Flow Monitoring Plan to address the relocated minimum flow, which was approved by FERC on September 10, 2020.

Other than the above-noted change, there have been no other operational or regulatory required changes to the Project since last certified by LIHI. Likewise, there have been no deviations of any flow-related requirements at the Project reported by BBHP or posted in FERC eLibrary between 2015 and February 11, 2021. Review of FERC eLibrary from 2015-2019 for the upstream Milford Project, which controls flows to the Stillwater Branch, did not show any flow-related issues.

Based on this information, I believe that the Stillwater Project continues to satisfy this criterion. No flow-related concerns were expressed by any stakeholder. However, I do not believe it satisfies the requirements for achieving three extra years for PLUS certification under Ecological Flow Regimes. Minimum flows to the east channel were reduced from 190 cfs, to 155 cfs to 50 cfs while the west channel flows were reduced from 40 cfs to 20 cfs from 1998 to 2005. Effective June 8, 2020, the west channel flow was reduced to leakage only (1 to 2 cfs) but the east channel flow was increased to 70 cfs, primarily released via Powerhouse B operation, except during downstream fish passage season. It was acknowledged by the agencies that elimination of the west channel flows resulted in some loss of aquatic habitat. Thus, the 2020 flow adjustment was made to help

<sup>8</sup> <https://elibrary.ferc.gov/eLibrary/IDMWS/common/opennat.asp?fileID=15553606>

<sup>9</sup> See Appendix A Brookfield email



enhance mandatory upstream eel passage, and not enhancement of all species habitat conditions as a goal. Therefore, I do not believe the extra years of certification are warranted.

### *The Project Passes Criterion A – Ecological Flow Regimes*

## **B. WATER QUALITY**

**Goal:** Water Quality is protected in waterbodies directly affected by the facility, including downstream reaches, bypassed reaches, and impoundments above dams and diversions.

### **Assessment of Criterion Passage**

The Applicant appropriately selected **B-2 – Agency Recommendation** for all ZOE's.

The application notes that the entirety of the Stillwater Branch of the Penobscot River is Class B. The MDEP historically conducted ambient water quality sampling in the Stillwater Branch with all dissolved oxygen (DO) readings in attainment. Water quality monitoring conducted by BBHP as part of the FERC required Dissolved Oxygen Monitoring Plan following construction of the Powerhouse B facilities was completed in 2014 and reported in April 2015, demonstrating that DO standards for Class B waters are met under the current operating scheme. No agencies had comments regarding the results of these studies.

The Project operates under the terms of the WQC as issued in 2005 and amended in 2011. The 2019 application to MDEP to eliminate the 20 cfs minimum flow to the west channel but release all 70 cfs to the east channel with the goal of upstream eel passage enhancement was found satisfactory by the MDEP and the WQC was amended October 28, 2019. Based on review of that amendment, impacts to water quality in the bypass did not seem to be a MDEP concern. The application noted that according to MDEP's 2016 Integrated Water Quality and Assessment Report (305(b) report) to the U.S. Environmental Protection Agency, the Stillwater Branch is not impaired.

Attached to the LIHI application is a letter dated November 3, 2020, from MDEP, responding to the BBHP's request for comment. In the letter, the MDEP detailed activities conducted by BBHP that satisfied various WQC requirements. The MDEP also stated that they believe that provided BBHP continues to consult with the fisheries resource agencies on passage issues, as the Applicant has made provisions to mitigate the impacts of the Stillwater Project on fisheries resources in the Stillwater Branch of the Penobscot River, they "find that BBHP continues to abide by the Terms and Conditions of the WQC."

No stakeholder contacted during my review provided any comments about water quality concerns at the Project. Based on my review of the application and eLibrary information, I believe the Project continues to satisfy the requirements for this criterion.

### *The Project Passes Criterion B – Water Quality*

## C. UPSTREAM FISH PASSAGE

**Goal:** The facility allows for the safe, timely, and effective upstream passage of migratory fish. This criterion is intended to ensure that migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the facility.

### Assessment of Criterion Passage

The Applicant appropriately selected **A-1 - Not Applicable/De Minimis Effect** for the ZOE #1 - upstream reach and ZOE#2 – impoundment and **A-2 – Agency Recommendation** for the remaining ZOE. There are no barriers to upstream migration of American eel in either the impoundment or upstream regulated reach. The application noted that while this upstream reach receives water from Gilman Falls dam (part of the Milford Project), this structure does not create a barrier to upstream or downstream fish passage, as swim-through passage is provided through the gates or over the dam's spillway.

An Environmental Assessment was issued on July 9, 2012, to support the application for the 2012 FERC license amendment. It reported that the Stillwater Branch of the Penobscot River supports a variety of resident fish species and serves as a secondary downstream migration corridor for several anadromous fishes and American eel. Resident warmwater species include smallmouth bass, chain pickerel, brown bullhead, white perch, yellow perch, white sucker, redbreast sunfish, pumpkinseed sunfish, burbot, banded killifish, fallfish, and several other minnow species. The two most important gamefish in the lower Penobscot River are smallmouth bass and chain pickerel. Smallmouth bass is the most abundant gamefish species present, inhabiting both riverine reaches and impoundments. Chain pickerel occupy backwater areas where stream velocities are low and submerged aquatic vegetation is available. Chain pickerel and smallmouth bass are not native species but were introduced in 1819 and 1869, respectively. Coldwater species, such as burbot, landlocked salmon, brook trout, and lake trout, may occur seasonally or immigrate from upstream reaches. Diadromous species present in the Penobscot River include alewife, Atlantic salmon, American shad, sea lamprey and American eel. Historically, the Penobscot River supported larger runs of American shad, blueback herring, Atlantic sturgeon, shortnose sturgeon, rainbow smelt, tomcod, and striped bass. American shad, blueback herring, alewife, American eel and Atlantic salmon, are the species addressed in the licensing.

The Stillwater Branch of the Penobscot River is now designated as critical habitat for the federally and state endangered Atlantic salmon, and other diadromous fish, including American shad, blueback herring, alewife (which may move downstream from the upper reach), and American eel. However, there is no upstream anadromous fish passage at the Stillwater Project, and as per the Settlement Agreement, all fish trapped at the downstream Orono Project's fish lift are trucked upstream of the Stillwater Project and released into the mainstem of the Penobscot River upstream of the Stillwater Reach. During the original certification review of the Stillwater Project, communication with Fred Seavey of USF&WS indicated that no requirement for upstream passage at this site was part of the compromise reached during settlement negotiations. It was determined that as the Stillwater Branch receives 8 to 30% of the river flow, that it was more beneficial for overall fish restoration of the river basin to concentrate the upstream passage for the mainstem of

the river via state-of-the-art upstream passage at the Milford Project.<sup>10</sup>

The Stillwater Project does have upstream eel passage via a permanent, flow-through concrete channel that was installed in 2015, which is approximately 6 ft wide and 36 ft long with a bristle-brush floor and provides a 1.5-cfs conveyance flow seasonally. The new upstream eel passage is located at the small bedrock island about mid-river of the spillway, not far from Powerhouse B (See Figures 5 and 9). The entrance of the ladder at the base of the dam is at an elevation of approximately 86.0 feet. The original eel ladder at Powerhouse A was removed when the current one was installed. This upstream eel passage ladder is operated at a minimum from June 1 to August 31 annually.

Video monitoring and night-time surveys of upstream eel migration using the eel ladder were conducted in 2016, with results reported to FERC on April 13, 2017. There was limited use of the ladder. Agency comments on the results of this study appeared to come only from USF&WS. Regarding their overall assessment of the results, which included Orono and Stillwater studies, they stated:

*“While Orono’s results are very encouraging, Stillwater’s are not. Further testing at Stillwater is needed. Replication of the Orono’s results would be valuable.”*

In 2017, the bristle brush floor was extended to cover more of the rock ledge leading to the ladder and flows to the right of the ladder (which was the 20 cfs minimum flow release to the west channel and spillway leakage) were essentially eliminated, with significant increase in ladder usage observed during monitoring assessment (not full effectiveness testing). These results were described in BBHP’s American Eel Upstream Passage Assessment and Monitoring Report dated March 2018, which is linked in the LIHI application. While these flows were initially not thought to be the problem with ladder usage, in response to my question, K. Bernier of Brookfield stated that re-evaluation of ladder usage after the improvements to the ladder base were made, showed that eel were indeed following the 20 cfs flow, and distracted from the ladder<sup>11</sup>.

No further upstream eel passage studies were conducted in 2018-2020, even though it appears that license-required passage effectiveness testing has not yet been completed. The last mention of these requirements at Stillwater was from an email from Steven Shepard of USF&WS from December 29, 2017 included in the above noted March 2018 report. That email noted:

*“The Service has typically required the standard eel fishway effectiveness test noted in the MDMR comments. This test complements night observations of eel passage and behavior. The effectiveness test consists of confining test groups of 100 eels in a tank at the fishway entrance near dusk and capturing all of the migrant eels passing that night. The Service has not defined a specific effectiveness metric, but most eel fishway effectiveness tests approach 100% passage in one night. The design of the Stillwater upstream eel fishway may not lend itself to such a test. We will assess the ability to conduct the standard test, or an alternative test, with MDMR.”*

<sup>10</sup> <https://lowimpacthydro.org/wp-content/uploads/2020/07/Milford-Recertification-Report-05072019-complete.pdf>

<sup>11</sup> See Appendix A Brookfield email



MDMR, with concurrence from the USF&WS, submitted a set of comments, some of which appear to apply jointly to Stillwater, Orono and Medway. One of those is that numerical performance standards for all migratory species in Maine will be developed within the next five years. They also stated they believe the iterative and slow-paced approach being used by BBHP for studies at their various Penobscot River Projects has made it difficult for the agencies to fully assess the safety and effectiveness of the upstream passage<sup>12</sup> at each of the projects, and for making informed recommendations for modification of passage facilities or project operations for many species. MDMR reports that this approach involves “monitoring for one aspect (e.g. passage route or survival) often for only one species, life stage, and direction of migration in a given year”. As there is only upstream passage for eel at this Project, most of these concerns are likely meant to apply to the other BBHP Penobscot River Projects. There were no specific comments on upstream eel passage at Stillwater. To address the more generalized MDMR concern of too few studies being conducted, in BBHP’s response comment letter, dated February 16, 2021, they stated they have been conducting the studies prioritized by the agencies in the annual meetings. In follow-up communication with LIHI staff, BBHP also reported that an internal efficiency study of the eelway itself had been requested and is scheduled to be completed in 2021.

Based on my review of the application, follow-up data from Brookfield, and stakeholder comments, I believe that efforts being conducted during the past five years indicate that BBHP is making appropriate efforts to provide safe upstream eel passage at this Project. I suspect that some of the more general comments offered by MDMR regarding upstream passage were not intended to apply to Stillwater as there are no upstream passage requirements for anadromous species, based on my understanding of the license, WQC and Settlement Agreement. However, future effectiveness testing for eels may be required once numerical performance standards are established. Therefore, I believe that the Project continues to satisfy this criterion provided the recommended condition is included, as detailed in Section IX.

### *The Project Conditionally Passes Criterion C – Upstream Fish Passage*

## **D. DOWNSTREAM FISH PASSAGE AND PROTECTION**

**Goal:** The facility allows for the safe, timely, and effective downstream passage of migratory fish. For riverine (resident) fish, the facility minimizes loss of fish from reservoirs and upstream river reaches affected by Facility operations. Migratory species are able to successfully complete their life cycles and maintain healthy populations in the areas affected by the Facility.

### **Assessment of Criterion Passage**

The Applicant has selected **D-1 - Not Applicable/De Minimis Effect** for ZOE#1 the unregulated upstream reach and **D-2 – Agency Recommendation** for the other four ZOEs. However, as downstream passage is unimpeded once fish reach the two tailraces (ZOE#4 and #5), I believe Standard A-1 may be more appropriate for these ZOEs. BBHP also applied for **PLUS** credit for the Bypass Reach (ZOE#3).

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<sup>12</sup> As only eel upstream passage is required at Stillwater, it may be this comment was more applicable to upstream passage at the other sites or mostly applies to downstream passage.

Powerhouse A has full-depth trash racks with 1-inch clear spacing across the turbine intakes angled perpendicular to the flow; a downstream fish bypass facility located at the left side of the intake (looking downstream) between the forebay wall and trashracks, installed in 2013, which consists of a single low-level entrance and a single surface entrance both of which flow into a 2.83-ft-wide bypass flume that discharges into the tailwater through a 36-inch-diameter conduit pipe. Subject to suitable river conditions, the Powerhouse A bypass is operated from April 1 to December 31 annually, with a total combined flow of 70 cfs. From April 1 to August 15, the flow is provided entirely through the surface entrance. From August 15 to November 15, the flow is balanced with a 40/30 cfs split between the surface entrance and low-level entrance to enhance downstream eel passage. The flow then reverts back to surface entrance flow only from November 15 to December 31 (or ice-in of the headpond).

Powerhouse B has a 1-inch clear space angled trashrack to minimize fish entrainment, and a downstream fish passage facility consisting of a combination of an opening in the flashboards in the forebay near the trashracks (for 2 weeks during the downstream Atlantic salmon smolt migration) and a 4-ft-wide fish bypass opening in the forebay wall. A 4-ft square downstream eel passage facility is installed at the base of the trashracks. Both bypasses discharge to a plunge pool that empties into a flume which runs along the west side of the powerhouse to the tailrace. Subject to suitable river conditions, the Powerhouse B bypass is operated from April 1 to December 31 annually with a total combined flow of 70 cfs. From April 1 to August 15, the flow is provided entirely through the surface entrance. From August 15 to November 15, the flow is balanced with a 40/30 cfs split between the surface entrance and low-level entrance to enhance downstream eel passage; operation of the fish bypass then reverts back to surface entrance flow only from November 15 to December 31 (or ice-in of the headpond). The double-regulated unit nearest the downstream fish passage facility at Powerhouse B is operated as first on and last off to provide attraction to the downstream fish passage.

#### Anadromous Species excluding Atlantic Salmon

The goals for restoration of anadromous species in the Penobscot River have been designed on a regional basis, with the main focus on the mainstem of the River, pursuant to the Settlement Agreement. Nonetheless, study plans to test the effectiveness of passage facilities on the Stillwater Branch are required. Studies of American shad, alewife, blueback herring and American eel follow “traditional” approaches, as defined in the Settlement Agreement and incorporated in the FERC license. The testing for Atlantic salmon is governed by the 2012 Biological Opinion.

The following table shows studies evaluating the effectiveness of the downstream passage facilities conducted between 2014 and 2018 by BBHP. Five studies were done for Atlantic salmon, two for American shad and one each for alewife and American eel. According to BBHP and LIHI staff discussions, UMO also conducted acoustic tag studies of adult shad in 2018 and 2020, as well as salmon smolt downstream studies in most years from 2005 – 2019.

In addition, two studies were conducted in the fall of 2020, including “Downstream Juvenile Alosine Passage Route Utilization”, a radio telemetry evaluation having the goals of evaluating the residence time from arrival until downstream passage and the proportional downstream passage route utilization for juvenile alosines at the Milford, Stillwater, and Orono Projects, and

“Desktop Assessment of Juvenile Alosine Project Passage Survival” having the goal of understanding out-migration survival using estimated blade strike probabilities for juvenile alosines and estimates of total station survival for juvenile alosines using the Turbine Blade Strike Analysis (TBSA). Final 2020 study reports were issued February 15, 2021, pursuant to a request BBHP received from the resource agencies for extra time to review the reports, and which FERC approved.



**SUMMARY OF BBHP DOWNSTREAM PASSAGE STUDIES AT STILLWATER**

Study Year	Study Dates	Species	Life Stage	Analysis Type	Median Residence Time	Passage Survival/Success		Key Agency Comments Related to Study Findings
						Estimate	Confidence Interval	
2017	June 13-Aug 15	American Shad	Adult	Quantitative	4.7 d	95.8%	75% CI = 91.7-97.9%	Forebay residence prior to downstream passage was relatively long at Stillwater.
2018	June-July	American Shad	Adult	Quantitative	0.3 d	94.7% *	<i>*estimated from 18 of 19 tagged shad which approached dam</i>	
2018	June-July	Alewife	Adult	Quantitative	0.4 d	94.6%	75% CI = 92.4-97.8%	
2016	September-October	American Eel	Adult	Quantitative	1.8 hr	92.0%	-	22% of eels passed Stillwater via Powerhouse A and half died during passage. Existing one-inch rack spacing was not successful and Licensee should inspect racks to gaps or bends which allowed eels to enter; passage delay a concern.
2014	May	Atlantic Salmon	Smolt	Quantitative	>24 hrs	98.2%	75% CI = 92.5-100%	
2015	May	Atlantic Salmon	Smolt	Quantitative	>24 hrs	69.2%	75% CI = 62.3-76.2%	
2016	May	Atlantic Salmon	Smolt	Quantitative	>24 hrs	94.3%	75% CI = 91.9-96.5%	Implementation of 20 to 50% spill
2017	May	Atlantic Salmon	Smolt	Quantitative	>24 hrs	95.3%	75% CI = 93.2-97.5%	Implementation of 20 to 50% spill
2018	May	Atlantic Salmon	Smolt	Quantitative	>24 hrs	91.7%	75% CI = 88.7-94.5%	Implementation of 20 to 50% spill

Pursuant to the fish passage articles for the Project, BBHP is required to consult with the stakeholders if the results of the current monitoring indicate that changes in project structures or operations, including alternative flow releases, are necessary to protect fish resources. Based on linked study reports and follow-up email communication with K. Maloney of Brookfield<sup>13</sup>, the improvements made during the past five years were:

- Repair of several small gaps in the Stillwater A trashracks based on a dive inspection conducted in July 2017, as recommended by the USF&WS.
- Modification of the downstream fishway at Station B to increase smolt survival by: (a) increasing the height of the plunge pool wall to reduce the likelihood of smolts landing on top of the wall or splashing overboard, and (b) installing stop logs downstream of the plunge pool area (in an existing slot) to increase the depth of the plunge pool and reduce the height of fall for passing fish.
- Sequential increases in bypass flows, as established in the Biological Opinion, were tested in an effort to enhance Atlantic salmon downstream passage effectiveness.

On March 6, 2020, FERC issued a letter regarding fish passage conditions on the lower Penobscot River, including the Stillwater Project, identifying “frequent issues that arise in the stakeholder comments which may require further explanation, additional review or data analysis, or future study.”<sup>14</sup> These are: (1) migratory delay; (2) operational conditions; and (3) development of passage performance standards (effectiveness criteria) for up and downstream passage for alosines and eel. The LIHI application notes that:

*“Two meetings have been held with the agencies, on June 3, 2020 and September 9, 2020, to discuss the March 6, 2020 letter. For migratory delay, the above referenced studies were disseminated for residence times, compared to other eel and alosine studies conducted in New England, and found to be comparable or better. Study factors, such as the use of pre-spawn shad contributing to increased residence time, were also discussed. For operational conditions, the various improvements implemented to date, such as spill, were discussed with acknowledgement that any future improvements would be contingent upon passage performance standards. Regarding passage performance standards, a review of a model of shad restoration was conducted and for which restoration goals will need to be considered. At the September 9, 2020 meeting, it was agreed that another meeting should be convened after the fall passage studies (juvenile river herring passage route studies and turbine blade strike analyses at Orono/Stillwater/Milford) are completed and results compiled.”*

Based on this, it appears that BBHP has been diligently working to comply with FERC’s request to address these concerns.

No agency has confirmed that effective downstream passage for any species has been demonstrated to date, likely in large part because numerical performance standards do not exist, except for Atlantic salmon. In their comments, MDMR stated their intentions to develop such standards within the next five years. They also have concerns about the limited number of studies

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<sup>13</sup> See Appendix A Brookfield emails

<sup>14</sup> See Appendix B.

performed each year, although, as noted in their response letter, BBHP's position is that studies recommended at each annual fisheries meeting are being conducted. It is unclear how LIHI can help resolve these apparently conflicting viewpoints, although I am recommending that this topic be openly discussed between BBHP and the stakeholders, when they meet annually. From the information provided, it appears that BBHP has generally been responsive to agency requests.

MDMR also suggested that LIHI certification should be contingent upon BBHP's development of "a prudent timeline to complete the additional studies" identified in their comments. Their comments however do not appear to detail what those studies are, except for reference to potential future studies once numerical performance standards are developed, and their general concern about limitations caused limited numbers of studies performed each year.

### Atlantic Salmon

Performance standards for "effective passage" have been developed for Atlantic salmon which is a federally endangered species. Atlantic salmon numerical standards are contained in the Biological Opinion (BO) issued on August 31, 2012, and noted below, are to be measured during a three-year testing period. Specific action plans, included in the BO, have been established if these standards are not met each consecutive year, which are noted below.

*"The performance standard for downstream migrating smolts and kelts at the Stillwater Project is a minimum of 96% survival, based on a 75% confidence interval. That is, no fewer than 96% of downstream migrating smolts and kelts approaching the dam structure will survive passing the dam structure, which would include from 200 meters upstream of the trashracks and continuing downstream to a point where delayed effects of passage can be quantified. Fish that stop moving prior to reaching the most downstream telemetry array or take longer than 24 hours to pass the project will be considered to have failed in their passage attempt."*

In the event that the performance standard is not met, the following sequence of enhancements will be implemented sequentially each year:

1. Increase bypass flow up to the limit of the facility;
2. Increase spill to between 20% and 50% of river flow at station at night during the two week smolt out migration period; and
3. Two weeks of 100% spill of river flow at night (except for one unit, which will be operated at its lowest possible setting as required for powerhouse startup), followed by two weeks of spill of 25% of river flow during day and night.

Per follow-up communications with BBHP<sup>15</sup>, step #1 of this sequence of enhancements was skipped and step #3 not yet employed. Step #2 targeted flows were released 24 hours per day throughout the month of May in 2016, 2017 and 2018. These flows were implemented by dropping enough flashboards prior to the two-week smolt migration period to ensure that 20 – 50% of the river flow is spilled at the target headpond elevation. That headpond elevation is then maintained at the Project using both powerhouses.

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<sup>15</sup> See Appendix A



To date, as shown in the preceding table, the Atlantic Salmon standards have not yet been met for three consecutive years. However, BBHP noted in their application that recent discussions with NMFS indicate concerns with the statistical validity of the standard as currently written (i.e. consecutive years of study increase the likelihood of non-attainment) so they are working with the NMFS on the potential to reinstate consultation on this issue ahead of the 2023 deadline for take associated with performance standard achievement.

### American Eel

BBHP reported that using out-of-basin eels (from the St. Croix River), a radio telemetry study of downstream migrating adult silver eels was conducted at the Stillwater Project and other basin projects in 2016. Study results showed of the 52 silver eels released upstream of the Stillwater Dam, 51 were detected as approaching the dam. Of the eels that reached the Stillwater Dam, most passed downstream through the Stillwater A surface bypass (40.0%) or over the spillway (20.0%). At least 27 of the telemetered silver eels were in the vicinity of the Stillwater Plant A intakes, of which 22% passed through the turbines. One half of those silver eels died as a result of turbine passage. This study also demonstrated that silver eels use low level entrance bypasses, as well as surface bypasses at Stillwater. Combined passages rates of the low level and surface bypasses at Stillwater was 68.0%.

Only the USF&WS provided comments on the 2016 report. These findings resulted in the USF&WS recommendations to inspect the Stillwater Powerhouse A trash racks since so many eels passed through the 1-inch screening. According to the Applicant, this inspection was conducted in July 2017 and repairs to gaps found were made in September 2017<sup>16</sup>. The USF&WS also commented that passage delays are a concern at all Brookfield lower Penobscot River Projects. In response, BBHP pointed out that silver eel migration is triggered by flows and moon phases, and that eels tended to move downstream past the dams when flows increased, and as the moon was waning toward the new moon phase. This suggests that the observed delay may primarily have been a function of the presence or absence of environmental cues to trigger downstream movement. No additional downstream eel passage studies have since been requested by the resource agencies or FERC at the Stillwater Project.

Based on my review of the materials provided and comments received, I believe that the Stillwater Project continues to conditionally satisfy this criterion as BBHP appears to be conducting the passage studies requested by the agencies with the intent of meeting the license and WQC requirements to provide safe and timely downstream passage of the target species. Likewise, required consultation and passage condition improvement activities are being performed. However, I believe conditions should be satisfied to confirm criterion compliance, as described in Section IX. These include modification of former Conditions #2 and #3.

However, I do not believe that the Project is entitled at this time to receive extra years of certification. The LIHI PLUS standard states:

*"In addition to satisfying one or more of the standards above, the facility has deployed an*

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<sup>16</sup> See Appendix A Brookfield email. One of MDMR's comments to LIHI questioned whether or not this inspection was conducted and if repairs were made.

*advanced technology, the primary purpose of which is to increase downstream fish passage; or is part of a basin-scale redevelopment strategy; or is operating an adaptive management program to regularly evaluate the performance of new technology. The adaptive management program should include monitoring of the overall fish passage effectiveness and correction of deficiencies in effectiveness.”*

The downstream measures used at Stillwater are not an advanced or new technology. While the passage efforts at the Project, along with those at many of the other Penobscot River basin BBHP Projects are enhancing the basin fisheries, the requirements built into the license and WQC are the result of focused negotiations, resulting in the Settlement Agreement. That Agreement included a goal to restore self-sustaining populations of 11 native species of sea-run fish in the basin. However, another key piece of the negotiations was maintenance of approximately 90% of the current power production owned by BHHP in the river basin through enhancements such as the headpond level increase and construction of Powerhouse B at Stillwater, and similar changes at other BBHP hydropower facilities. It was also agreed that development of these new facilities would not be challenged by the signatories to the Agreement. Thus, I believe the downstream passage efforts can be viewed as a license requirement rather than voluntary adoption of a basin-scale redevelopment strategy only having fisheries restoration as its focus.

#### ***The Project Conditionally Passes Criterion D – Downstream Fish Passage and Protection***

### **E. SHORELINE AND WATERSHED PROTECTION**

**Goal:** The Facility has demonstrated that sufficient action has been taken to protect, mitigate and enhance the condition of soils, vegetation and ecosystem functions on shoreline and watershed lands associated with the facility.

#### **Assessment of Criterion Passage**

The Applicant has appropriately selected **Standard E-1, Not Applicable/De Minimis Effect** to pass the Shoreline and Watershed Protection criterion for all Project ZOE's.

There has been no change in the shoreline and watershed protection requirements for the Project since it was last certified by LIHI. No conservation buffer zone, watershed enhancement fund, or Shoreland Management Plan is required by the FERC License.

The current FERC Project boundary encloses the dam and powerhouses and follows the reservoir up to the full pond 94.65 ft NGVD elevation (see Figure 4), therefore, none of the islands are Project lands. There are no shoreline lands within the Project boundary save for a small parcel upstream of Powerhouse A (that includes the egress and the canoe portage trail) and a small parcel upstream of Powerhouse B (that provides vehicular access to the Project from Stillwater Avenue). Immediately adjacent to Stillwater Powerhouse A, the canoe portage ingress and a short section of trail are located on Project lands. Land controlled by BBHP is limited to those inside the Project boundary, estimated at 4.7 acres, and is mostly limited to those necessary for operation and maintenance of the Projects and for other Project purposes.

The discussion under the *Criterion F -Threatened and Endangered Species* denotes that a number of plant species classified by the State as “Species of Special Concern” are noted to be along the impoundment boundary and several state-listed animal species (all are bats) are possibly in the area. This includes the Northern Long-eared Bat which is also a federal endangered species. No critical habitats for these terrestrial species are identified at the Project. There is limited land available within the Project boundary, and much of it developed with Project facilities. As noted under the *Threatened and Endangered Species* criterion, as no changes in Project facilities or operation are planned, no impacts to any terrestrial species are expected.

Based on my review, I believe the Project continues to pass this criterion.

### ***The Project Passes Criterion E – Shoreline and Watershed Protection***

## **F. THREATENED AND ENDANGERED SPECIES PROTECTION**

**Goal:** The Facility does not negatively impact federal or state-listed species.

### **Assessment of Criterion Passage**

The applicant selected **Standard F-2 – Agency Recommendation, F-3 - Recovery Planning and Action** and the **PLUS** standard for all five ZOE. Standard F-3 was selected as there is Biological Opinion (BO) with specific requirements, as the Stillwater Branch as well as the Penobscot River, are mapped as critical habitat for the federally and state endangered Distinct Population Segments of Atlantic Salmon. A Recovery Plan exists for this species. This designation occurred in 2009. The Biological Opinion was issued August 31, 2012. While there are other protected species also potentially in these ZOEs that do not have Recovery Plans, selection of only one standard per ZOE is recommended by the LIHI Handbook, so only F-3 is recommended. The following discussion has been developed per category of species type and status as all potential effects would be relatively similar between ZOEs.

### **Federal Aquatic Species – Atlantic Salmon**

The FERC Order dated September 14, 2012 incorporated the previously required Atlantic salmon Species Protection Plan (SPP), Biological Opinion (BO), and Atlantic Salmon Passage Study Plan.

The Stillwater fish passage facilities are operated pursuant to the Biological Opinion, which includes a plan identifying iterative measures that BBHP is required to undertake should passage effectiveness studies indicate that the required performance standard for Atlantic salmon is not being met (96% survival within a 75% confidence interval with passage within 24 hours for downstream migrants). The Biological Opinion developed by NMFS found that the construction of new powerhouses and increases in headpond levels at Stillwater and Orono may adversely affect but are not likely to jeopardize the continued existence of Atlantic salmon. This opinion is based on the assumption that the downstream passage facilities at Stillwater will provide safe passage for the species, which are defined by numerical standard, as previously discussed under *Criterion D - Downstream Passage*. Proof of safe passage has not yet been confirmed as the noted numerical standards have not been met to date. As previously noted, consultation between NMFS

and BBHP about possible changes to the current effectiveness standards may be initiated prior to the 2023 deadline for take.

For Stillwater, the Biological Opinion includes an Incidental Take Statement (ITS). The ITS exempts the incidental taking of Atlantic salmon adults, smolts, and kelts from activities associated with the construction of the Powerhouse B, ongoing Project operations, and downstream passage and survival studies. BBHP has submitted the required reporting for incidental takes of GOM-DPS Atlantic salmon for 2016 through 2020. None were reported at Stillwater for this time period based on review of the ITS reports submitted.

#### Federal Terrestrial Species – Northern Long-Eared Bat

USF&WS records indicate that Northern long-eared bat may use the site and nearby areas. BBHP noted that routine project operations are not anticipated to affect this species, and committed that any periodic vegetation clearing activities would be conducted in accordance with the Section 4(d) rule for Northern long-eared bats using the USF&WS streamlined consultation process.

#### State Aquatic Species

Review done by MDIF&W, provided in the application, indicated that three state-threatened mussel species, the yellow lampmussel, tidewater mucket and brook floater have been documents in the vicinity of the Stillwater Project. BBHP reported that none of these were found in the impoundment during mussel relocation efforts undertaken as part of the construction of Powerhouse B. Normal Project operations would not likely impact these species. However, it is theoretically possible that significant lowering of the headpond could expose some mussels. For this review, I have assumed that should significant lowering of the impoundment be required that could impact mussels, BBHP would proactively consult with MDIF&W to conduct recommended impact minimization activities. The Atlantic salmon, also listed by the state as endangered, was discussed above.

#### State Terrestrial Fauna and Plant Species

The application noted the following state-listed animal species that likely occur in the Project area during migratory or breeding season:

- Little brown bat (State Endangered)
- Northern long-eared bat (State Endangered)
- Eastern small-footed bat (State Threatened)
- Big brown bat (Special Concern)
- Red bat (Special Concern)
- Hoary bat (Special Concern)
- Silver-haired bat (Special Concern)
- Tri-colored bat (Special Concern)

Given run-of-river operations and limited shoreline management activities at the Project, normal Project operation would not be expected to impact to these species. It is assumed that BBHP would



consult with MDIF&W if any significant construction activities are conducted at the site in the future. None are currently planned.

In a letter dated October 19, 2020, included in the application, the Maine Natural Areas Program (MNAP) identified several rare plant species, all classified as Species of Special Concern, in the Project area. Three of these are noted at the Stillwater Dam Ledges and four are noted at the Gilman Falls on the Stillwater Branch. One was historically found at the Stillwater Picnic ledges. These were also previously identified in 2010, and a requirement for the construction of Powerhouse B was development and implementation of a Sensitive Plant Protection Plan. A follow-up survey for these plants was conducted in 2017. The April 2018 report by Kleinschmidt noted that not all areas inspected in 2010, were re-inspected in 2017, due to safety concerns (Project ownership changed during this period) and some areas were just not accessible. The report states that the majority of the habitat remains intact and is of good quality. Some loss of species was identified due to habitat loss within the Powerhouse B driveway and parking lot area. The 2020 MNAP letter stated that provided there are no changes to current impoundment or river flows, MNAP has no concerns with the recertification for the Stillwater Project and the mapped botanical features along this stretch of the Stillwater River.

Based on this review, I believe that the Project continues to conditionally satisfy the requirements of this criterion. This is based on the ongoing efforts of BBHP to try to provide safe and effective downstream passage for Atlantic salmon and the unlikelihood of negative effects to other species as no changes to the Project are planned. BBHP applied for PLUS certification for this criterion, using their activities associated with the activities required by the BO and Species Protection Plan (SPP) developed to comply with the BO requirements. The BO, and subsequent SPP, were requirements pursuant to the Federal Endangered Species Act, and incorporated into the Project license. BBHP's position is that the BO and SPP are an "enforceable agreement with resource agencies" and as a result, is "to be a significant participant in a species recovery effort". It is true that the Settlement Agreement in its entirety has had a major role in restoration of the endangered Atlantic salmon and other migratory species in the Penobscot River basin. However, the Project has yet to fully comply with the passage standards established by the BO. Thus, I do not believe the Project has yet satisfied the PLUS requirements. A condition is recommended associated with this issue as noted in Section IX.

***The Project Conditionally Passes Criterion F – Threatened and Endangered Species Protection***

## **G. CULTURAL AND HISTORIC RESOURCE PROTECTION**

**Goal:** The Facility does not inappropriately impact cultural or historic resources that are associated with the Facility's lands and waters, including resources important to local indigenous populations, such as Native Americans.

### **Assessment of Criterion Passage**

The Applicant has selected **Standard G-1 – Not Applicable/De Minimis Effect** for all ZOE as past studies during powerhouse and fish passage construction in 2004 and 2005 did not find any

significant cultural resources. However, as license Article 412 requires a Programmatic Agreement established with FERC, Maine State Historic Preservation Office (SHPO), Penobscot Indian Nation (PIN), and the U.S. Department of the Interior Bureau of Indian Affairs (BIA), which in turn requires a Cultural Resource Management Plan (CRMP), I believe **Standard G-2 – Agency Recommendation** is more appropriate. K. Mahoney agreed with this change in a follow-up email.<sup>17</sup>

The application noted that the Programmatic Agreement was executed on August 8, 1997 and the CRMP was filed on May 27, 1999 and approved by FERC on November 29, 1999. The Programmatic Agreement also requires filing of an annual report by the Project license anniversary (April 20th) on activities conducted under the CRMP. It appears such filings have been made. BBHP has committed to take appropriate measures as defined in the CRMP should new properties be discovered at the Project during the term of its license.

Based on my review of the materials provided and obtained from FERC eLibrary, it appears that the Project continues to satisfy this criterion.

### *The Project Passes Criterion G – Cultural and Historic Resource Protection*

## **H. RECREATIONAL RESOURCES**

**Goal:** The facility accommodates recreation activities on lands and waters controlled by the facility and provides recreational access to its associated lands and waters without fee or charge.

### **Assessment of Criterion Passage**

The Applicant has selected with **Standard H-1, Not Applicable/De Minimis Effect** for the upstream reach (ZOE#1) and the bypass reach (ZOE#3) and **Standard H-2, Agency Recommendation** for the Project impoundment (ZOE #2) and both tailraces (ZOE #4 and #5).

Article 410 of the FERC license required the licensee to construct and maintain recreation facilities at the Project, but there is only a single canoe portage trail. Article 411 of the license requires recreation monitoring at the Project every 6 years specifically to ensure that recreational and cultural use needs of the Penobscot Indian Nation are being met. The Project-managed recreational feature is limited to a canoe portage starting at the impoundment take-out at the Stillwater Avenue Bridge, approximately 750 ft upstream of the dam and Powerhouse A, around the dam, following Free Street approximately 1,200 ft past the dam to a shoreline access to the Stillwater Branch at the terminus of Free Street. A parking area for about six vehicles is located at the dam. The application also noted other recreational features in the area but they are not the responsibility of BBHP. While the canoe portage is really only in ZOE #2 and #5, the tailrace area of Powerhouse B does have public access to the river across private land.

The last recreational monitoring report was filed on December 1, 2016. An inspection conducted by FERC on July 9, 2018 noted that Project recreational facilities and signage appear to be in

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<sup>17</sup> See Appendix A

compliance with no deficiencies noted. Based on my review, I believe that the Project continues to satisfy this criterion.

*The Project Passes Criterion H – Recreational Resources*

**IX. GENERAL CONCLUSIONS AND REVIEWER RECOMMENDATION**

Based on my review, I believe that this Project conditionally continues to meet the requirements of a Low Impact facility and recommend it be re-certified for a five-year period with the following conditions. Although PLUS standards were being sought under Criterion A – Ecological Flow Regimes, Criterion D – Downstream Passage and Criterion F - Endangered and Threatened Species, as described under those sections, I do not believe the requirements for extra years of certification have been met at this time.

Condition 1 – The Owner shall provide LIHI a copy of agency correspondence documenting numerical performance standards that the agencies may establish for upstream eel passage and/or downstream diadromous species for the Penobscot River basin that affect the Stillwater Project within 60 days of publication of the standards.

Condition 2 – If additional upstream fish passage studies are required at this Project, the plan and schedule for implementation, study results, and agency and PIN comments on them shall be provided to LIHI in applicable compliance statements. Should studies occur, LIHI reserves the right to modify this condition based on study results and assessment of the effectiveness of upstream passage.

Condition 3 – In annual compliance statements, the facility Owner shall notify LIHI of actions implemented, as agreed to by agencies and PIN, that address downstream passage concerns for alosines and American eel:

- a) At the conclusion of meetings held to address the three concerns identified in FERC’s March 6, 2020 letter, the facility Owner shall provide a summary of the final agreements. This shall include a copy of filing(s) made to FERC addressing these concerns, plans and schedules for implementation, results of studies, and agency and PIN comments on them. Should the Owner not agree to make all requested modifications, the rationale for these decisions shall be provided.
- b) Should studies or modifications occur, LIHI reserves the right to modify this condition based on study results and assessment of the effectiveness of downstream passage.

Condition 4 – In annual compliance statements, the facility Owner shall notify LIHI of actions implemented, as agreed to by agencies and PIN, that address Atlantic salmon downstream passage concerns:

- a) Any changes made in the current Atlantic salmon downstream passage performance standards established by the Biological Opinion or if formal consultation under the Endangered Species Act ahead of the 2023 deadline is needed. The status of actions undertaken as part of any formal consultation shall also be provided.

- b) If during the term of LIHI certification, the current or new performance standards cannot be met within the existing or any new timeframes established by NMFS, LIHI reserves the right to modify, suspend, or revoke the Certificate.
- c) If, prior to expiration of the LIHI Certificate, the facility Owner receives NMFS concurrence that current or revised numerical performance standards for downstream Atlantic salmon have been met, thus confirming safe and effective downstream passage, the facility Owner may request that LIHI consider possible certification extension pursuant to satisfying the PLUS requirements under the *Threatened and Endangered Species Criterion*.



**Appendix A**  
**Responses to Reviewer Inquiries**

From: PBMwork@maine.rr.com  
To: "julianne\_rosset@fws.gov" <julianne\_rosset@fws.gov>, "Dan.McCaw@penobscotnation.org" <Dan.McCaw@penobscotnation.org>, "Kevin.Dunham@maine.gov" <Kevin.Dunham@maine.gov>, "Jeff.Murphy@noaa.gov" <Jeff.Murphy@noaa.gov>, "Gail.Wippelhauser@maine.gov" <Gail.Wippelhauser@maine.gov>  
Cc:  
Bcc:  
Priority: Normal  
Date: Monday December 14 2020 11:41:06AM  
Seeking your your thoughts on Brookfield's Stillwater, Orono and Medway Projects

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Hi

I am the reviewer for the Low Impact Hydropower Institute (LIHI) for the recertification applications submitted by Brookfield Renewable / Black Bear Hydro Partners (BBHP) for the Stillwater, Orono and Medway Projects located on the Stillwater Branch or mainstem of the Penobscot River, Maine.

You should have received an invitation directly from LIHI to comment on these applications. That comment deadline is January 30, 2021.

I would be interested in hearing your opinion on whether or not you believe these projects should be re-certified again as low-impact. Would you characterize your working relationship as positive with BBHP? If you believe any of the projects should not be re-certified, I would like to know what issues raise concern to you' As noted below, in addition to these general questions, I also have some specific ones, for Orono and Stillwater, I would like your feedback on.

Finding a passage facility is safe and effective

BBHP stated in their application that the approach being used at this time to evaluate passage success is to conduct requested monitoring and then, based on stakeholder consultation, make the improvements recommended by you to enhance either up or downstream migratory passage. In your opinion, has BBHP been accommodating in making modifications to the various passage facilities or project operations that you have been suggesting?

I also understand that to date, specific numerical standards for determining "safe and effective" passage have not been developed, except for downstream passage of Atlantic salmon (and these standards have not yet been met.) From your perspective, will these be required for all other designated species? Can you tell me if there is a target date for establishment of these standards for the other target species?

Upstream passage at Orono

1) BBHP informed us that that no further upstream passage studies for Atlantic salmon beyond that conducted in 2014 and 2015 will be needed at Orono as "We were only required to conduct an upstream passage study to determine whether salmon that were attracted to the Orono bypass reach during times of spill or generation flows were delayed in making their way to the Milford facility and the 2015 study showed they were not." Do you agree that no further studies are needed as a result of the 2015 study findings?

2) At this time, can you comment on whether or not upstream passage performance standards for river herring and American shad will be likely be developed and testing required, or given the fact that fisheries restoration is focused on the Penobscot River mainstem rather than the Stillwater Branch, is it more likely that such standards will never be established?

3) Would you also agree that based on the 2016 upstream American eel passage studies, that no further studies for eels will be required, as reported to us by BBHP? (BBHP has noted to LIHI that additional upstream passage studies for eel however will like be required at Stillwater.) Or will possible future studies be requested if numerical standards for passage effectiveness are established?

Downstream Eel Passage at Stillwater and Orono

From your perspective, have sufficient studies been conducted to determine that downstream eel passage has been shown to be safe and effective at these sites or will numerical standards still be developed in the future and new studies required to make this determination?

All information and perspectives are important to my review and I sincerely appreciate any input you are willing to share with me. You can respond directly to me or incorporate the information in your formal response to LIHI. Alternatively, if you prefer to discuss your thoughts over the phone, I'd be happy to call if you provide me a date and time I should call you.

Thank you very much



From: "Dunham, Kevin" <Kevin.Dunham@maine.gov>  
To: "PBMwork@maine.rr.com" <PBMwork@maine.rr.com>  
Cc:  
Bcc:  
Priority: Normal  
Date: Friday December 18 2020 3:32:39PM  
RE: Seeking your your thoughts on Brookfield's Stillwater, Orono and Medway Projects

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Hi Pat,

As a fisheries biologist for Maine Inland Fisheries and Wildlife I have very little interaction with BBHP as Atlantic salmon, river herring, and other anadromous/catadromous species are managed by Maine Department of Marine Resources and various Federal agencies. What little interaction I have had with BBHP has been cordial and positive.

Kevin

**Kevin Dunham**  
**Fisheries Biologist**  
Maine Department of Inland Fisheries & Wildlife  
Fisheries Division – Penobscot Region  
16 Cobb Road  
Enfield, ME 04493  
Office: (207) 732-4131 Ext. 4003  
  
Cell: (207) 592-0693  
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**From:** PBMwork@maine.rr.com <PBMwork@maine.rr.com>  
**Sent:** Monday, December 14, 2020 11:41 AM  
**To:** Rosset, Julianne <julianne\_rosset@fws.gov>; Dan McCaw <dan.mccaw@penobscotnation.org>; Dunham, Kevin <Kevin.Dunham@maine.gov>; jeff.murphy <jeff.murphy@noaa.gov>; Wippelhauser, Gail <Gail.Wippelhauser@maine.gov>  
**Subject:** Seeking your your thoughts on Brookfield's Stillwater, Orono and Medway Projects

**EXTERNAL: This email originated from outside of the State of Maine Mail System. Do not click links or open attachments unless you recognize the sender and know the content is safe.**

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Thank you very much

Pat McIlvaine

From: "Maloney, Kelly" <Kelly.Maloney@brookfieldrenewable.com>  
To: "PBMwork@maine.rr.com" <PBMwork@maine.rr.com>  
Cc:  
Bcc:  
Priority: Normal  
Date: Tuesday December 8 2020 12:15:35PM  
RE: Fish Passage questions

Hi, Pat,

See responses below.

Thanks!

Kelly

**From:** PBMwork@maine.rr.com <PBMwork@maine.rr.com>  
**Sent:** Tuesday, December 08, 2020 12:06 PM  
**To:** Maloney, Kelly <Kelly.Maloney@brookfieldrenewable.com>  
**Subject:** RE: Fish Passage questions

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Hi Kelly

Thanks for the responses. As I don't like to "read" anything into a response that kind of remains silent on a specific question, can you respond to my follow-up questions noted in red below? I highlighted in blue your statements that raised my questions.

Thanks. These should be the last questions for Orono and Stillwater.

Pat  
-----

From: "Maloney, Kelly"  
To: "PBMwork@maine.rr.com", "mfischer@lowimpacthydro.org", Kevin"  
Cc:  
Sent: Monday December 7 2020 8:01:42AM  
Subject: RE: Fish Passage questions

Pat,

The short answer to all of this is that the agencies feel that testing of the downstream performance is more of a priority than upstream for the Penobscot River, and the Orono facility is not a true fish passage facility. I conferred internally with my team, including Kevin Bernier, cc'd who provided much of the information below.

Last fall and winter, we had consulted with the agencies regarding re-doing the upstream adult alewife study in 2020 at the Orono and Milford Projects due to the successful 2019 “proof of concept” evaluation, whereby a set of improved methodologies was developed that can be used for the assessment of adult river herring upstream passage effectiveness. As you indicate, these upstream river herring studies had been attempted at Orono and Milford in 2015, but they provided no meaningful results due to fallback of the study fish. However, we changed direction earlier this year as the result of the consultation meetings held last fall and winter, as the agencies indicated a preference for downstream juvenile alosine studies, so that is what we are doing this season. FERC has supported our approach to prioritized studies, in consultation with the agencies, so we are fully compliant with Article 411.

Below is a table explaining all of the incremental improvements made at the Orono fishway for alewife and the annual passage numbers.

Orono Trap and Truck - Measures implemented to increasing the number of river herring trucked upriver.				
	2015	2016 - 2018	2019	2020
Staffing and Equipment	2015 - 4 seasonal staff and one transport transport trailer with 700 gallon tank; max 600 fish per load	2016- 4 Season Staff and one transport trailer with 700 gallon tank; max 1,000 fish per load. 2 Seasonal leased vehicles to support Penobscot and Union River fish passage efforts.	Two seasonal fish passage technicians hold CDL license, therefore in addition to the trailer with the 700 gallon tank, we can also utelize the larger trailer with 1,000 gallon tank; max 1,500 fish per load. Will have ability to haul with two trucks 7 days per week rather than 5.	Obtained additional tank truck from the Saco dedicated to Orono during the peak of the alewife run.
		2017 & 2018- 1 additional seasonal staff, 1 additional leased truck and part time use of additional trailer (Ellsworth)		
Strategy		1. Improve efficiency (trap/count/sort/load) to maximize # fish trucked per day	Staff on site earlier in the morning and will stay later into the evening to increase number of loads	Same

		daily		
	Max 4 truckloads per day at 600 fish per truckload	2. Increase load capacity by 66% to 1,000 alewife per load (700ga x 1.5=1,000 per truck load)	Same	Same
		3. Utilize 2 trailer/tank from Ellsworth Monday - Friday	Haul 7 days per week	Add 1 tank truck from Saco
		4. Utilize 3 staff at Orono whenever possible.	2 CDL licensed drivers allowing for use of trailer with 1,000 gallon tank. 3 staff per day during peak of river herring run.	Same
		4. Utilize underwater camera and monitor to reduce frequency of too many fish in hopper	Same	Same
		5. Adjust attraction water to improve trap/sort/truck efficiency.	Same	Same
# herring trucked	19,016	2016 - 90,306; 2017 - 100,976; 2018 - 93,446	171,029	121,787

Yes, we will restart upstream fish passage effectiveness testing when determined to be the priority in consultation with the agencies. To be clear, there are no performance standards yet established for alewife and shad and our instruction from FERC is just to continue to consult with the agencies on such, which we continue to do. It's not clear what, if any, standards will be established. And it's unclear whether those standards would be applied to Orono anyway. The Orono facility was not constructed as a true fish passage facility. As stated in NMFS 2012 Biological Opinion, "The purpose of the fish trap is not to serve as a traditional fishway, but rather as an evacuation device that will remove fish that are attracted to the spillage in the Orono bypass reach."

As such, there is not a requirement to test the effectiveness of upstream passage for Atlantic salmon for Orono, technically and there is no upstream Atlantic salmon performance standard for Orono. We were only required to conduct an upstream fish passage study to determine whether salmon that were attracted to the Orono bypass reach during times of spill or generation flows were delayed in making their way to the Milford facility and the 2015 study showed that they are not. **Therefore, there will be no further upstream Atlantic salmon studies conducted for Orono. Please provide documentation from the fisheries agencies and PIN that they agree no further testing is required for salmon. If they have not issued any such specific statements, please say so.** Honestly, there is nothing to send you. There is no further testing because testing was never required in the first place at Orono.

**Orono upstream eel passage** – construction of a new upstream eel ladder was completed at the Orono Project in June 2016. Eels were then observed entering and exiting the eel ladder at high rates (nearly 100,000 estimated overall) during video monitoring and nighttime surveys conducted at the Project in 2016; in addition, lower numbers of eels were observed downstream of the dam during the nighttime surveys than in previous years. Due to the documented successful use of the new Orono eel ladder in 2016, **and the fact that the FERC-approved, "Revised American Eel Assessment and Monitoring Plan"** (dated February 17, 2015) **called for a one year study in 2016** (with consultation regarding "whether additional monitoring in 2017 is necessary"), Black Bear proposed to operate and maintain the Orono eel ladder in 2017 and in future years as designed and tested; however, Black Bear did not propose additional upstream eel studies or monitoring at the Orono Project. **Although the USFWS commented that "replication of the Orono results would be valuable", there were no objections to discontinuing upstream eel monitoring at the Orono Project. Please provide documentation from the fisheries agencies and PIN that they agree that no further testing is required. LIH's focus is on resource agency concurrence, not FERC's. Can you provide any insight as to why the agencies believe more testing is needed at Stillwater and not Orono? (see blue highlighted sentence below). Also, since you did not identify additional eel ladder modifications, can I assume that none were made since it was installed in 2016?** The agency comments on the upstream eel passage study at Orono should provide the concurrence that you seek and you are correct, the Orono study showed that the ladder was successful as designed so no modifications were made and we are simply operating it now. The agencies will likely want a future eel passage study at Stillwater because of the relocated minimum flow.

**Stillwater upstream eel passage** – construction of a new upstream eel ladder was completed at the Stillwater Project in December 2015. Video monitoring and nighttime surveys in 2016 showed that eels were successfully passing upstream over Stillwater Dam, but they were not utilizing the new upstream eel ladder. As a result of the 2016 monitoring, modifications (extension of bristle-brush climbing substrate; water flow adjustment to remove a velocity barrier; reduction of competing flows through the flashboards) were made for the 2017 passage season, and the video monitoring and nighttime surveys were repeated. The 2017 video monitoring showed that the modifications improved eel passage (as an estimated 11,500 eels passed through the new upstream eel ladder in 2017, compared to none in 2016); in addition, many other eels were observed during the nighttime surveys ascending the ledges and spillway and successfully passing into the headpond at multiple locations across the dam. Due to the upstream eel passage success observed under the conditions tested in 2017, Black Bear (after consultation with the resource agencies) submitted applications to the Maine DEP and to FERC in 2019 to respectively modify the Stillwater Project's Water Quality Certification and amend the Project's FERC license in order to permanently implement these 2017 test conditions (which include releasing the Project's 70 cfs minimum flow to the east bypass channel in order to eliminate false attraction of eels to the west bypass channel). The Maine DEP approved this WQC modification on October 28, 2020, and FERC amended the license on June 8, 2020.

As indicated in the 2018 upstream eel passage report (submitted to FERC on March 22, 2019), **USFWS and MDMR (with concurrence from MDEP and PIN) have noted that effectiveness testing should ideally be performed to close the loop on upstream eel passage at the Stillwater Project.** However, due to unresolved difficulties at the site with performing a "standard" effectiveness test (e.g., by confining test groups of eels in a tank at the fishway entrance near dusk, and then capturing the migrant eels that pass upstream), this testing has not been conducted. The issue has been discussed annually with the resource agencies (most recently during a March 3, 2020 consultation meeting), but the site complications remain an obstacle, and other studies have been prioritized (especially with the agency focus on downstream passage). Black Bear will continue annual consultation with the agencies to determine if a satisfactory and feasible means exists for accomplishing this effectiveness testing of the Stillwater upstream eel passage.

**Orono downstream eel passage** – using out of basin eels (from the St. Croix River), a radio telemetry study of downstream-migrating adult silver eels was conducted at the Orono Project in 2016. The study results showed that 44 of 45 eels (98% survival) successfully passed the Project, with the lone mortality being the one eel that passed though the turbines (at Station B). The low incidence of turbine passage is likely due to the one-inch trashracks installed at the Project when the site was redeveloped in 2013 – 2014; these trashracks were designed to physically exclude larger fish from entering the turbines, including adult eels. The USFWS provided the only comments on the 2016 study report, with their only Orono-related comment being that passage delays are a concern at all stations. In response, Black Bear pointed out that silver eel migration is triggered by flows and moon phases, and that eels tended to move downstream past the dams when flows increased, and as the moon was waning toward the new moon phase. This suggests that the observed delay may primarily have been a function of the presence of environmental cues to trigger downstream movement. **No additional downstream eel passage studies have been requested by the resource agencies or FERC at the Orono Project. Is it safe for me to conclude that they have not yet gone "on record" saying that such downstream passage is "safe and effective"? As you did not provide any summary of passage facility improvements, can I assume none were made because none were recommended by the agencies?** Again, I would refer to agency comments on the study reports but if 98% isn't "safe and effective" I don't know what is. You are correct, with 98% effectiveness, no additional modifications or operational adjustments have been made.

**Stillwater downstream eel passage** - using out of basin eels (from the St. Croix River), a radio telemetry study of downstream-migrating adult silver eels was conducted at the Stillwater Project in 2016. The study results showed that 47 of 51 eels (92% survival) successfully passed the Project, with three of four mortalities being eels that passed though the Station A turbines and one from an eel that never passed the Project. The USFWS provided the only comments on the 2016 study report, and recommended that Black Bear inspect the Stillwater Plant A intake racks for gaps or bent trashracks that may have allowed large eels to gain entrance to the turbines; the USFWS also commented that passage delays are a concern at all stations. A dive inspection by Black Bear in late July 2017 confirmed that several small gaps existed in the Stillwater A trashracks, and these gaps were then repaired by divers in September 2017. Black Bear pointed out that silver eel migration is triggered by flows and moon phases, and that eels tended to move downstream past the dams when flows increased, and as the moon was waning toward the new moon phase. This suggests that the observed delay may primarily have been a function of the presence of environmental cues to trigger downstream movement. **No additional downstream eel passage studies have been requested by the resource agencies or FERC at the Stillwater Project. As above, have they gone on record saying the passage is "safe and effective" yet? So improvements were only made in 2017, is that correct?** Again, 92% is highly effective but I don't know that the agencies have gone on record and would only refer to comments on the reports. Correct on improvements though it is important to note that we do inspect the fishways annually and made modifications/improvements as necessary to ensure they are working properly.

Please let me know if you have additional questions.



Thank you,

Kelly Maloney

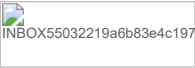
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**From:** PBMwork@maine.rr.com <PBMwork@maine.rr.com>  
**Sent:** Thursday, December 03, 2020 11:33 AM  
**To:** Maloney, Kelly <Kelly.Maloney@brookfieldrenewable.com>; 'mfischer@lowimpacthydro.org' <mfischer@lowimpacthydro.org>  
**Subject:** Fish Passage questions

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Hi Kelly

I need some additional information on fish passage, mostly but not all associated with upstream passage issues.

The biggest gap I am finding is documentation of compliance with the requirements of effectiveness testing at the Orono fish lift as required by Article 411 of the 2012 license amendment. Article 411 appears to require "passage effectiveness testing for the passage facilities required by Article 409, with target species to include American shad, alewife, blueback herring, and American eel. at the project". My Stage I report for Orono requested that you include a "discussion which includes a list of studies conducted, a brief summary of the results and documentation of agency support of any agreements that monitoring or effectiveness testing can be stopped". This request was also made for downstream passage, and that information was provided, but was not for upstream passage.

Upstream passage of alewife, herring and shad - Orono

The only discussion the updated application includes about alewife, herring and shad upstream passage testing is the sentence that reads: "Only one upstream passage study, for adult alewife, has been attempted at the Orono Project, and it was unsuccessful due to fallback...." (The application does not say when this testing was done.) Additional discussion of why such testing was not again conducted must be provided. With respect to all anadromous species, it appears that lift fish counts, followed by implementation of modifications suggested by the stakeholders following each year's count, has been substituted for traditional effectiveness testing methods. Thus, please provide a discussion that shows the results of each year's count and the yearly improvements made to enhance passage. It appears this approach has been acceptable do far to the fishery agencies and PIN but it seems that is changing given your recent discussions on developing numerical standards for all species. Will radio-telemetry testing be restarted at some point in the future, perhaps once the upstream performance standards are established? What will be the trigger that re-initiates its implementation?

Upstream passage of Atlantic salmon - Orono

Please describe what upstream passage studies have been done for Atlantic salmon....nothing is mentioned in the application yet a letter from FERC dated Dec 13, 2016 states that "the 2015 was the second year of adult salmon passage studies, and that BBHP proposed to reinstitute such studies at Orono in 2017." So your list is needed. If changes were made to the lift in response to testing...please describe them. This data for salmon can be incorporated into the discussions noted above provided it is clear what species is being discussed.

Upstream passage of eel - Orono and Stillwater

The application states upstream eel passage studies were only done in 2017 and 2019 but its not clear from your write-up on page 99 whether these studies were done at Orono, Stillwater or both,,,so please clarify. Also, please provide the agency (fishery and PIN) agreement that no further studies are needed (and at which sites) ....unless more studies are just on the back burner? What do you understand will be needed by the fishery agencies and PIN to declare that upstream eel passage is safe and effective? Also, please identify for each year, what improvements were made based on the most recent previous passage studies. For example, provide statements such as "based on he 2015 studies the following improvements (list them) were made in \_\_\_\_\_ Noting these enhancements is important to demonstrate the value of the adaptive program you are implementing at this time.

Downstream Passage - Orono and Stillwater

Please summarize the changes (by year) implemented in response to downstream eel testing conducted between 2015 and 2019 in the same fashion as noted above for upstream eel passage at both sites.

Thanks again

Pat

From: "Bernier, Kevin" <Kevin.Bernier@brookfieldrenewable.com>  
To: "Maloney, Kelly" <Kelly.Maloney@brookfieldrenewable.com>, "PBMwork@maine.rr.com" <PBMwork@maine.rr.com>  
Cc:  
Bcc:  
Priority: Normal  
Date: Tuesday December 15 2020 4:38:03AM  
RE: A few more Orono questions

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Pat – just to clarify #2 regarding the tallies of river herring at the Orono fish lift, 163,126 would be the “official” number reported to MDMR at season’s end and after the data are checked and verified. The tallies in the weekly reports are “unofficial” and are not yet double-checked by the fish passage staff (i.e., they go through the daily data sheets at season’s end and corroborate the tallies before they are provided to MDMR).

**Kevin Bernier**  
  
Senior Compliance Specialist

**Brookfield Renewable**  
  
C 207 951 5006

---

**From:** Maloney, Kelly  
**Sent:** Monday, December 14, 2020 3:46 PM  
**To:** PBMwork@maine.rr.com  
**Cc:** Bernier, Kevin <Kevin.Bernier@brookfieldrenewable.com>  
**Subject:** RE: A few more Orono questions

Pat,

Good afternoon. Please find the responses to your questions below.

Much obliged!

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

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**From:** PBMwork@maine.rr.com <PBMwork@maine.rr.com>  
**Sent:** Monday, December 14, 2020 11:39 AM  
**To:** Maloney, Kelly <Kelly.Maloney@brookfieldrenewable.com>  
**Subject:** A few more Orono questions

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Hi Kelly

- 1) Just to make sure I'm not missing something,... am I correct in saying there were no downstream passage studies for Orono in 2019 for any species? (None were mentioned in the application or annual compliance filings.) Was there any particular reason for this? **That is correct. As discussed elsewhere, Brookfield has taken a prioritized approach to fish passage studies wherein we annually consult with the agencies to determine which species, lifestages and direction they would like Brookfield to prioritize for the upcoming fish passage season. In 2019, upstream passage studies for adult river herring were conducted for the Milford Project following agency consultation. In 2020, downstream passage studies at the Milford, Stillwater and Orono projects were conducted for juvenile alosine, including a desktop analysis of entrainment, in consultation with the agencies.**
- 2) When I looked at the 2019 study (which seems to address only Milford upstream work) I noticed that the # river herring reported in 2019 at the Orono lift as 163,126 yet your email to me stated 171,029. So which is the correct number? (I just like my report to be as accurate as possible.) **According to the weekly fish passage reports provided to the agencies, 171,029 alewife were caught at the trap and 165,078 were transported upstream while 5,951 were released downstream.**
- 3) Could you summarize any changes (operational, passage changes, etc.) made at Orono to enhance downstream passage of anadromous species between 2015 and 2020 if there were any other than the flow increases in 2016, 2017 and 2018 to address the requirements of the Biological Opinion for salmon? **As indicated in the March 27, 2017 SPP report to FERC (included in Section 6.0 of the application), operation of Station A is now prioritized over Station B to increase Atlantic salmon smolt survival. In addition, following the fish mortality incident in 2018, Brookfield revised its flashboard maintenance procedure such that water is passed over the spillway throughout the work (to ensure that the bypass area is not dewatered).**

Thanks

Pat

## **Appendix B**

**FERC Letter of March 6, 2020**



**FEDERAL ENERGY REGULATORY COMMISSION**  
**Washington, D. C. 20426**

**OFFICE OF ENERGY PROJECTS**

Project No. 2712-086--Maine  
Stillwater Hydroelectric Project

Project No. 2710-070--Maine  
Orono Hydroelectric Project  
Black Bear Hydro Partners, LLC; Black  
Bear SO, LLC; and Black Bear  
Development Holdings, LLC

Project No. 2534-100--Maine  
Milford Hydroelectric Project  
Black Bear Hydro Partners, LLC

March 6, 2020

VIA FERC Service

Kelly Maloney  
License Compliance Manager  
Black Bear Hydro Partners, LLC  
150 Main Street  
Lewiston, ME 04240

Subject: Discussion of ongoing Quantitative Diadromous Fish Passage Studies

Dear Ms. Maloney:

This letter is in regard to your February 12, 2019 and January 13, 2020 filings describing your completed and continuing quantitative evaluations of the fish passage facilities at your Penobscot River Projects, conducted pursuant to Article 409 for the Milford Project (No. 2534),<sup>1</sup> Article 408 for the Stillwater Project (No. 2712),<sup>2</sup> and

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<sup>1</sup> Order Approving Fish Passage Design Drawings Under Articles 407 and 408 (141 FERC ¶62,025), issued October 9, 2012.

<sup>2</sup> Order Amending License and Revising Annual Charges (140 FERC ¶62,195), issued September 14, 2012.

Article 411 for the Orono Project (No. 2710)<sup>3</sup> (collectively, 2012 Orders). This letter acknowledges your recent efforts to comply with the requirements of the 2012 Orders by summarizing some of the findings of your diadromous fish studies conducted since 2014 and actions you have taken at your projects to improve passage. We also take this opportunity to highlight issues frequently raised by the project stakeholders.<sup>4</sup> To ensure your continued compliance with the 2012 Orders, we propose future topics of investigation or discussion in response to the frequently noted stakeholder concerns which must be addressed in future plans and reports, as outlined below.

### **Background and Requirements**

Pursuant to the above-referenced 2012 Orders and subsequent Federal Energy Regulatory Commission (Commission) orders approving your diadromous fish passage study plans,<sup>5,6,7</sup> you have planned and conducted qualitative and quantitative fish passage studies to monitor and evaluate the effectiveness of the fish passage facilities for three alosine species (alewife and blueback herring, collectively referred to as river herring, and American shad) and American eel. The three projects provide upstream eel passage via eel ladders, and provide downstream alosine and eel passage via surface and low-level bypasses. Upstream alosine passage is provided at the Orono (fish lift with trap and transport) and Milford (fish lift and Denil ladder) projects. The results of these monitoring studies would provide a basis for recommending modifications to project structures or operations, including alternative flow releases, to protect fish resources.

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<sup>3</sup> Order Amending License and Revising Annual Charges (140 FERC ¶ 62,194), issued September 14, 2012.

<sup>4</sup> Stakeholders include representatives from the U.S. Fish and Wildlife Service, National Marine Fisheries Service, the Penobscot Indian Nation, Maine Department of Inland Fisheries and Wildlife, and Maine Department of Marine Resources.

<sup>5</sup> Order Modifying and Approving, in Part, Diadromous Fish Passage Study Plan (146 FERC ¶ 62,118), issued February 11, 2014.

<sup>6</sup> Order Approving and Modifying Quantitative Diadromous Fish Passage Study Plan (150 FERC ¶ 62,111), issued February 25, 2015.

<sup>7</sup> Order Modifying and Approving Quantitative American Eel Downstream Passage Study Plan (156 FERC ¶ 62,089), issued July 29, 2016.

**Completed Diadromous Fish Passage Studies, 2014-2019**

You have completed qualitative and quantitative studies at the Milford, Stillwater, and Orono projects, as summarized in the table below. You also collaborate with the Maine Department of Marine Resources (Maine DMR) to collect annual upstream fish passage counts at the Milford and Orono fish lifts.

<b>Year</b>	<b>Study &amp; Species</b>	<b>Site/Project</b>
2014	Upstream eel passage siting survey	Stillwater & Orono
	Upstream eel counts	Milford
	Adult eel presence	Stillwater Branch & Penobscot River
	Downstream fish passage video	Orono & Milford Milford, Orono, & Stillwater
2015	Upstream and downstream adult river herring telemetry	Milford, Orono, & Stillwater
	Downstream adult eel video	Stillwater
	Upstream fish lift video	Milford & Orono
	Pilot juvenile alosine tagging study	
2016	Downstream adult eel telemetry	Milford, Orono, & Stillwater
2017	Downstream adult shad telemetry	Milford, Orono, Stillwater
2018	Downstream adult shad telemetry	Milford
	Downstream adult river herring telemetry	Milford, Orono, Stillwater
2019	Upstream adult river herring	Milford

Since the start of studies, you have consulted with the stakeholders in development of the study plans and preparation of the reports. As summarized here and in previous letters, you have enacted modifications at the fish passage facilities, repeated studies in order to determine the effectiveness of modifications (e.g., the shad study at Milford in 2018), refined study techniques, and collected information about environmental and operational data during fish passage.

As a result of your studies and stakeholder consultations, you have enacted changes at the passage facilities, including: increasing the truck and transfer effort at the Orono fishlift to reduce overcrowding; installing backwatering bulkheads at the Milford fishlift to alleviate the entrained air issue that was contributing to passage delays; repairing gaps in the trashracks at the Stillwater A plant to prevent eel entrainment; inspecting the Bay 7 downstream passage at Milford to determine if there is an issue that may be affecting survival; and installing entrance weirs in the outer trashracks at the Milford Dam to improve downstream fish passage.

Your results have also contributed to discussions with the stakeholders about project operation and maintenance during the passage season. For example, you clarified the prioritization of passing inflows at the Milford Project during periods of ISO New England generation curtailment, stating that you prioritize use of the sluice gate (for passage of spill flows up to 2,000 cfs), as it provides a relatively safe downstream passage compared to the other spill routes (i.e., the Obermeyer gate and flashboard gates), and does not contribute to false attraction flows or lead to potential stranding.<sup>8</sup> In your 2019 report, the stakeholders noted that fish were present at the fish lift in the early morning and you state that you consider initiating lift sequences earlier in the morning if there is interest from the resource agencies to do so.

You have also used stakeholder comments in the development of studies by identifying data gaps and determining study methods. For example, in consultation for the 2019 study year, you and the stakeholders identified evaluation of upstream passage of adult alosines and downstream passage of juvenile alosines as two existing data gaps, and you worked with the stakeholders to identify the study design modifications being proposed for 2019, as well as to identify a source for fish to use in the juvenile study.

## **Discussion**

As described above, we recognize the efforts you have made to improve passage or correct issues at the facilities based on the results of the monitoring studies. Based on our review of data collected at the projects, we have identified some frequent issues that arise in the stakeholder comments which may require further explanation, additional review or data analysis, or future study. These are: (1) migratory delay; (2) operational conditions; and (3) development of passage performance standards (effectiveness criteria). Due to the common themes in these comments and because they frequently arise, we conclude that they require further action to maintain compliance with your project license and to benefit fishery resources at the project.

### **Migratory delay**

Based on your studies of downstream eel passage (as contained in your 2016 report, filed April 13, 2017), the U.S. Fish and Wildlife Service (FWS) expressed concern for migratory delay occurring at the three projects, as some eels took too long to find a successful downstream route. You responded that eels tended to move downstream

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<sup>8</sup> The 2017 report did not describe route-specific survival estimates at Milford, but good survival is inferred from the results, which reported that all tagged adult shad passing via spill were detected at each of the 3 downstream stations; the 2018 report describes 90 percent survival for tagged adult shad passing through spill routes.

following increased river flow and precipitation, and that the delay may be a function of the absence of environmental cues to move downstream.

In your studies of downstream migrating shad (your 2017 report, filed April 12, 2018 and 2018 report, filed February 12, 2019), you noted the complexity of shad movements and the difficulty in being able to differentiate active searching for downstream passage routes at the dams from the intervening periods of time shad might spend upstream (which may be related to spawning or may be searching for a downstream route). The National Marine Fisheries Service (NMFS) questioned what an appropriate residence time for shad might be, and suggested that the timeliness of passage needed improvement. FWS and Penobscot Indian Nation (PIN) noted that at Milford, many shad were milling around in the forebay, unable or unwilling to use the downstream bypass, and were delayed until the waste gate was fully open. Though survival was better at Stillwater and Orono than at Milford, shad still experienced delay at those projects. Based on the results of the 2017 study and the comments received from the stakeholders, you made changes to the Milford bypass and repeated the downstream shad study at Milford in 2018. The 2018 studies again demonstrated that the downstream migration of shad was not always continuous and may include forays upstream following their initial arrival at the dams. The median upstream residence time for adult shad was overall lower in 2018 than in 2017, particularly at the Stillwater Project, which was attributed to the study method differences (location of release) and potential differences in the spawning condition of the shad (still spawning or completed spawning).

In your 2019 study of upstream migrating adult river herring at the Milford Project (filed January 13, 2020) you concluded that the internal lift efficiency was low compared to the near field attraction effectiveness of the lift and the lift entrance efficiency, despite the majority of fish passing upstream within 48 hours or less from arrival at the project. PIN noted that the 2019 study has similar findings to your previously completed Atlantic salmon studies conducted under separate license requirements. The salmon studies indicated high attraction efficiency at the Milford fish lift but low internal lift efficiency, with upstream passage delayed by fish making multiple forays in and out of the lift before completing successful passage. PIN recommended, and NMFS agreed, that you should employ an array of cameras or sonar devices at multiple points in the Milford fish lift to identify potential bottlenecks to passage and areas where the fish are prone to reject the fishway.

We recognize that you have taken steps to minimize delay by making structural changes when your results indicate problems with the timeliness of passage, however there may be the potential to enact other operational changes to minimize any delay. Maine Department of Marine Resources (Maine DMR) suggested that you decide a maximum residence time (i.e., 1 hour, 6 hours, 12 hours, 24 hours) before you implement additional measures to provide passage. Your 2017 and 2018 daily fishway observations



describe schools of alosines milling in the impoundments, and PIN's comments on the 2019 report indicate river herring were observed swimming in and out of the Milford fishlift. However, decisions are made to enact a corrective action in response to these observations are not always clear; for example, at Stillwater station A, operators removed a grizzly bar at the downstream fishway on July 10, 2017 to see whether it would encourage shad to pass, but you don't report whether there was a threshold for numbers of fish or other triggers informing that action.

Based on your completed telemetry studies, recorded observations of fish behavior, and project-specific information, you may already have the data available to inform reasonable operational and/or structural modifications to ensure timely up- and downstream passage at the projects. Therefore, you should continue to consult with the stakeholders to determine whether there are potential project or environmental factors that may be contributing to migratory delay, and what additional structural or operational modifications must be enacted to minimize delay.

#### Operational conditions

Pursuant to the requirements for each project, the results of your diadromous monitoring studies provide a basis for recommending structural or operational changes at the project. As we noted above, you have used the results of the fish studies to make structural changes to the facilities (such as installing widows at Milford bypass or repairing gaps in the racks at Stillwater). However, it is unclear whether you plan to make intentional operational changes to facilitate passage. This may include, but isn't limited to: turbine prioritization, lift frequency, flow augmentation, changes to how flow is released, and/or cessation of generation.

Based on the stakeholder comments over the years of studies, there is interest in understanding how project operations may affect passage. In its review of your 2017 study plan, Maine DMR suggested that you document operational changes (e.g. timing and duration of opening gates, lowering the Obermeyer dam, spill conditions and locations of spill, etc.) in order to evaluate its effect on passage. You provide this information as tables in your reports, and describe the project conditions during the studies as "baseline" (units operating and bypass open). We note that some of the operational conditions described in your reports appear to be related to precipitation and flow conditions or ISO curtailments beyond your control. You report the environmental and operational conditions during each passage study; therefore you have documented passage under different conditions. Specifically, your 2017 report indicates peaks of passage coinciding with sluice gate operation at Milford, and your 2018 and 2019 reports provide information about passage when flashboards are down (Milford in 2019) and when they are installed and intact (Orono in 2018).

Your recent reports under the Atlantic Salmon Species Protection Plan<sup>9</sup> describe how you manipulate specific spill conditions, prioritize stations, or pass inflows in order to improve passage conditions for Atlantic salmon smolts, indicating that you should be able to develop similar conditions or evaluations for alosines and eels. As the diadromous fish passage study results are expected to inform recommendations for structural or operational changes at the projects, you should review your years of passage data and operations information and consult with the stakeholders to determine whether you have sufficient evidence to refine operational conditions to improve passage. Alternatively, it may be necessary to develop additional studies to specifically evaluate passage under different operational conditions.

### Performance standards

The 2012 orders stated that monitoring and evaluation of the passage facilities over time would help ensure that the facilities are effective and would minimize fisheries-related impacts caused by the project. The orders also required you to determine, in consultation with the stakeholders, what actions are necessary to remedy the fisheries impacts if the studies identify that these facilities are not effective. PIN commented on your 2017 Plan (filed May 15, 2017) that it needed a description of how effectiveness would be quantified, and whether evaluation criteria for determining if passage is adequate in accordance with the 2012 Orders and respective fish passage articles. In our letter responding to the 2017 Plan (issued October 4, 2017), we concluded that your current approach to the effectiveness studies has been accepted by the stakeholders and approved by the Commission, and in the absence of specific performance criteria, this process over the life of the licenses is expected to ensure that the facilities provide safe and effective passage for diadromous species at the projects.

Subsequently, in their comments on your 2018 Plan (filed March 16, 2018), PIN and NMFS expressed an interest in development of up- and downstream passage performance standards for alosines, which would help identify the levels of passage necessary to achieve restoration, management, and cultural goals in the watershed, and referred to a recently developed passage performance model for the Penobscot River<sup>10</sup> which warranted further discussion. You stated you would continue to consult with the stakeholders on the parameters that are needed to satisfactorily demonstrate safe, timely,

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<sup>9</sup> Order Modifying and Approving Revised Species Protection Plan and Revised Atlantic Salmon Passage Study Plan (146 FERC ¶ 62,224), issued March 27, 2014.

<sup>10</sup> Stich, D.S., T.F. Sheehan, and J.D. Zydlewski. 2019. A dam performance standard model for American shad. Canadian Journal of Fisheries and Aquatic Sciences 76: 762-779.

and effective passage at the facilities, but that alosines and eels are not listed under the Endangered Species Act the way Atlantic salmon are, and therefore passage criteria should not be strictly established or enforced. To date, neither you nor the stakeholders have proposed effectiveness criteria.

In your 2019 report, you referenced the dam passage performance standard model for the Penobscot River in describing your river herring passage results, where approximately 58 percent of the river herring passed upstream within 24 hours and 79 percent within 48 hours of arrival at the Milford Project. Specifically, you noted that the model estimates the effects of dam passage and migratory delay on management goals for shad (i.e., abundance, spatial distribution of spawning adults, and proportion of repeat spawners in space and time), and highlighted a finding in the model that upstream passage efficiencies of 0.60 or greater with passage occurring within 48 hours are needed in order to meet interim recovery targets for shad.

Though the model provides a tool to relate proposed performance standards directly to management objectives, your 2019 report does not indicate whether you will pursue use of this model to establish effectiveness criteria, and the stakeholders don't provide specific comments. You should therefore reconvene with the stakeholders on the matter now that the model is published to discuss the potential for passage criteria. You should also consider a re-examination of your completed radio telemetry studies with adult alosines (conducted 2017-2019) as the model may inform the understanding of those results with regard to management objectives, and/or determining what additional information is needed.

## **Conclusion**

In conducting diadromous fish studies between 2015 to 2019, you have collected information about downstream migrating adult shad, river herring, and eels, and upstream migrating river herring at the projects. Pursuant to the fish passage articles for each project, you are required to consult with the stakeholders if the results of the monitoring indicate that changes in project structures or operations, including alternative flow releases, are necessary to protect fish resources. Based on review of your completed quantitative studies at the projects, we acknowledge that you have made modifications to facility structures based on the results of the studies to improve passage conditions as required by the respective fish passage effectiveness articles for each project. However, as detailed above, we have identified three recurring requests in the stakeholder comments which require additional analysis or consultation: (1) migratory delay, (2) operational conditions, and (3) performance standards.

Your 2019 report indicates that you intend to continue qualitative alosine evaluations at the projects in fall of 2020. Your 2020 Diadromous Fish Passage Study

Plans are due for Commission review by April 15, 2020. Given this timeframe, we understand that you may not be able to fully address the above issues in the 2020 study proposal. However, to the extent you can modify your study plans at this late time, to incorporate a stakeholder proposal, that would be advisable. Further, because you hold regularly scheduled monthly fish passage meetings with the stakeholders, and based on the history of completed studies at the projects and the proposed 2020 study, you are in a position to adaptively manage or change the plans to improve overall effectiveness. Any changes would be made after discussion with the stakeholders concerning migratory delay, operational conditions, and performance standards.

In order to provide us sufficient time next year to review the results of this year's study results and make any necessary changes in your 2021 Study Plans, please file your Diadromous Fish Passage Study report for our review by January 15, 2021. Please file your report along with any consultation letters or email regarding these issues, and describe your next steps toward a resolution of the three concerns identified by the stakeholders.

Thank you for providing your diadromous fish reports and study plans. We look forward to receiving your 2020 diadromous fish study plans by April 15, 2020. If you have any questions pertaining to this letter, please contact me at [holly.frank@ferc.gov](mailto:holly.frank@ferc.gov) or (202) 502-6833.

Sincerely,

Thomas J. LoVullo  
Chief, Aquatic Resources Branch  
Division of Hydropower Administration  
and Compliance

cc: VIA Electronic Mail

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