APPLICATION REVIEW FOR RECERTIFICATION BY THE LOW IMPACT HYDROPOWER INSTITUTE OF THE

ORONO HYDROELECTRIC PROJECT NO. 2710

January 31, 2017

Application Reviewer: Patricia McIlvaine

REVIEW OF APPLICATION FOR RECERTIFICATION BY THE LOW IMPACT HYDROPOWER INSTITUTE OF THE ORONO HYDROELECTRIC PROJECT

Prepared by:
Patricia McIlvaine
January 31, 2017

I. INTRODUCTION AND OVERVIEW

This report reviews the application submitted on December 4, 2015 by Black Bear Hydro Partners (BBHP or Applicant), an indirect subsidiary of Brookfield Renewable Energy Group (Brookfield), to the Low Impact Hydropower Institute (LIHI) for re-certification for the Orono Hydroelectric Project. An Intake Review was completed on July 8, 2016, and an updated application submitted in November 2016. Additional data was provided in January 2017, in response to subsequent inquiries from the application Reviewer. See Section II for further discussion.

The original Orono Project, which only had one powerhouse, was certified by LIHI as Project #66 from June 1, 2010 to June 1, 2015. The original certification report can be found here:

http://lowimpacthydro.org/wp-content/uploads/2011/01/Orono-Reviewer-Report.pdf

The Orono was originally licensed to Bangor Hydro Electric Company in 1997. Ownership of the facility changed in 2000 to Penobscot Hydro LLC, which later became PPL Maine, LLC, and was subsequently purchased by BBHP with the license transfer on September 17, 2009. Brookfield Renewable Energy Group purchased BBHP on November 1, 2013. The Project is licensed by the Federal Energy Regulatory Commission (FERC) as Project Number 2710. The current license expires on March 31, 2048.

As discussed in detail in the original certification report, the relicensing of the Project was part of a 2004 Settlement Agreement involving five hydropower projects owned and operated by BBHP located within the Penobscot River Basin. The Settlement Agreement incorporated the addition of a second powerhouse, Orono Powerhouse B. As part of the Settlement Agreement, the two lowest dams on the Penobscot River were removed and fish passage installed at a third dam, all owned by BBHP.

The original LIHI certification of Orono included three conditions. The first one required notification to LIHI if the transfer of the Great Works, Veazie and Howland Projects, which was a key part of the Settlement agreement, did not occur. Although I did not locate notice to LIHI in our files, since the transfer did take place, this condition is moot. The third condition required submission of the agency approved Species Protection Plan to LIHI. This plan was submitted to LIHI by BBHP. The second condition stated as "(2) As the installation of the new fish passage bypasses, and the potential requirement for two-week unit shutdowns to enhance downstream eel

passage, will be triggered upon final closure on transfer of the Great Works, Veazie and Howland Projects to the Penobscot River Restoration Trust, which is expected to occur within the term of LIHI certification, future annual status of compliance reports to LIHI must include appropriate documentation to demonstrate compliance with these requirements, in addition to other standard status reporting requirements." Unfortunately, BBHP did not meet the reporting requirements of this condition in any of their annual compliance reports. Powerhouse B construction appeared to be initiated in 2012 and became operation on November 23, 2013. The various fish ways were constructed between 2013 and 2016. LIHI only became aware of the construction of the second powerhouse and fishways when BBHP applied for recertification in December 2015, which also requested review of the second powerhouse for LIHI certification.

The estimated annual production of the Project from both powerhouses is 50,800 MWh. Review of records by Dana Hall of LIHI indicate that renewable energy credits have only been issued for generation from the original powerhouse during the past term of LIHI certification.

II. REVIEW OF RECERTIFICATION STANDARDS AND APPLICATION COMPLETENESS

This recertification review was conducted under the April 2014 LIHI Handbook since the application was submitted before the end of December 2015. Chapter 2, Section 2.25 of the April 2014 Handbook provides that a request for renewal of a previously-issued LIHI certification ("re-certification") will be granted at the conclusion of the term of the existing certification, so long as (1) there have been no "material changes" at the facility that would affect the certification and (2) LIHI's certification criteria have not been revised since the previous certification was issued by LIHI." Although not specifically defined in the 2014 Handbook, "material changes" were explained to the applicants to mean "changes in circumstances at facilities reviewed by LIHI involving (1) compliance issues (non-implementation, delayed implementation, incomplete implementation of obligations that are relevant to LIHI's Criteria), and/or (2) new or renewed issues that are relevant to LIHI's Criteria occurring since the previous certification was issued."

A review of the December 2015 application indicated that there was significant missing information, and that "material changes" had occurred, namely the construction and operation of Powerhouse B, and construction, operation and effectiveness testing of new fish passage facilities. The application only contained data on the requirements of the Project relative to the LIHI criteria and limited information on compliance with these requirements. It was suggested that an Intake Review prepared for another Penobscot River project submitted by Brookfield to LIHI at the same time as Orono, be used as a template. Unfortunately, those responses were also incomplete. As such a site-specific Intake Review was done in June 2016, to which Brookfield responded in November 2016. Unfortunately, that information also lacked some data, especially associated with evidence of compliance with the FERC required Plans to be implemented during construction of Powerhouse B and the fishways. The response provided by Brookfield on The Fish Salvage Plan and Mussel Relocation Plan was that they had no records for that work since the construction had been done by the previous owner. They provided a letter report done for investigations needed under the Invasive Species Plan but stated it was maintained in internal

records only since FERC did not require it to be filed. The spring and fall investigations required under the Sensitive Species Plan one year after construction (2014) have not yet been completed. Brookfield reported they have been unable to coordinate with the New England Wild Flower Society. They propose to do the studies in 2017 even if the Society is not available to participate. In summary, there were data gaps documenting compliance activities and agency interface during construction and immediately following construction.

III. REVIEW OF CERTIFICATION STANDARDS COMPLIANCE

As noted earlier, BBHP did not comply with the notification requirements of one of the conditions of the original LIHI certification. Also, Chapter 3, Section 3.01, (Notification of Potential Non-Compliance) of 2014 LIHI's Certification Handbook requires that a holder of a LIHI certification must notify LIHI under four potential events, one being: "a change in conditions relevant to the certification". While the installation of fish passage facilities is such a "change", arguably these were "positive" environmental changes. This application review found that these measures appear to have been installed with some agency oversight, although US Fish and Wildlife Service (USFWS) has not yet certified them as required by the Settlement Agreement and FERC license. The Settlement Agreement, which was signed by all applicable resource agencies other than the National Marine Fisheries Service (NMFS), incorporated development of the new powerhouse. As noted above, insufficient data was provided by Brookfield to demonstrate compliance during construction with Plans developed to ensure minimal impact to environmental resources. The construction was however ultimately approved by a FERC Order.

A second event covered by Section 3.01 is "the receipt of a notice of violation or noncompliance relevent to the facility's certification from any government agency". The Project had two deviations from its headpond level requirements since November 2013, which is when the new powerhouse began operation. One of the events resulted in the death of several river herring and suckers. Both events occurred in 2015 and were found by FERC to be violations of their license as the deviations resulted from operator error. However, FERC elected not to pursue additional enforcement action at the time (See letter dated August 14, 2015 in Appendix A.) This occurred within the certification period for the original powerhouse project (LIHI #67) (June 1, 2010 to June 1, 2015). These were reported to LIHI only when directly asked for in their response to the Intake Review. As FERC found them to be license violations, LIHI should have been notified as required by the Handbook Section 3.01.

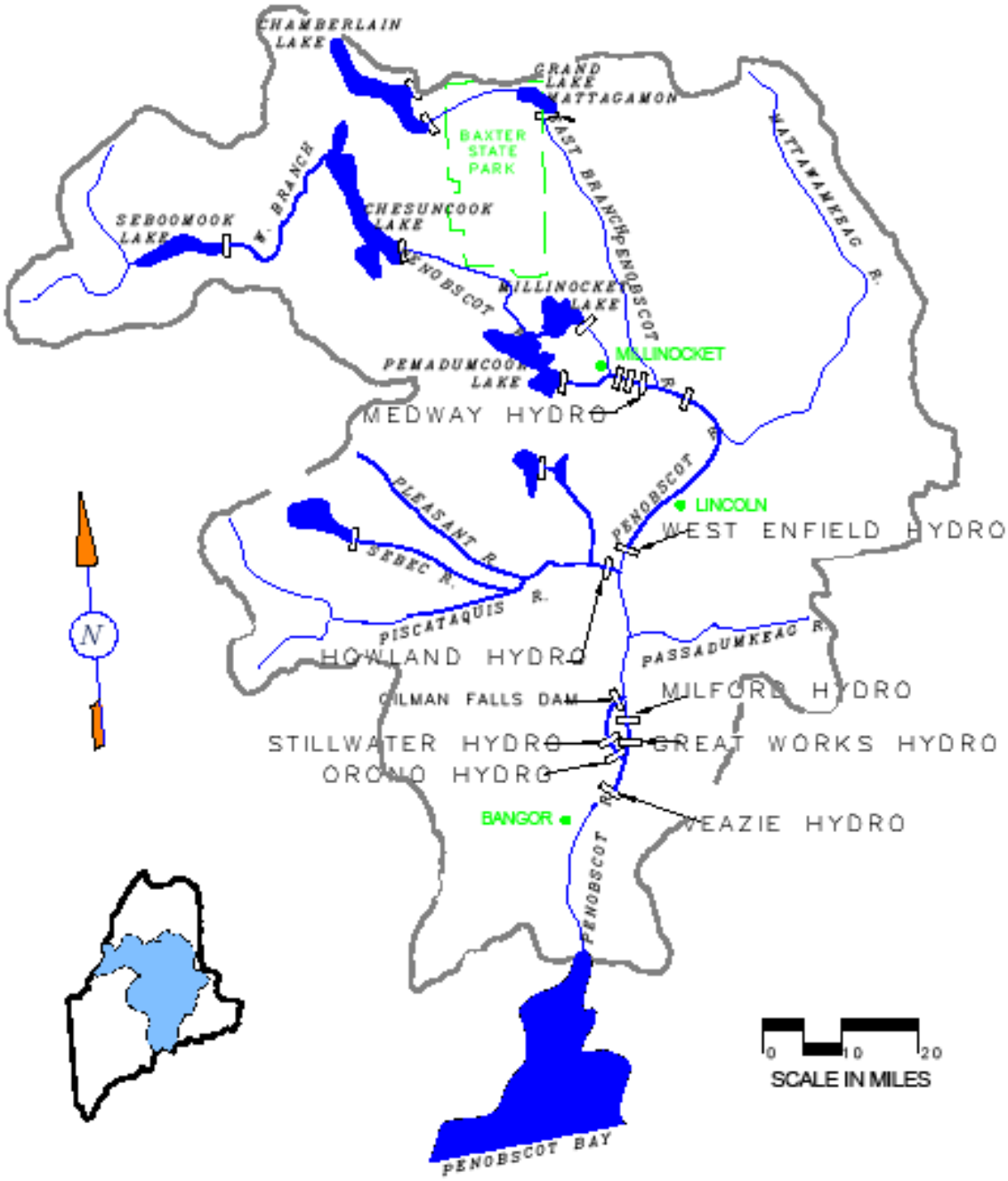
Section 3.02 (Review of Potential Non-Compliance), identifies that such events shall be investigated by the Executive Director or an Application Reviewer to determine if such a violation has occurred such that the Executive Director can make a recommendation regarding compliance and penalties to the Governing Board. Although not contracted as such, this current review can be viewed as the "data gathering" step of such an investigation. As detailed later, I am making the recommendation that the Orono Project be certified with several conditions. It may be appropriate that the decision regarding any necessary response actions to the Applicant's non-compliance with LIHI's certification obligations can be incorporated into LIHI's acceptance/rejection of this review recommendation.

IV. PROJECT'S GEOGRAPHIC LOCATION

The Orono Project is located on the Stillwater Branch of the Penobscot River ("River) in Orono, Penobscot County, Maine,

The Penobscot River Basin ("Basin") is New England's second largest river system with a drainage area of 8,570 square miles. Upstream storage dams on both the West and East Branches control a large portion of flows within the drainage area. The Basin includes the East and West Branches of the Penobscot River, the Piscataquis River, the Sebec River, the Pleasant River, the Mattawamkeag River, the Passadumkeag River, the Stillwater Branch and the main stem of the Penobscot River. These are illustrated on the following page. The Mattawamkeag River remains free-flowing, while a total of 20 run-of river dams are located on the other Basin waterways. The Orono Project is located on the Stillwater Branch less than 1,000 feet upstream where the Branch enters the main stem of the Penobscot River, and approximately one mile downstream of the Stillwater Project. With removal of the Veazie Dam in November 2013, there are no longer any dams on the Penobscot River downstream of the Orono Project. Removal of the Veazie and Great Works dams was key feature part of the Settlement Agreement, and the nationally recognized restoration of the Penobscot River.

The following aerial photograph and show the location of the project and nearby hydropower facilities in the Penobscot River basin.



PENOBSCOT RIVER BASIN

V. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

The Orono site was first developed for hydropower in 1898, and in the ensuing decades went in and out of operation. The project stopped operating in 1996 due to catastrophic failure of the facility's wood-staved penstocks which caused the project to be shut down. After FERC issued a new license for the Project on December 8, 2005, the Project was refurbished and began commercial operation of the four units in the original powerhouse in the first quarter of 2009.

The Orono Project consists of a 1,178-foot-long by 15-foot-high concrete gravity dam with a 320-foot-long spillway topped with 2.4-foot-high flashboards; three 10-foot-diameter penstocks; a 40-foot-wide, 94-foot-long and 27-foot-high surge tank; and an original powerhouse with four existing generating units. The second powerhouse was constructed in 2012-2013 and began operation on November 22, 2013. The new powerhouse (Powerhouse B) is located within the existing bypassed reach about 420 feet downstream of the dam and is supplied by a 292-foot-long, 25-foot-wide, 12-foot-high concrete penstock and surge chamber just upstream of the powerhouse. A new 84-foot-wide, 20- foot-high intake is integrated into the existing intake and shares a single trashrack having with 1 inch clear spacing.

The Project's impoundment is approximately 2.3 miles long, with a surface area of 180 acres at the normal full pond of 73.0 feet above mean sea level (msl) and an estimated gross storage capacity of 1,405 acre-feet. An increase of the headpond full elevation by 0.6 inches was part of the Settlement Agreement, and amended FERC license and Water Quality Certification (WQC). The impoundment raise increased the gross storage capacity by about 105 acre-feet and inundates about 4.4 additional acres. The current project boundary encloses the dam, the reservoir up to the 73.0-foot msl elevation, the powerhouse, and the penstocks except for a short section that traverse beneath the Maine Central railroad bridge. Land area occupied by the non-reservoir features described above is estimated at 1.2 acres. The application states that approximately 95 acres of land is contained in a 200-foot zone extending around the impoundment. BBHP owns a very small portion of this area.

The Orono Project is operated as a run-of-river development with discharge from the project turbines and spillway equivalent to inflow. Flows are reallocated between the main stem of the Penobscot River and the Stillwater Branch through operation of its Milford Project (No. 2534).

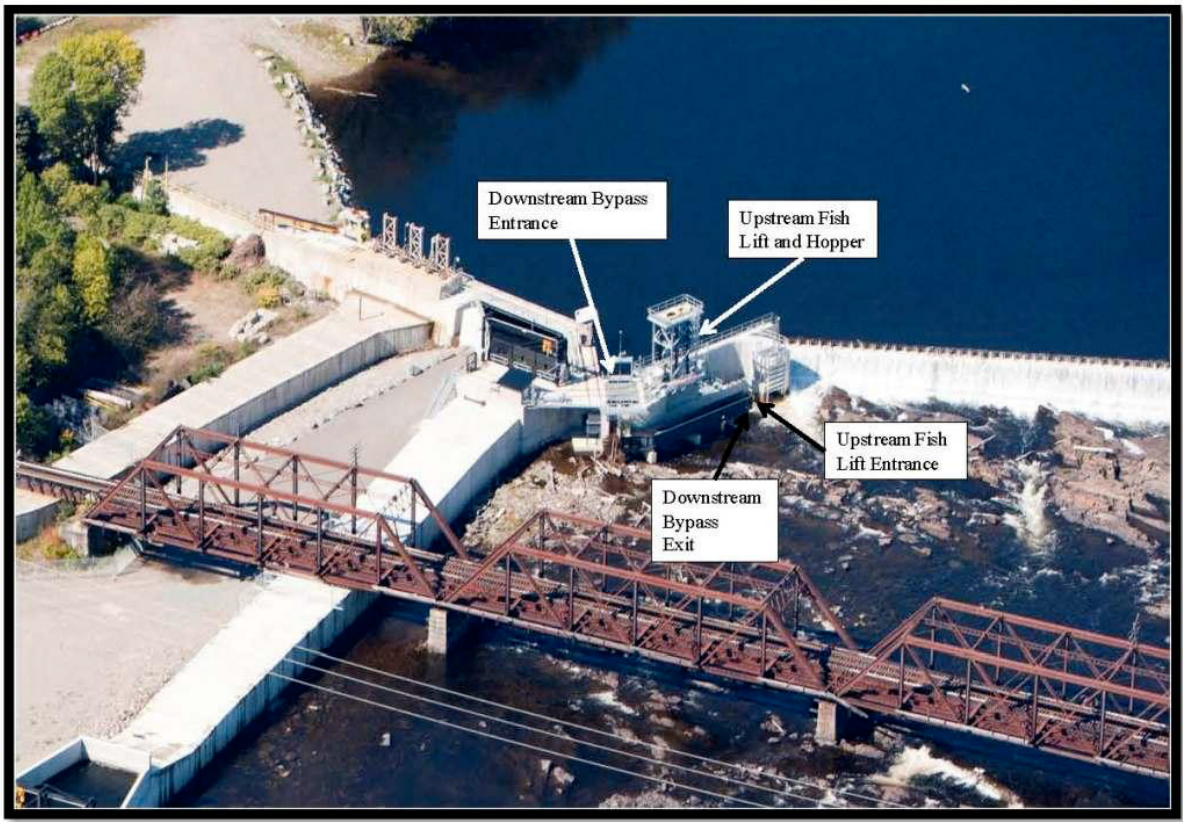
New downstream diadromous fish passage facilities at the Orono Project include an 8-foot-wide entrance into a 20-foot-long by 12-foot-wide floor screen chamber with a 3-foot wide exit at the downstream end. The fish exit the screen chamber into a steel sluice and are conveyed to a plunge pool which discharges into the bypass reach below the dam. Passage is also provided via a lower level entrance, which consists of a 4-foot-square opening at the base of the trashrack. The downstream fish passage facility is designed to pass a combined flow of approximately 150 cfs through the surface entrance and lower orifice.

The new upstream anadromous fish trapping facility is adjacent to and integral with the new downstream fish passage facility. Of the 150 cfs downstream attraction flow entering the screen chamber, approximately 130 cfs passed through the floor screen and is used for upstream attraction flow for the trapping facility, controlled by two submerged gates. The upstream

trapping facility consists of a fixed rail system, a blocking screen and an elevating hopper to retrieve the trapped fish. BBHP provides trucking of trapped fish to a location upstream of the Milford Dam on the main stem Penobscot River, and not to the Stillwater Branch at the Orono Dam. Upstream eel passage is provided through a concrete structure near the junction of the non-overflow section of the dam and the spillway

The Orono Project includes a downstream minimum flow bypass that discharges to the tailrace. The Project provides a minimum flow to the bypass reach of 200 cfs via 153 cfs through the fish passage facility and approximately 47 cfs through the flashboards.

The following aerials show the location of the dam, two powerhouse as well as the various fish passage facilities now in operation at the Orono Project.



VI. REGULATORY AND COMPLIANCE STATUS

FERC License

The original FERC license was issued in 1977, with a retroactive effective date of 1950. This license was set to expire in 1993. By an order issued on September 25, 1985, the license expiration date was accelerated, effective the date of the Order. From 1985 to 2005, the project was operated under an annual license until a new license was issued on December 8, 2005. The new license was the result of the Lower Penobscot River Basin Comprehensive Settlement Accord, which included a number of agreements, including the Lower Penobscot River Multiparty Settlement Agreement (Settlement Agreement). Numerous federal and state agencies and non-governmental organizations signed the agreements. A detailed description of the settlement agreement processes and signatories can be found in the original certification report.

By order dated September 14, 2012, FERC issued an amended license for the Project to authorize construction of a second powerhouse (Powerhouse B) which increased the installed capacity of the Project to 6,518 kW. This order also authorized raising of the elevation of the reservoir by 0.6 feet through the use of flashboards, replacement of an existing downstream fish passage facility with a new facility that includes bottom and surface entrances, relocation of the upstream eel passage adjacent to the new powerhouse and a trap-and truck facility for upstream passage of anadromous species. The conditions of the amended WQC were incorporated into the amended license. All of these changes, including the increase in reservoir height and additional generating units were established by the Settlement Agreement.

Water Quality Certification (WQC)

On August 23, 2011, the Maine Department of Environmental Protection (MEDEP) issued a revised WQC. The only changes from the original WQC (issued December 15, 2004) were associated changing measuring the headpond limit based on the new impoundment elevation (which was raised 0.6 inches) and with construction related issues (e.g. erosion control, temporary fill specifications, concrete curing and spoils disposal). This amended certification was adopted in its entirety in the September FERC 2012 license.

Overall Regulatory Compliance

Review of FERC's eLibrary and information provided by the Applicant indicates that the Project in general appears to have been operated in compliance with its regulatory requirements. Two deviations from its headpond level requirements since November 2013, when the new powerhouse began operation. Both events occurred in 2015 and were found by FERC to be violations of their license as the deviations resulted from operator error. However, FERC elected not to pursue enforcement action at the time.

As noted under Section II, Brookfield could not confirm that all of the requirements of four Plans that were to be implemented during construction were met. Thus, it was impossible for this review to judge compliance with all of the FERC license mandates regarding construction.

VII. PUBLIC COMMENT RECEIVED BY LIHI

The deadline for submission of comments on the re-certification application was February 19, 2016, in response to the original December 2015 application. No public comment letters were received. With the exception noted below, no outreach discussion with agencies was conducted as ongoing fish passage studies, including agency comments are well documented through 2015 activities. As 2016 study reports are not yet issued, the agencies would not be able to offer comment on these latest studies. I also did not believe that the agencies would be able to provide specific comments on construction activities, as with the exception of the new eel ramp, these activities were completed almost two years ago. I did contact three individuals (John Perry, Beth Swartz, and Kevin Dunham – all contacts provided by Brookfield) at Maine Department of Inland Fish and Wildlife to see if they had any records from the previous Owner regarding finding the endangered Brook Floater mussel in the drained impoundment. None of these individuals responded to my email inquiry.

VIII. SUMMARY OF COMPLIANCE WITH CRITERIA AND ISSUES IDENTIFIED

Criterion A - Flows – The Orono Powerhouse appears to be generally operated in compliance with the established minimum flow and headpond fluctuation limit requirements and deviation reporting. No deviations in minimum flow have been noted between 2010 and 2016.

Criterion B - Water Quality - The project appears to be in compliance with the water quality requirements of the Water Quality Certification. The Maine Department of Environmental Protection (MEDEP) 2012 Integrated Water Quality Monitoring and Assessment Report, the most recent report, indicates the project waters are not listed as impaired.

Criterion C - Fish Passage and Protection The required upstream and downstream passage facilities have been constructed under the required timeline. Fish passage effectiveness studies, including the need to meet specific numerical performance standards for Atlantic salmon, a federally endangered species, are underway. Adequacy of the new fish passages installed must be demonstrated for three years. US Fish and Wildlife Service (USFWS) certification of the fishways is still outstanding. Four conditions are recommended to ensure compliance with these fish passage requirements.

Criterion D - Watershed Protection - There are no requirements for a buffer zone, shoreline protection fund or shoreline management plan for the Facility. Thus, this Facility passes for this criterion. No additional term for certification is appropriate.

Criterion E - Threatened and Endangered Species Protection –The GOM-DPS Atlantic salmon is in the project area, a federally endangered species. A The Biological Opinion developed by National Marine Fisheries Service (NMFS0 found that the proposed actions may adversely affect but are not likely to jeopardize the continued existence of the Atlantic salmon. This opinion is based on the assumption that the downstream passage facilities at the Orono Project will provide safe passage for the species, which are defined by numerical standards. Proof of safe passage will not be confirmed until effectiveness testing is completed and the results assessed. The Project appears to be in compliance with all requirements of its Species Protection Plan which was developed in compliance with the Biological Opinion. Incidental takes of the GOM-DPS Atlantic salmon have been appropriately reported.

Criterion F - Cultural Resources – The Project has a Cultural Resource Management Plan which includes provisions to address cultural resource issues in the event they arise during the term of the license. No such resources were encountered during construction of Powerhouse B or the new fishways.

Criterion G - Recreation - The Project was found to be in compliance with its recreational requirements.

Criterion G - Facilities Recommended for Removal - No resource agencies have recommended dam removal.

IX. GENERAL CONCLUSIONS AND REVIEWER RECOMMENDATIONS

Based on my review of information submitted by the applicant and FERC eLibrary, I believe that the Orono Project continues to be compliance with the LIHI criteria and ***should be re-certificated for term of five years***, providing the following conditions are satisfied. These

conditions incorporate requirements under **Criterion C – Fish Passage and Protection** and **E – Threatened and Endangered Species Protection.**

1. The Owner shall notify LIHI within 30 days of receipt of USFWS certification of the upstream and downstream anadromous and eel passage facilities as required by the Lower Penobscot River Multiparty Settlement Agreement. This certification requires affirmation that a) the facilities were designed and 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. It is assumed that certification of the fish lift indicates that the capacity concerns have been resolved. 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.

2. If the requirement for re-initiation of quantitative studies of downstream passage of juvenile and adult 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.

3. The Owner shall notify LIHI within 60 days of receipt of USFWS, 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 could be completed by 2018 based on the three-year testing requirement, unless advancement to a higher 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.

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 Maine Department of Marine Resources (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, or are scheduled for implementation. The noted upstream and downstream passage results shall be provided within 60 days of report finalization.

5. The Owner shall provide LIHI a summary of the results the 2017 survey for Hyssop-leaved fleabane, a state-listed species of Special Concern, as required by the Sensitive Species Protection Plan. This summary shall be provided within 60 days of its

finalization, following review and comment by the Maine Natural Areas Program and New England Wild Flower Society.

LIHI reserves the right to revoke the certification if the fishways do not receive USFWS certification and/or the studies do not demonstrate that safe fish passage is being provided.

X. DETAILED CRITERIA REVIEW

A. FLOWS

Goal: The Flows Criterion is designed to ensure that the river has healthy flows for fish, wildlife and water quality, including seasonal flow fluctuations where appropriate.

Standard: For instream flows, a certified facility must comply with recent resource agency recommendations for flows. If there were no qualifying resource agency recommendations, the applicant can meet one of two alternative standards: (1) meet the flow levels required using the Aquatic Base Flow methodology or the "good" habitat flow level under the Montana-Tennant methodology; or (2) present a letter from a resource agency prepared for the application confirming the flows at the facility are adequately protective of fish, wildlife, and water quality.
Criterion:

1) **Is the facility in Compliance with Resource Agency Recommendations issued after December 31, 1986 regarding flow conditions for fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking conditions, and seasonal and episodic instream flow variations) for both the reach below the tailrace and all bypassed reaches?**

YES. The project appears to meet these criteria thresholds. The Project operates as run-of-river facility with specified minimum flow and headpond variation limits. The Project includes a downstream bypass that discharges to the tailrace. The Project provides a minimum flow to the bypass reach of 200 cfs via 153 cfs through the fish passage facility and approximately 47 cfs through the flashboards. These flows are managed, in part, through control of the headpond elevation. Monitoring of this operation is achieved by complying with the Operations and Flow Monitoring Plan which was approved by FERC on August 27, 2013.

As FERC no longer submission of annual reports confirming compliance with such requirements, the applicant submitted a signed confirmation statement to LIHI certifying these requirements have been met.

For the period of June 2010 through December 2016, only two deviations from the headpond limits although minimum flows were not reported as a problem. These events occurred on May 17-18, 2015 (excursion period of 18 hours and 12 minutes) and May 27-28, 2015 (excursion period of 10 hours and 29 minutes). Several dead river herring and suckers were found as a result of the earlier deviation. FERC determined that both were violations of the FERC license related to operator error. "The May 18, 2015 deviation was caused by project operators implementing

outdated operating instructions. The May 27-28, 2015 deviation could have been avoided if the operator had continued to monitor the reservoir elevation or if the alarm system had properly notified the operator." FERC noted that the violations were recorded to the Project's compliance history, however, no additional enforcement actions were pursued. Corrective actions were implemented by BBHP to minimize/prevent re-occurrence of the events.

This Project passes Criterion A - Flows- Go to B

B. WATER QUALITY

Goal: The Water Quality Criterion is designed to ensure that water quality in the river is protected.

Standard: The Water Quality Criterion has two parts. First, an Applicant must demonstrate that the facility is in compliance with state water quality standards, either through producing a recent Clean Water Act Section 401 certification or providing other demonstration of compliance. Second, an applicant must demonstrate that the facility has not contributed to a state finding that the river has impaired water quality under Clean Water Act Section 303(d).

Criterion:

1) Is the Facility either:

a) In compliance with all conditions issued pursuant to a Clean Water Act Section 401 water quality certification issued for the facility after December 31, 1986? Or in compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Facility area and in the downstream reach?

Yes. There have been no concerns raised in any documentation that suggest that water quality impacts are occurring as a result of project operations. Required dissolved oxygen (DO) monitoring conducted in 2014 and reported April 2015 demonstrated that DO standards for Class B waters are met under the operating scheme used at the Orono Project. No agencies had comments regarding the results of these studies. The project also appears to have met all non-water quality requirements of the WQC with the possible exception of fish passage related items which are still on-going.

Go to B2

2) Is the Facility area or the downstream reach currently identified by the state as not meeting water quality standards (including narrative and numeric criteria and designated uses) pursuant to Section 303(d) of the Clean Water Act?

NO. Based on review of the MEDEP 2012 Integrated Water Quality Monitoring and Assessment Report, the project waters are not listed as impaired.

The existing water quality is classified by the MDEP as a Class B. Class B waters are general-purpose waters and are managed to attain good physical, chemical and biological water quality; aquatic life use goal approximately Tier 3 on the Biological Condition Gradient. Well-treated discharges with ample dilution are allowed.

Go to B3

3) If the answer to question B.2. is yes, has there been a determination that the Facility is not a cause of that violation?

NOT APPLICABLE

The Project Passes Criterion B - Water Quality - Go to C

C. FISH PASSAGE AND PROTECTION

Goal: The Fish Passage and Protection Criterion is designed to ensure that, where necessary, the facility provides effective fish passage for riverine, anadromous and catadromous fish, and protects fish from entrainment.

Standard: For riverine, anadromous and catadromous fish, a certified facility must be in compliance with both recent mandatory prescriptions regarding fish passage and recent resource agency recommendations regarding fish protection. If anadromous or catadromous fish historically passed through the facility area but are no longer present, the facility will pass this criterion if the Applicant can show both that the fish are not extirpated or extinct in the area due in part to the facility and that the facility has made a legally binding commitment to provide any future fish passage recommended by a resource agency. When no recent fish passage prescription exists for anadromous or catadromous fish, and the fish are still present in the area, the facility must demonstrate either that there was a recent decision that fish passage is not necessary for a valid environmental reason, that existing fish passage survival rates at the facility are greater than 95% over 80% of the run, or provide a letter prepared for the application from the U.S. Fish and Wildlife Service or the National Marine Fisheries Service confirming the existing passage is appropriately protective.

Criterion:

1) Is the facility in compliance with Mandatory Fish Passage Prescriptions for upstream and downstream passage of anadromous and catadromous fish issued by Resource Agencies after December 31, 1986?

CONDITIONALLY, YES. The license has both mandatory fish passage requirements (under Ordering Paragraphs D and E) and reservation of authority for both USFWS and NMFS (under Article 402). As a signatory to the Settlement Agreement, the USFWS 1997 Mandatory Fish Passage requirements were incorporated into the Agreement, and as such, were incorporated into the amended FERC license issued on December 8, 2005. On May 23 and 29, 2012 respectively both NMFS and USFWS issued letters to FERC requesting reservation of their authority to order fish passage prescriptions for the modifications to the Orono Project (i.e. Powerhouse B), which

was incorporated into the September 14, 2012 FERC license. The 2012 license however maintained the requirements from the 2005 license for upstream and downstream passage for American Shad, alewife, blueback herring, the federally endangered Atlantic salmon, and American eel.

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. This approach was key to the Settlement Agreement. Both downstream and upstream passage for anadromous species is required at the Orono Project. Fish caught at the Orono fish lift are transported upstream of the Milford Project, with release into the Penobscot River mainstem rather than in the headpond of the Orono Project which is the Stillwater Branch. Basin-wide focus is also supported by the fact that all fish studies are coordinated and reported in combined reports for the Orono, Stillwater and Milford Projects, facilitating simultaneous basin-wide review by the resource agencies.

The fish passage designs, schedule, and operations and maintenance procedures of the new fishways were developed in consultation and cooperation with NMFS, USFWS, MDMR, the Maine Department of Inland Fisheries and Wildlife (MDIFW), and the Penobscot Indian Nation (PIN). See table below for key dates regarding the fishways.

Facility	**Construction Completion**	**First Season Use**
Upstream eel ladder	June 2016	June – November 2016
Trashrake screening installation	October 2013	Not applicable
Downstream eel passage	November 2013	August – November 2016
Upstream anadromous passage (trap and truck lift)	November 2013	April – November 2014
Downstream anadromous passage	November 2013	April – November 2014

Formal certification that the fish and eel passage facilities rests with the USFWS. This certification is based on the following three items:

- Did the licensee design and install the facilities as prescribed?
- Did the facilities complete a year of testing and fine tuning?
- Are the facilities ready for routine operations?

To be “ready for operation”, the fishways must have agency approved Operating Manuals and electronic data collection. BBHP reports that the Operations Manual have been submitted for approval in April 2015 but are still under review. The electronic data collection protocols are scheduled for approval in 2017. Thus, to date, no fishway has been certified. Based on email consultation with Stephen Shepard of USFWS for the related Stillwater Project, this certification is still under review as the monitoring and evaluation of the effectiveness of the passage facilities is still underway. Correspondence has shown that resource agencies have expressed concern that the number of river herring attempting to move upstream at the Orono Project was beyond the capacity of the fish lift, based on 2015 count data, and concluded that it would be necessary to enact measures to increase the number of fish that the facility can handle. Based on a letter sent to FERC, it appears that Brookfield did make changes in their handling protocols that increased

the number of herring that were transported successfully upstream. Brookfield reported that these changes were discussed with the resource agencies in a January 15, 2016 agency consultation meeting, and provided for additional review in February 2016. Only USFWS responded stating that the capacity limitations will be a factor during their certification review of the lift. Brookfield stated the revised O&M Plan for the lift will include these revised protocols and will again be issued for agency comment prior to the Plan's submission to FERC on April 15, 2017. A Condition that LIHI be notified of this certification has been recommended.
Study plans to test the effectiveness of these passage facilities have been developed and appear to be modified as needed. 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 downstream testing for the Atlantic salmon is governed by the Biological Opinion issued on August 31, 2012. As a result, one study plan was developed for Atlantic salmon while the remaining species studies were addressed jointly in a second study plan.

Downstream River Herring Studies

The first round of testing was conducted in 2014, following a study plan reported by the applicant to have been approved by the fisheries agencies (USFWS, NMFS, MDMR, MDIFW and PIN) and implemented as planned. This testing for American Shad, alewife, and blueback herring involved visual observations through use of cameras to identify species and counts. This approach was taken due to the expected low numbers of target species of appropriate lifestage.

In 2015 quantitative studies of adult river herring using stationary automated radio-telemetry techniques showed such "studies in the lower Penobscot River are feasible; however, the study results demonstrate that tagging alosines with current methods does not provide relevant information about fishway effectiveness. Most of the river herring tagged in 2015 moved downstream within several days of being released and did not approach the Orono or Milford dams. Therefore, the number of tagged river herring approaching either dam was too small to support any meaningful conclusions about the performance of the upstream and downstream fishways.

Also in 2015, a quantitative downstream effectiveness study of juvenile American Shad, alewife, and blueback herring utilized standard tagging and monitoring approaches was also conducted. The results of the pilot tagging study demonstrated that netting and tagging juvenile alosines is not an effective means to evaluate downstream fishway use or effectiveness due to their the size. The alosines were small and fragile (i.e., average length of 83 mm, range 30 to 95 mm) and did not withstand active collection and tagging techniques.

As a result, Brookfield proposed, and it was apparently found acceptable to the agencies, that only qualitative studies of downstream river herring would be conducted in 2016. It was also agreed that additional studies of juvenile alosine passage would be delayed until the state of the art for studying alosine species is better developed. A condition has been recommended to address these future obligations.

Upstream River Herring Studies

Visual observations using underwater cameras and fish counts were conducted at the new lift in 2014 and 2015. In 2014, 2,075 river herring and no American shad used the lift. In 2015, 19,016 river herring and one American shad were counted. As already noted, the resource agencies and PIN agreed that the number of river herring attempting to move upstream in 2015 at the Orono Project at times exceeded the capabilities of the fish lift, and that measures are needed to increase the number of fish that can be handled. Revised transport measures was developed and implemented by BBHP in 2016. A FERC letter dated January 5, 2017 noted that based on rough calculations for 2016, nearly 79,000 river herring were transported in 2016, which is more than double the 20,000 transported in 2015. The final report on the 2016 studies is required to be submitted to FERC by April 15, 2017.

Atlantic Salmon Studies

Numerical performance standards have been established in the Biological Opinion for Atlantic salmon to be measured during a **three-year testing period**. Specific action plans have also been established if these standards are not met each consecutive year. These are noted below:

Performance standards for Atlantic salmon: what about upstream?

> *"The performance standard for downstream migrating smolts and kelts at the Orono 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.

It appears that Brookfield is working diligently to accommodate agency concerns with these studies. The BO and SPP adaptive management provisions both allow for the design and methods of the studies to be adjusted as necessary in consultation with the stakeholders. For both the 2015 and the 2016 studies, updated study plans were developed through agency consultation and were utilized. Satisfaction of the 2016 study plan is apparent in the letter issued by NMFS on August 12, 2016 which is included in Appendix A.

Effectiveness studies were first performed in 2014. Despite working with the agencies on study plan changes, it appears there is controversy expressed by NMFS over whether or not the 2014 study standards were met. Brookfield's study reports to FERC indicated that the salmon smolt standard was achieved at Orono in 2014, but not in 2015; however, the agencies disagreed and stated that the standards were not met in either year. FERC stated in their December 13th correspondence that they agree with NMFS that the 2016 study would be the first of the required three years of study under the enhanced operational mode. The 2016 studies flows were increased to between 20% and 50%, which Brookfield contends were similar to flows in 2014.
A report on 2016 studies for Atlantic salmon) is due to FERC on March 30, 2017. A condition regarding these studies has been recommended.

It should be noted that while Brookfield did not have any records regrading implementation of the Fish Salvage Plan during construction of the new powerhouse, they reported to me that they did contact NMFS to see if any Atlantic salmon were stranded during that work. The individual contacted stated he did not recall any such reporting.

American Eel Studies

The design of the upstream eel passage is a new design for use in the United States but has been successfully used in Europe for a number of years. The resource agencies had a number of concerns and recommendations for changes in the facility. The key concerns were associated with the limited zone of passage during various water levels and the potential for fallback at the exit, especially for smaller eels. It also uses much more flow for attraction and conveyance than typical passages (680 gallons/minute compared to about 50 gal/min.) BBHP has committed to making modifications to the facility should the studies show such problems exist.

The first monitoring of the newly re-located eel ladder was for the period of June 1 through August 31, 2016. Brookfield reported that preliminary results for nighttime surveys and video monitoring demonstrated good use of the new eel way by multiple size classes of eels. A report covering the 2016 testing is due to FERC by March 31, 2017.

The study plan for quantitative downstream eel effectiveness testing was filed in 2016 and approved by the agencies. Brookfield reports that preliminary review of the downstream eel passage radio telemetry data shows 100% survival of 45 study eels at the Orono Dam. Most eels used the downstream fishway surface bypass (46.7%), followed by the spillway (35.6%) and the low level fishway bypass (15.6%). Only 1 eel was recorded passing through either of the powerhouses (Station B).

The final 2016 study results report is due for submission on FERC by April 15, 2017. It appears that BBHP regularly meets with the resource agencies and PIN to review and discuss any concerns arising from current testing results.

A condition is recommended regarding the eel studies.

Go to C5

2) Are there historic records of anadromous and/or catadromous fish movement through the facility area, but anadromous and/or catadromous fish do not presently move through the Facility area (e.g., because passage is blocked at a downstream dam or the fish run is extinct)?

NOT APPLICABLE

a) If the fish are extinct or extirpated from the Facility area or downstream reach, has the Applicant demonstrated that the extinction or extirpation was not due in whole or part to the Facility?

NOT APPLICABLE

b) If a Resource Agency recommended adoption of upstream and/or downstream fish passage measures at a specific future date, or when a triggering event occurs (such as completion of passage through a downstream obstruction or the completion of a specified process), has the Facility owner/operator made a legally enforceable commitment to provide such passage?

NOT APPLICABLE

5) Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream or downstream passage of riverine fish?

NOT APPLICABLE. No fish passage requirements have been issued for riverine fish.

Go to C6

6) Is the facility in Compliance with Resource Agency Recommendations for Riverine, anadromous and catadromous fish entrainment protection, such as tailrace barriers?

YES. One-inch clear spacing angled trashracks for the full length of the intakes at both Orono powerhouses have been installed.

The Project Conditionally Passes Criterion C - Fish Passage and Protection - Go to D

D. WATERSHED PROTECTION

Goal: The Watershed Protection criterion is designed to ensure that sufficient action has been taken to protect, mitigate and enhance environmental conditions in the watershed.

Standard: A certified facility must be in compliance with resource agency and Federal Energy Regulatory Commission ("FERC") recommendations regarding watershed protection, mitigation or enhancement. In addition, the criterion rewards projects with an extra three years of certification that have a buffer zone extending 200 feet from the high water mark or an approved watershed enhancement fund that could achieve within the project's watershed the ecological and recreational equivalent to the buffer zone and has the agreement of appropriate stakeholders and state and federal resource agencies. A Facility can pass this criterion, but not receive extra years of certification, if it is in compliance with both state and federal resource agencies recommendations in a license-approved shoreland management plan regarding protection, mitigation or enhancement of shorelands surrounding the project.

Criterion:

1) Is there a buffer zone dedicated for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low-impact recreation) extending 200 feet from the average annual high water line for at least 50% of the shoreline, including all of the undeveloped shoreline?

NO, *go to D2*

2) Has the facility owner/operator established an approved watershed enhancement fund that: 1) could achieve within the project's watershed the ecological and recreational equivalent of land protection in D.1), and 2) has the agreement of appropriate stakeholders and state and federal resource agencies?

NO, *go to D3*

3) Has the facility owner/operator established through a settlement agreement with appropriate stakeholders, with state and federal resource agencies' agreement, an appropriate shoreland buffer or equivalent watershed land protection plan for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low impact recreation)

NO, *Go to D4*

4) Is the facility in compliance with both state and federal resource agencies recommendations in a license approved shoreland management plan regarding protection, mitigation or enhancement of shorelands surrounding the project.

NOT APPLICABLE. No Shoreland Management Plan, buffer zone or enhancement fund was required for the Orono Project.

The Project Passes Criterion D - Watershed Protection - Go to E

E. THREATENED AND ENDANGERED SPECIES PROTECTION

Goal: The Threatened and Endangered Species Protection Criterion is designed to ensure that the facility does not negatively impact state or federal threatened or endangered species.

Standard: For threatened and endangered species present in the facility area, the Applicant must either demonstrate that the facility does not negatively affect the species, or demonstrate compliance with the species recovery plan and receive long term authority for a "take" (damage) of the species under federal or state laws.

Criterion:

1) Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?

YES. The endangered GOM-DPS Atlantic Salmon is a federally endangered species definitively found in the Orono Project area. Two other federally listed species, Shortnose Sturgeon and Atlantic Sturgeon located in the lower reaches of the Penobscot River, were historically blocked from reaching the Orono Project by the Veazie dam, which was removed in October 2014. Neither sturgeon has been captured in the fish lift installed at Orono. If any are captured, they would be released downstream in the mainstem of the Penobscot River per the approved Sturgeon Handling Plan.
The Northern Long-eared Bat, a Federal threatened species is noted as possibly in the general area of the Project. Habitat for the bat is not expected at the Orono Project, due to existing development and limited property ownership.

Regarding state-listed species, Brook Floater mussel is a State Threatened species which was identified by the MDIFW as possibly occurring in the area. Brookfield reported that none were found when the impoundment was drained for construction of Powerhouse B, based on the lack of correspondence providing such notification to any agency in their files. As previously noted, Brookfield reports they have no records of the actual monitoring activities conducted under the previous owner during construction. As previously noted, I did not get any response to my outreach to MIFW on this issue. Hyssop-leaved fleabane, a state-listed species of Special Concern, was observed as at the proposed Orono tailrace. The Sensitive Species Protection Plan was developed to minimize impacts to this plant. Brookfield reports that the required survey has not yet been completed because annual efforts to coordinate with the volunteer crew of the New England Wild Flower Society have not been successful. Given the delay in implementation, it is Brookfield's intent to attempt to engage the New England Wild Flower Society in 2017 and, if coordination is again unsuccessful, Brookfield will complete the survey independently. A condition has been recommended regarding these planned survey efforts.

Go to E2

2) If a recovery plan has been adopted for the threatened or endangered species pursuant to Section 4(f) of the Endangered Species Act or similar state provision, is the Facility in Compliance with all recommendations in the plan relevant to the Facility?

YES. The Biological Opinion issued August 31, 2012 incorporated the requirements of the recovery plan. The fish passage effectiveness testing requirements for downstream passage of Atlantic salmon incorporates specific numerical standards that must be achieved to ensure the safety of the species. Upstream passage standards have not been established in the Biological Opinion. See further discussion below.

Go to E3

3) If the Facility has received authority to Incidentally Take a listed species through: (i) Having a relevant agency complete consultation pursuant to ESA Section 7 resulting in a biological opinion, a habitat recovery plan, and/or (if needed) an incidental take statement; (ii) Obtaining an incidental take permit pursuant to ESA Section 10; or (iii) For species listed by a state and not by the federal government, obtaining authority pursuant to similar state procedures; is the Facility in Compliance with conditions pursuant to that authorization?

YES. A The Biological Opinion developed by NMFS was issued August 31, 2012. The NMFS found that the proposed actions may adversely affect but are not likely to jeopardize the continued existence of the GOM DPS of Atlantic salmon.

Specific to Orono, the Biological Opinion includes an Incidental Take Statement (ITS). The ITS exempts the incidental taking of Atlantic salmon adults, smolts, and ke1ts from activities associated with the construction of the new powerhouse, ongoing operations of the Orono facilities, and downstream and upstream passage and survival studies. BBHP has been issued the required reporting for incidental takes of GOM-DPS Atlantic salmon. These "takes" include those used for fish passage effectiveness testing. The Project appears to be in compliance with all requirements of its Species Protection Plan which was developed in compliance with the Biological Opinion.

This opinion is based on the assumption that the downstream passage facilities at the Orono Project will provide safe passage for the species, which are defined as:

> *"The performance standard for downstream migrating smolts and kelts at the Orono Project is a minimum of 96% survival, based on a 75% confidence interval.*

As previously described under ***Section VIII Criteria C, Fish Passage and Protection***, this testing will be conducted over a three year period, so proof of safe passage will not be confirmed until this testing is completed and the results assessed. As the Biological Opinion depends on the safe passage of Atlantic salmon, a satisfaction of this criterion is incorporated into the same condition recommended under Criterion C..

Go to E5

5) If E2 and E3 are not applicable, has the Applicant demonstrated that the Facility and Facility operations do not negatively affect listed species?

Not applicable

The Project Conditionally Passes Criterion E - Threatened and Endangered Species Protection - Go to F

F. CULTURAL RESOURCE PROTECTION

Goal: The Cultural Resource Protection Criterion is designed to ensure that the facility does not inappropriately impact cultural resources.

Standard: Cultural resources must be protected either through compliance with FERC license provisions, or through development of a plan approved by the relevant state or federal agency.

***Criterion*:**

1) **If FERC-regulated, is the Facility in compliance with all requirements regarding Cultural Resource protection, mitigation or enhancement included in the FERC license or exemption?**

YES. Cultural resource assessments during the licensing process did not reveal any specific issues associated with the Orono Project. However, the Project does have a Cultural Resource Management Plan which includes provisions to address cultural resource issues in the event they arise during the term of the license. Brookfield reported that no such resources were encountered during construction of Powerhouse B or the new fishways.

The Project Passes Criterion F - Cultural Resource Protection - Go to G

G. RECREATION

Goal: The Recreation Criterion is designed to ensure that the facility provides access to the water without fee or charge, and accommodates recreational activities on the public's river.
Standard. A certified facility must be in compliance with terms of its FERC license or exemption related to recreational access, accommodation and facilities. If not FERC-regulated, a certified facility must be in compliance with similar requirements as recommended by resource agencies. A certified facility must also provide the public access to water without fee or charge.

Criterion:

1) **If FERC-regulated, is the Facility in Compliance with the recreational access, accommodation (including recreational flow releases) and facilities conditions in its FERC license or exemption?**

YES. BBHP's recreationally related obligations for the Project includes the maintenance of a portage trail around the project, having an upstream take-out point and downstream put-in location**.** A FERC Environmental Inspection report dated July 8, 2014 confirmed that these

features are well maintained and possesses clearly marked signage to facilitate public use. However, the Public Safety Plan required updating, which was submitted on November 1, 2015.

Go to G3

3) Does the Facility allow access to the reservoir and downstream reaches without fees or charges?

YES. The application denotes that such access is provided free of charge to the reservoir and downstream reaches of the river.

The Project Passes Criterion G - Recreation - Go to G

H. FACILITIES RECOMMENDED FOR REMOVAL

Goal: The Facilities Recommended for Removal Criterion is designed to ensure that a facility is not certified if a natural resource agency concludes it should be removed.

Standard: If a resource agency has recommended removal of a dam associated with the facility, the facility will not be certified.

Criterion:

1) Is there a Resource Agency recommendation for removal of the dam associated with the Facility?

NO. No resource agency has recommended removal of this dam.

The Project Passes Criterion H -Facilities Recommended for Removal

APPENDIX A

REFERENCED AGENCY CORRESPONDANCE

FEDERAL ENERGY REGULATORY COMMISSION
Washington, D. C. 20426

OFFICE OF ENERGY PROJECTS

Project No. 2710-072-- Maine
Orono Hydroelectric Project
Black Bear Hydro Partners, LLC

August 14, 2015

Kevin Bernier
Senior Compliance Specialist
Black Bear Hydro Partners, LLC
26 Katherine Drive
Hallowell, ME 04347

Subject: Compliance with Impoundment Levels, Article 401

Dear Mr. Bernier:

On June 3, 2015, you filed a letter describing two events that resulted in the impoundment level at the Orono Project (FERC No. 2710) to be lowered more than one foot below full pond. Pursuant to Article 401 of the amended project license[1] and your approved Operations and Flow Management Plan,[2] you are required to notify the Federal Energy Regulatory Commission (Commission), resource agencies, and Penobscot Indian Nation (PIN) when deviations from run-of-river operation, reservoir level, and minimum flow requirements occur. The project is located on the Stillwater Branch of the Penobscot River in Penobscot County, Maine.

Background

Pursuant to Condition 1.A of the amended Water Quality Certification for the project, [3] you are required to operate the project in a run of river mode, with outflow

[1] Order Amending License and Revising Annual Charges. 140 FERC ¶ 62,194 (issued September 14, 2012).

[2] Order Approving Operations and Flow Monitoring Plan Pursuant to Article 401. 144 FERC ¶ 62,177 (issued August 27, 2013).

[3] Attached to the amended license order as Appendix A, and issued by the Maine Department of Environmental Protection on August 23, 2011.

approximately equal to inflow on an instantaneous basis except for flashboard failure or replacement,[4] and impoundment levels maintained within one foot of full pond [elevation 73.0 feet mean sea level (msl)]. Your approved Operations and Flow Management Plan explains how you operate the project in compliance with headwater elevation, minimum flow, and fish passage requirements, describes how the mandatory flows will be met at all times (including flood events and flashboard repairs), and describes likely, though infrequent, maintenance activities that would require the temporary deviation from operational constraints. The plan also includes provisions for providing notifications and operations data to the Commission, resource agencies, and PIN when deviations from license requirements occur.

May 18, 2015 Deviation

Your letter states that the first deviation occurred on the morning of May 18, 2015. Project staff checking the fishway at the project found that the impoundment level had decreased overnight, which consequently reduced the available flow for fishway operations. You state that the upstream fish lift's attraction flow was still available, but because the upstream fish lift attraction flow is drawn from the downstream fishway, there was no flow left over for downstream transport. The staff members found several dead river herring and suckers trapped in the entrance chamber that feeds attraction water from the downstream fishway, likely due to the lack of flow to continue transporting fish downstream to the tailrace. You reviewed the operational data and determined that the impoundment first dropped below 72.0 msl at 4:33 p.m. on May 17, 2015, which continued until 10:45 a.m. on May 18, 2015 (in total, 18 hours and 12 minutes). You state that the lowest observed elevation was 71.0 feet msl, which is 2.0 feet below full pond level.

Your preliminary findings from the initial investigation into the deviation indicates that the cause of the lowered elevation was that operating instructions for the reservoir had been modified while flashboards were being replaced at the project on May 13, 2015. The operating instructions were not immediately updated when the work was complete. As a result, project operators were targeting lower impoundment elevations that what is required with the flashboards in place.

[4] During times of flashboard failure, the applicant will maintain water levels at or above the spillway crest. During those times when flashboards are being replaced, the applicant will maintain water levels within one foot of the spillway crest.

May 27-28, 2015 Deviation

You state that on the morning of May 28, 2015, a project technician noted a low impoundment level alarm for the project and immediately contacted the North American System Control Center (NASCC), who successfully restored the impoundment level by backing down generation at the project. Shortly thereafter, project staff checked the fishways and reported lower fishway flows (due to the lowered impoundment level) but reported no mortality. Upon review of operational data, you determined that the impoundment first dropped below 72.0 feet msl at 9:56 p.m. on May 27, 2015, and continued until 8:25 a.m. on May 28, 2015 (in total, 10 hours and 29 minutes). You state that the lowest observed elevation was 70.2 feet msl, which is 2.8 feet below full pond level.

You reviewed system control logs and determined that the NASCC remote system control center operator had received a single alarm at 7:31 p.m. on May 27, 2015, which indicated that the impoundment level had dropped approximately 6 inches below the full pond level (within 1 foot of allowable deviation). The operator apparently did not see a reason at that time to adjust operations based on the alarm, the alarm did not persist, and no additional alarms were received at the NASCC.

Your preliminary investigation of this incident indicates that a lack of sufficient alarms at the NASCC led to this deviation. Specifically, during the May 27-28 deviation, the NASCC operator did receive a single alarm while the impoundment elevation was still within the allowable 1-foot deviation range, but the system provided no subsequent alarms and relied instead on only the operator's constant monitoring to maintain compliance with the 1-foot drawdown limit. You state that because no additional alarms were received at the NASCC, the operator was not alerted to the continuation of the situation after there was no cause to adjust operation based on the situation that pertained to the single alarm that was received.

Fiber Cable Outage

With regard to both deviations, your preliminary investigation revealed that there was an outage of the fiber cable that directly reports actual impoundment levels at the project to remote monitoring operations. Therefore, during the fiber cable outage, remote monitoring operations had to rely on an estimate of impoundment elevation that was calculated from the project's forebay elevation. You state that instrumentation on the forebay was available at all times and the calculation used to estimate impoundment levels appears to have been valid. Through your preliminary investigation you determined that this method was adequate for temporarily monitoring the impoundment

level for license compliance, however, you have not determined that it was a contributing factor for the two deviations.

Corrective Actions

In order to prevent a re-occurrence, you have taken several corrective actions. You have installed low water level alarms to alert NASCC operators when the impoundment level approaches drawdown limits, and the alarms are designed to be persistent (i.e., they cannot be manually deactivated until the impoundment level is recovered). You made trending data for the forebay elevation available to NASCC operators during the interim period when the fiber cable was out (fiber cable repairs were completed on June 1, 2015). You provided revised operating instructions to the project operators for full pond conditions with the flashboards up and in place. Finally, you have initiated a detailed internal incident investigation in order to determine the root causes for the deviations and to provide recommendations to prevent a re-occurrence; you state that you would update the Commission with any additional corrective measures arising from this investigation.

Agency Comments

As required, you provided notice of the deviations to the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service, Maine Department of Inland Fisheries and Wildlife, Maine Department of Marine Resources, Maine Department of Environmental Protection, and PIN. Additionally, you emailed the resource agencies and PIN on May 28, 2015, to provide notification about the fish mortalities that occurred in the downstream fish way. That email also provides information about two salmon smolt mortalities that were unrelated to the deviations at the project, and the corrective actions you took to ensure no further mortalities occurred.

Discussion and Conclusion

The two deviations were the result of an inadvertent lowering of the impoundment level, and in both cases, you quickly initiated actions to raise the water level and minimize the duration of the deviations. Further, you have implemented measures to prevent a re-occurrence and have initiated a detailed internal investigation of the incidents. You state that you are not aware of any adverse impacts to fish or wildlife other than the river herring and suckers that were found in the downstream fishway. No additional incidents (related to safety, dam safety, public safety, and/or security) resulted from the deviations. Further, you state that if further information is gained during your investigation, you would subsequently inform the Commission of any additional corrective measures. Pursuant to the requirements of Article 401 and the Operations and

Flow Monitoring Plan, you provided notice of the deviations to the resource agencies and PIN.

We expect that you will report the unrelated salmon smolt mortalities to the Commission under your approved Species Protection Plan[5] and in your annual reports to NMFS to summarize and document incidental take of species listed under the Endangered Species Act.

Based on our review of the available information, we will consider the deviations to be a violation of your license related to operator error. The May 18, 2015 deviation was caused by project operators implementing outdated operating instructions. The May 27-28, 2015 deviation could have been avoided if the operator had continued to monitor the reservoir elevation or if the alarm system had properly notified the operator. We will add the violation to your compliance history for the project; however, we will not pursue additional enforcement action at this time. Additionally, we acknowledge and appreciate the ongoing internal investigation and rapid corrective actions taken in response to the deviations. Please keep the Commission apprised of any further conclusions and findings based on your investigation of the deviations.

Thank you for your letter and your diligence to maintain compliance at your project. If you have any questions pertaining to this letter, please contact Holly Frank at (202) 502-6833 or holly.frank@ferc.gov.

Sincerely,

Andrea Claros

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

cc: Jeff Murphy
NOAA Fisheries Service
Maine Field Station
17 Godfrey Drive, Suite 1
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[5] Order Modifying and Approving Revised Species Protection Plan and Revised Atlantic Salmon Passage Study Plan. 146 FERC ¶ 62,224 (issued March 27, 2014).

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

AUG 12 2016

Kimberly D. Bose, Secretary
Federal Energy Regulatory Division
888 First Street, N.E.
Washington, D.C. 20426

Re: Atlantic Salmon Species Protection Plan - 2015 Annual Report for Project Nos. 2710, 2712, 2534, 2600, and 2666 (Orono, Stillwater, Milford, West Enfield, and Medway Hydroelectric Projects)

Dear Secretary Bose,

On May 31, 2016, Brookfield Renewable Energy Group filed their Atlantic Salmon Species Protection Plan Annual Report for 2015 with you. The report presents the study results from Atlantic salmon smolt survival studies conducted at the West Enfield, Milford, Stillwater, and Orono projects in 2015, as well as the results of an Atlantic salmon upstream passage study at the Milford project. The purpose of this letter is to clarify certain points made in that submittal.

The studies at the West Enfield, Milford, Stillwater, and Orono projects were conducted pursuant to the 2012 Species Protection Plan (SPP) proposed by Black Bear Hydro Partners, LLC (these facilities have since been purchased by Brookfield). In August 2012, we issued a Biological Opinion to FERC which concluded that the continued operation of the subject projects consistent with the provisions of the SPPs would not jeopardize the continued existence of species listed by us under the Endangered Species Act (ESA) or adversely modify or destroy any designated critical habitat for listed species. Our Opinion contained an Incidental Take Statement (ITS) exempting certain levels of take for these actions. The provisions of the SPP and the reasonable and prudent measures and terms and conditions from the Opinion's ITS have been incorporated into the projects' FERC licenses.

The following are our comments on the 2015 Annual Report:

Following the completion of studies at the projects in 2015, the Licensee modified certain aspects of the study plan for 2016 based upon recommendations from us. We acknowledge the Licensee's efforts working with us and other stakeholders on the Penobscot River to conduct the best possible assessments of Atlantic salmon. In addition, the Licensee has implemented a very thorough and transparent operational plan for theses projects and fishways in the Penobscot River.

Page five of cover letter, number 5, bullet 1: In their annual report, Brookfield does not indicate how the projects were operated during the 2016 smolt survival study in regards to the adaptive

management plan (AMP, Figure 2 in our Opinion) that was incorporated in their SPP. It is our understanding that Brookfield skipped a step (i.e., maximizing flow through the downstream bypass) in the AMP and proceeded to the next step (i.e., increase spill to between 20% and 50% of river flow at station at night during the two-week smolt out migration period). It is also our understanding that Brookfield went beyond what was required of them in this step by spilling between 20% and 50% of flow throughout the study period, not just at the night during the two-week peak of the smolt migration period. We are very supportive of this decision as it should significantly improve smolt survival and decrease migratory delay associated with the projects. As detailed in our 2012 Opinion, the 96% downstream performance standard must be achieved for three years in order for the standard to be considered met. We consider 2016 as the first of three years of study under this mode of operation.

Page 5 of cover letter, number 5, bullet 2: Although we understand that this bullet is specifically discussing activities proposed for 2016, it is worth noting our understanding that Brookfield will continue monitoring upstream passage of adult Atlantic salmon at the project in 2017, as the upstream performance standard has yet to be achieved.

Page 6 of cover letter, number 5, bullet 3: Brookfield is proposing to cease monitoring of adult salmon activity at the Orono project, since significant delay was not detected in either 2014 or 2015. The intent of the Opinion and the SPP was that monitoring will occur at the Orono project when studies are occurring at the Milford project to make sure that the exempted amount of take (i.e., significant levels of delay) is not exceeded. As tagged salmon have been trapped at the Orono project, and are known to access habitat downriver, it is appropriate for Brookfield to continue collecting information on their movements in the project area during studies at Milford. The monitoring involves a relatively small amount of effort (i.e., the placement of radio receivers in the bypass reach and tailrace, and periodic data downloads) and provides important information on the effects of the action, as well as on how salmon behave at the confluence of the Stillwater Branch and the mainstem Penobscot River.

Page 6, number 6, last sentence of paragraph 2: We concur with Brookfield's description of the schedule for kelt studies (i.e., ten years after smolt survival standards have been achieved at the Milford, Stillwater, Orono, and West Enfield projects). However, the last sentence indicates that "…kelt studies are not anticipated until at least 2026." As it is required that each project meets the performance standard for three years under a single step of the AMP, the smolt standards cannot be met until 2018 at the earliest, since the first year of testing under the current step (i.e. 20%-50% spill) is occurring in 2016. Therefore, pursuant to the agreement that kelt studies occur 10 years later, we anticipate that kelt studies will not occur at these projects until 2028 at the earliest.

Page 6, number 7: This item addresses requirements for consultation that were incorporated into the Medway license as a result of the section 7 consultation. FERC amended the Medway license on February 21, 2013 to require that the licensee "…consult, once every five years, with NMFS, U.S. Fish and Wildlife Service, Penobscot Indian Nation, Maine Department of Inland Fisheries and Wildlife, and Maine Department of Marine Resources once every five years regarding the status of Atlantic salmon and other Endangered Species Act-listed fishes in the Penobscot River to ensure that operation of the Medway Project is consistent with the listing determinations for such species and with the then-current recovery objectives for such species." Given that the

amendment was issued in February 2013, we anticipate that this consultation will occur no later than February 2018.

Page 7, number 8, response to our first comment: We stand by our comment and our February 20, 2015 comment letter submitted to Brookfield. As described in that letter, we do not believe that the 2014 results support a determination regarding the achievement of the performance standard. We disagree with Brookfield in suggesting that there were "…no further comments or objections from NMFS." Although we did not file additional comments with FERC, we certainly made it clear to Brookfield that we were still dissatisfied with the study. In fact, the day after Brookfield filed their 2014 annual report with FERC (March 24, 2015), we had an e-mail exchange (attached) with Brookfield where we indicated that we had not yet received information from them that was necessary for us to adequately assess the results of the study; indicating that this information was "…extremely important for us to understand cumulative effects of hydropower in the river". On May 6, 2015, we reiterated in a separate e-mail to Brookfield that "…there remains some disagreement whether downstream performance standards were achieved at dams in the Penobscot River in 2014" (attached). We are reiterating this point as our position has not changed.

If you have any questions concerning these comments, please contact Jeff Murphy (207-866-7379 or Jeff.Murphy@noaa.gov) .

Sincerely,

Julia E Crocker

Julia E. Crocker
Endangered Species Coordinator

Cc: Oliver Cox (MDMR)
Steven Shepard (USFWS)
Antonio Bentivoglio (USFWS)
Dan McCaw (PIN)
Julie Crocker (NMFS)

Dan Tierney - NOAA Federal <dan.tierney@noaa.gov>

FERC Filing: Atlantic Salmon Species Protection Plan - 2014 Annual Report for Orono, Stillwater, Milford, West Enfield and Medway Projects

Jeff Murphy - NOAA Federal <jeff.murphy@noaa.gov> Wed, Mar 25, 2015 at 8:15 AM
To: "Bernier, Kevin" <Kevin.Bernier@brookfieldrenewable.com>
Cc: "Donald Dow (Donald.Dow@noaa.gov)" <Donald.Dow@noaa.gov>, "Dan Tierney (dan.tierney@noaa.gov)" <dan.tierney@noaa.gov>, "Steve Shepard, F&WS" <steven_shepard@fws.gov>, "Day, Julie" <Julie.Day@brookfieldrenewable.com>, "antonio_bentivoglio@fws.gov" <antonio_bentivoglio@fws.gov>, "Anitra_Firmenich@fws.gov" <Anitra_Firmenich@fws.gov>, "peter_lamothe@fws.gov" <peter_lamothe@fws.gov>, "Cox, Oliver" <Oliver.N.Cox@maine.gov>, "Richard.Dill@maine.gov" <Richard.Dill@maine.gov>, "Randy Spencer (randy.spencer@maine.gov)" <randy.spencer@maine.gov>, "John Perry (john.perry@maine.gov)" <john.perry@maine.gov>, "'gordon.kramer@maine.gov' (gordon.kramer@maine.gov)" <gordon.kramer@maine.gov>, "dan.mccaw@penobscotnation.org" <dan.mccaw@penobscotnation.org>, "Clere,Jason" <Jason.Clere@brookfieldrenewable.com>, "Murphy,Kyle" <Kyle.Murphy@brookfieldrenewable.com>, "Richter, Robert" <robert.richter@brookfieldrenewable.com>, "Zarrella, Antonio" <Antonio.Zarrella@brookfieldrenewable.com>, "Craig, Michael" <Michael.Craig@brookfieldrenewable.com>, "Wynn, Todd" <Todd.Wynn@brookfieldrenewable.com>, "Dewechter, Robert" <Robert.DeWechter@brookfieldrenewable.com>, "Cole, James" <James.Cole@brookfieldrenewable.com>, "Seyfried,Jason" <Jason.Seyfried@brookfieldrenewable.com>, "Brochu, Robert" <Robert.Brochu@brookfieldrenewable.com>, "mary.mccann@hdrinc.com" <mary.mccann@hdrinc.com>, "Sears, Michael (Michael.Sears@hdrinc.com)" <Michael.Sears@hdrinc.com>, "jim.gibson@hdrinc.com" <jim.gibson@hdrinc.com>

Hi Kevin - Despite our previous requests for all tagged smolt detection data through each project in the Penobscot River, your response filed with FERC suggests that you are unwilling to provide it. You state:

"Therefore, the Orion data that did include all frequencies is an incomplete
data set for all smolts that traveled through the system and is of limited value, especially when
considering the additional effort required to filter and analyze this information from the existing
data set."

Its obvious that smolts from upstream projects were detected at receivers at downstream projects. This data is extremely important for us to understand cumulative effects of hydropower in the river. We reiterate our request for the data.

We will likely comment to FERC on this filing in the next several weeks. Thank you, Jeff.

[Quoted text hidden]

--
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Dan Tierney - NOAA Federal <dan.tierney@noaa.gov>

RE: Smolt Studies Meeting

Jeff Murphy - NOAA Federal <jeff.murphy@noaa.gov> Wed, May 6, 2015 at 8:09 AM
To: "Bernier, Kevin" <Kevin.Bernier@brookfieldrenewable.com>
Cc: "Yost, Fred" <fred_yost@fws.gov>, Anitra Firmenich <anitra_firmenich@fws.gov>, "Richter, Robert" <robert.richter@brookfieldrenewable.com>, Dan Tierney - NOAA Federal <dan.tierney@noaa.gov>, "Job, Kevin" <Kevin.Job@brookfieldrenewable.com>, "Cole, James" <James.Cole@brookfieldrenewable.com>, "Brochu, Robert" <Robert.Brochu@brookfieldrenewable.com>, "Craig, Michael" <Michael.Craig@brookfieldrenewable.com>, "Clere,Jason" <Jason.Clere@brookfieldrenewable.com>, "Cox, Oliver" <Oliver.N.Cox@maine.gov>, Antonio Bentivoglio <Antonio_Bentivoglio@fws.gov>, Peter Lamothe <Peter_Lamothe@fws.gov>, Donald Dow - NOAA Affiliate <Donald.Dow@noaa.gov>

Hello Kevin - Thanks for your efforts to address some of the concerns voiced regarding the smolt study design. We really appreciate your commitment towards adaptive management. We support your proposed release strategy and assume all fish released upstream will be monitored at downstream projects.

As you know, there remains some disagreement whether downstream performance standards were achieved at dams in the Penobscot River in 2014. My recommendation going forward for 2015 would be to implement step 2 of the adaptive management plan of the Species Protection Plan (increase bypass flow up to the limit of the facility).

Thanks again and best of luck this year. Jeff.

On Tue, May 5, 2015 at 11:46 PM, Bernier, Kevin <Kevin.Bernier@brookfieldrenewable.com> wrote:

> Below is the smolt release scenario that we settled on for the Penobscot based on the April 16 meeting at GLNFH. We believe this addresses the concerns that were voiced (such as evaluating impoundment mortality), while still meeting Brookfield's need to evaluate passage survival at each dam for meeting performance standards. The first releases are expected to be made this Thursday evening, May 7th.
>
> Please let me know if you have any comments or concerns.
>
> Thanks, Kevin

Table 1. Proposed release scenario, 2015 Atlantic salmon smolt studies, Penobscot River.

River Reach	Release Location (depends on river access)	Number Released	Purpose of Release
Weldon	Head of impoundment	50	Evaluate potential impoundment mortality – Weldon