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October 3, 2022

Shawmut Project (FERC No. 2322)

Mr. Kyle Olcott
Hydropower Coordinator
Maine Dept. of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017

Subject: Brookfield's Responses to Comments Submitted by the Kennebec Coalition, and the Conservation Law Foundation Regarding the Section 401 Water Quality Certification Application for the Shawmut Project (FERC No. 2322)

Dear Mr. Olcott,

Brookfield White Pine Hydro, LLC (BWPH) is licensee of the Shawmut Project located on the lower Kennebec River in Maine. The Federal Energy Regulatory Commission (FERC) license for the Shawmut Project expired on January 31, 2022 and the Project is now operating on an annual license while undergoing relicensing. BWPH's Section 401 Water Quality Certification Application for the Shawmut Project, submitted to the Maine Department of Environmental Protection (MDEP) on October 18, 2021 (WQC Application) included a revised suite of fish passage measures consistent with the lower Kennebec River Species Protection Plan that was filed with the FERC on May 31, 2021. On September 22, 2022, BWPH supplemented its current pending application with the submittal of the *Supplement to the Species Protection Plan and Interim Species Protection Plan for Atlantic Salmon, Atlantic Sturgeon, and Shortnose Sturgeon* (Supplement).

BWPH herein responds to certain of the joint comments filed with the MDEP on February 16, 2022 by the Kennebec Coalition (KC) and the Conservation Law Foundation (CLF) regarding BWPH's WQC Application (the 2021 KC/CLF Comments). BWPH was not aware of the 2021 KC/CLF Comments until they were recently made available by MDEP. Most of the 2021 KC/CLF comments are simply reiterations of their August 16, 2021 comments on the FERC Draft Environmental Assessment (DEA) that were previously addressed in BWPH's October 2021 application, and are largely rendered moot by the Supplement.¹

KC/CLF Comment: *The Shawmut Impoundment does not comply with state water quality standard for aquatic life...the Shawmut Dam segment [is characterized in the MDEP 2016 Integrated Water Quality Monitoring Report] as "Category 3 for potential aquatic life use impairment; insufficient data to delist: macroinvertebrate community attained Class C in 2004 but did not attain in 2002." The Department should deny certification on these grounds.*

BWPH Response: As stated in MDEP's August 11, 2021 draft WQC order at 17, the Shawmut impoundment "meets applicable aquatic life and habitat criteria":

In 1983, 2002, and 2004, benthic macroinvertebrate (BMI) surveys were conducted by the Department's biomonitoring program in the Kennebec River 0.3 kilometers upstream of the

¹ The Maine Department of Marine Resources (MDMR) commented on the WQC Application in January 3, 2022 correspondence, to which BWPH responded on June 1, 2022. To the extent the 2021 KC/CLF Comments reiterate MDMR's January 3, 2022 comments, BWPH does not repeat its June 1, 2022 response here.

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Shawmut Dam. The studies conducted in 1983 and in 2004 showed the impoundment met Class C aquatic life criteria in the Class C section of the impoundment; the 2002 study indicated non-attainment because the samples showed a low generic richness compared to the total abundance of individuals, as well as a low abundance of Ephemeroptera and low EPT relative abundance, all of which subsequently showed significant improvement in the 2004 study. All of these studies were conducted using methods that have since been updated, but are informative of the condition of the biotic community and indicate that Class C aquatic life criteria was met in the impoundment in 2004...Project operations ensure a flow providing wetted conditions for at least 75% of the cross-sectional area of the riverine impoundment, as measured from bankfull conditions and maintain 75% of the littoral zone in wetted conditions as measured from full pond, protecting habitat in the littoral zone. *Based on the evidence provided by the Applicant, the Department, applying its professional judgement through application of its Water Level Policy, determines the Shawmut riverine impoundment meets the applicable aquatic life and habitat criteria.*

(Emphasis added.)

KC/CLF Comment: *The Shawmut Dam does not operate as a “run of river” facility...[there are] three situations where the project routinely deviates from run of river operation:*

- *Units are turned on or off to accommodate changes in inflow and/or pond level. Units 1-6 typically operate in the approximate range of 650 cfs each, units 7-8 typically operate in the approximate range of 1,300 cfs each.*
- *Night time shutdown for eel passage. Since the fall of 2009, Units 7 and 8 have been shut down for 8 hours each night for a six week period between September 15 and November 15 to provide for the safe passage of downstream migrating eels. Depending on available inflow and pond level (spillage or not), these shutdowns and morning startups can change outflows by up to 2,600 cfs.*
- *The rubber dam (inflatable bladder) sections are deflated to accommodate changes in inflow and/or pond level. Since completion of the rubber dam sections in the fall of 2009, and depending on the current inflow compared to the total station hydraulic capacity, management of the pond level by short term operation of the bladder can change short term outflow by up to 7,000 cfs per bladder.*

In short, Brookfield’s own consultants provide the information - and documentation - of HOW and WHY the Shawmut project deviates from run of river operation. While the operational reasons are not unusual, the impact of those operations are significant on the flow of water into and out of the Shawmut Dam impoundment at several scales: (1) changes of 650-1300 cfs in station discharge as units cycle on and off; (2) changes of up to 2,600 cfs for nighttime shut-downs for eel passage; and (3) changes of up to 7,000 cfs due to operation of the inflatable bladder...[and]... the smallest of these three operational changes, in one instance we noted, resulted in head-pond fluctuations of up to 0.4 feet for short term operational changes in the range of +/- 600-1,000 cfs...

The concern with these fluctuations is not with the impacts of reservoir elevation changes, presuming these are within licensed limits, but with the impacts of changes in station discharge below Shawmut Dam, and as they pass through the Hydro-Kennebec and Lockwood projects... The potential impacts of that operation on aquatic habitat below the Shawmut Dam, attraction flow to the fishways at the project, or fish migration in the Kennebec River between the project and tidewater should be assessed accordingly... These fluctuations at the Shawmut Dam are especially worthy of further analysis as none of the other lower Kennebec dams’ licenses allows so much freedom to alter flows. Indeed, all the other lower Kennebec River dams have specific

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terms under either the FERC license or the applicable Water Quality Certification, to minimize flow fluctuations, and in all cases are substantially more protective than the one foot of reservoir surface elevation proposed by the Licensee.

BWPH Response: The KC and CLF previously asserted that the Shawmut project is not operated as a run of river facility by letter dated August 18, 2021 in comments on the MDEP's August 11, 2021 draft WQC order. A similar claim was made by KC at the outset of the FERC relicensing process. At that time, BWPH provided to FERC detailed information regarding impoundment levels and Project discharges clearly demonstrating that the Project is in fact operated as run of river. This information was updated and provided in Appendix 19(c) of BWPH's October 18, 2021 WQC application. As discussed extensively in Appendix 19(c), if the project actually deviated from run of river operation, it would mean that BWPH has storage capability at the Shawmut Project and that storage capability is exercised for energy generation. While a 1 ft fluctuation allows for operational flexibility to accommodate minor changes in elevation associated with varying operating conditions (such as the 4.8 inch fluctuation referenced by KC and CLF above during unit operations), it provides no "storage" capability. To even begin to capitalize on a single foot of "storage" afforded by this provision, BWPH would have to routinely maintain the headpond at elevation 111.0 ft, which, as evidenced by the October 18, 2021 submittal, we do not.

Further, the September 21, 2022 Supplement also describes the gate prioritization for the Shawmut Project. Flows in excess of station capacity (6,755 cfs) and, seasonally, fish passage conveyances (975 cfs), are first prioritized through the log sluice (1,840 cfs) and then through the hingeboard section of the spillway (7,000 cfs minimum to 10,050 cfs maximum). Even when the hingeboards have not been dropped, the top elevation of the hingeboards is 112.0 ft while the top elevation of the rubber dams is 112.5 ft. Inflows in excess of available project conveyances then is spilled at the hingeboard section of the spillway, even when these boards are intact. The rubber dams act in much the same way as pinned flashboards do at the Hydro-Kennebec and Lockwood Projects on the Kennebec River. When inflows are sufficiently high, in the case of the Shawmut Project at inflows in excess of 16,570 cfs, these sections drop in the same way as pinned flashboards would. This is a reactive dam safety mechanism and does not reflect an operational decision to enhance energy generation.

KC and CLF go on to indicate that their concerns with the operation of Shawmut Project are related to downstream flow regimes. Again, if Shawmut had available storage capacity, which it does not, and was operated as a peaking facility, which it is not, variable flows to downstream Projects inconsistent with inflows would be observed. BWPH submitted documentation of project inflows vs discharges in its October 18, 2021 filing. As shown, outflows track with inflows.

KC/CLF Comment: *Brookfield's proposed upstream fish passage facility will not work and is identical to that proposed in the previous application and determined to be inadequate by the Department.*

BWPH Response: KC and CLF reference statements regarding upstream passage made by MDMR in previous filings including its January 3, 2022 comments on BWPH's WQC Application. See BWPH response to MDMR's comments dated June 1, 2022. Moreover, BWPH has recently supplemented its fish passage proposal to include more robust measures that were not considered the KC/CLF Comments.

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KC/CLF Comment: *Brookfield's proposed "improvements" to the limited existing downstream fish passage measures at the Shawmut Dam are insufficient and will not allow its operations to meet downstream passage standards even close to 97 percent for Atlantic salmon smolts...*

First, Normandeau (Brookfield's consultant) inappropriately used paired release studies when analyzing the 2013 to 2015 data. Paired release studies should only be used when there are at least 1000 fish but Brookfield used this methodology with much smaller numbers of Atlantic salmon smolt (approximately 100 each year released above each dam) in the Kennebec. In doing so, Brookfield's consultant actually "creates fish" statistically, with calculated survival rates exceeding the number of fish that actually survived.

Second, Brookfield inappropriately calculated overall downstream survival rates as the product of survival rates at each individual dam, which leaves out the highly significant impacts of the impoundments between the dams. Mr. Pugh analyzed the actual survival of individual smolts from 200 meters above the Weston Dam to the lowermost telemetry station below the Lockwood Dam. Only an average of 56% of smolts survived this multi-dam passage over the course of the four years of the Normandeau studies (Table 1). Even this low survival rate is likely an overestimate because Normandeau released smolts just above the Weston Dam, excluding the likely significant impacts on smolt survival of the 12-mile-long journey through the Weston impoundment to the dam itself. Based on Mr. Pugh's calculations, Brookfield's contention that it can meet an "end-of-pipe" downstream passage goal of 88.5% is wishful thinking that imperils the future of the endangered Atlantic salmon.

Similarly, Mr. Pugh's analysis shows that average survival at the Shawmut Dam between 2013 and 2015 was 78.3% as set forth in Table 2 below, not the 93% the Department appears to have accepted. Brookfield's claimed dam survival estimates for the Shawmut Dam of 96.3%, 93.6%, and 90.6%, for an average 93.5%, is an overestimate of actual survival of fish that pass the Shawmut Dam. For fish released above Shawmut passing to the telemetry station above the Hydro-Kennebec Dam, survival was just 78.3%...

In sum, Brookfield has dramatically overstated the success of its existing downstream passage measures and greatly inflated the likelihood of the success of its limited proposed additional measures with an inaccurate and misleading model. Again, the NGOs believe that this is grounds for the Department to deny Brookfield's application for Water Quality Certification. Should it choose not to do so, the Department must require strict measures such as those MDMR recommended in its draft scoping comments on FERC's upcoming EIS. Specifically, MDMR stated:

MDMR requests that FERC not rely on the proposed guidance booms as safe, timely, and effective downstream passage for all species. USFWS has summarized passage data on guidance booms in a recent filing. The data in their summary demonstrates that guidance booms do not provide safe, timely, and effective passage for salmon smolts or adult river herring and guidance booms do not meet current USFWS design criteria. MDMR recommends that all project passage measures comport with the USFWS Fish Passage Engineering Design Criteria (2019) and based on those criteria, we recommend screening all operating turbines with angled, full-depth bar racks with clear space less than or equal to 0.75 inches. The best available data indicate that racks with 0.5-inch clear space are most protective for multiple species and life stages.

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BWPH Response: Study plans to guide the field and analytical methodologies employed during the 2013-2015 Atlantic salmon smolt downstream passage effectiveness studies at Shawmut were developed in consultation with NMFS and the other resource agencies. The use of the paired-release approach for these studies was agreed to as being representative of project-related survival estimates for smolts as they passed through the reach from approximately 200 m upstream of the dam to the first downstream receiver. (In the case of Shawmut this location was 1.1 miles downstream of the Project.) And while larger sample sizes would certainly be preferable, the availability of ESA-listed salmon smolts for scientific testing is limited by hatchery production and prioritization of meeting annual stocking goals. Subsequent to agency review and discussion, the annual study plans were filed with FERC as part of BWPH's Interim Species Protection Plan Annual Reports. Mr. Pugh's critique of this agency-approved methodology is most likely based on Zydlewski et al. (2017),² which was published in the *Canadian Journal of Fisheries and Aquatic Sciences* two years after completion of the third study year at the Kennebec River Projects.

Mr. Pugh's analyses for survival of smolts passing from Weston to Lockwood and from Shawmut to Hydro Kennebec is misleading as it fails to characterize losses specific to project effects versus those related to background (*i.e.*, natural) mortality. A simple comparison of the total number of smolts at the "top" of a reach versus those detected at the "bottom" does not allow for separation of mortality causes. A corrective estimate of the background mortality is required if one is to identify losses specific to the project effects and methodologies for development of these corrective estimates include the use of a paired-release approach and more recently the incorporation of passage through a "representative reach" of natural riverine habitat. Mr. Pugh's failure to account for the effects of background mortality in his estimates can negatively bias project survival by a considerable amount. Natural smolt mortality in free-flowing river sections has been estimated at 1% per km (Stich et al. 2014³). Mr. Pugh's characterization of project survival fails to take this into account which for the approximately 32 km distance between Weston and Lockwood results in a sizeable loss due to natural effects.

Nevertheless, latent mortality is the impetus for filing of the Supplement, which includes measures to minimize latent mortality, as well as analysis that demonstrates the cumulative standard of 88.5% is achievable given the implementation of the additional adaptive management measures outlined in the Supplement. An analysis of baseline immediate, latent, and total survival estimates by Project, including Shawmut, and cumulatively is presented in Table 13 of the Supplement. An analysis of the range of anticipated outcomes in immediate, latent, and total survival from the implementation of adaptive management measures is presented in Table 14 of the Supplement. BWPH has committed to conducting a study investigating dam passage injury on the potential to contribute to latent mortality (study plan to be developed with agencies). This study will characterize baseline hydrosystem delayed mortality and identify potential issues including migratory delay, sub-lethal injury and disorientation that may result from dam passage and contribute to hydrosystem delayed mortality.

KC and CLF cite MDMR's statement that "guidance booms do not provide safe timely and effective passage for salmon smolts or adult river herring and guidance booms do not meet USFWS criteria." However, Section 9.6.4 of USFWS' 2019 Fish Passage Engineering Design

² Zydlewski, J., D. Stich, and D. Sigourney. 2017. Hard choices in assessing survival past dams – a comparison of single- and paired-release strategies. *Canadian Journal of Fisheries and Aquatic Sciences* 74: 178-190.

³ Stich, D.S., M.M. Bailey, and J.D. Zydlewski. 2014. Survival of Atlantic salmon *Salmo salar* smolts through a hydropower complex. *Journal of Fish Biology* 85: 1074-1096.

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Criteria states “A floating guidance system for downstream fish passage...are designed for pelagic fish which commonly approach the guidance system near the upper levels of the water column. While full-depth guidance systems are strongly preferred, partial-depth guidance systems may be acceptable at some sites (e.g., for protection of salmonids, but not eels).”

As outlined in the Supplement, BWPH is proposing a second, angled fish guidance boom outside of the Shawmut forebay gate structure to augment the protection afforded by the previously proposed forebay fish guidance boom at the Unit 7 and 8 powerhouse, coupled with the 1 inch clear spaced overlays proposed for the Unit 1 – 6 powerhouse. Night-time shutdowns are otherwise proposed for eel passage.

KC/CLF Comment: *Brookfield’s application contains no passage standards for kelts despite extensive research showing the critical importance of repeat spawning in Atlantic salmon.*

BWPH Response: As emphasized in the Supplement, the proposed downstream passage standard for the Shawmut Project (and the other lower Kennebec River Projects) is applicable to all life stages of Atlantic salmon, both kelt and smolt.

KC/CLF Comment: *Brookfield’s proposals are inadequate for other species of sea-run fish both in terms of upstream and downstream passage.*

BWPH Response: BWPH has extensively discussed and explained, in other filings with the MDEP⁴, its proposal for upstream passage at the Shawmut Project, which was designed in full consultation with the agencies, including MDMR, and in accordance with USFWS Design Criteria, to accommodate fish design populations specified by MDMR.

As emphasized in the Supplement, the proposed downstream passage measures for the Shawmut Project now include the following:

- Install 1-inch overlays at the current intakes of the Unit 1 – 6 powerhouse
- Install a fish boom at the current intakes of the Unit 7 and 8 powerhouse
- Construct and operate a new upstream fish passage facility with an AWS having a 340 cfs capacity and a uniform acceleration weir
- Construct a new downstream fish passage flume downstream of the forebay Tainter gate
- Operate the upstream and downstream fish passage facilities in accordance with the Fish Passage Operations and Maintenance Plan
- Install a fish boom outside of the gate structure
- Install a 2-inch trashrack overlay at Unit 7 and 8
- Resurface and smooth the spillway concrete below the hingeboards and the log sluice
- Install a uniform acceleration weir at the Tainter gate
- Reprioritize spill flows to direct spill to avoid ledge outcroppings to the extent possible
- Implement nighttime shutdowns of Units 7 and 8 from 8 pm to 8 am for 4 weeks (but with the possibility of extending the shutdowns to 5 weeks) during the smolt migration period, generally targeted for the last week of April to the last week of May, with the start date to be determined in consultation with NMFS and MDMR based on smolt trapping information or migration model

⁴ See BWPH’s October 15, 2021 WQC Application as well as BWPH’s September 22, 2022 Supplement.

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While these measures are intended to improve fish passage conditions targeting Atlantic salmon, alosine species—as constituent elements of critical habitat—have been considered and are anticipated to significantly benefit from these proposed measures. For example, adult American shad with a length range of 14 to 30 inches, which covers size ranges expected in the Kennebec River, would be anticipated to be fully excluded by the 1 and 2 inch clear spaced overlays if not already deterred by the outside and forebay booms. While juvenile alosines would not be excluded by 2 inch overlays but may be deterred by 1 inch overlays and the booms, desktop entrainment studies utilizing USFWS' Turbine Blade Strike Analysis (TBSA) model have generally shown good survival for propeller and Francis units, 97.5% and 91.9%, respectively. Adult alosine would be expected to experience the same exclusion rates anticipated for Atlantic salmon smolt.

If you have any questions, please feel free to contact me at (207) 755-5605 or randy.dorman@brookfieldrenewable.com.

Sincerely,



Randall Dorman
Licensing Manager

Cc: N. Stevens, J. Seyfried, S. Michaud, J. Rancourt, D. Watson, K. Maloney, D. Heidrich;
BWPH
BWPH File: 2322|01