August 18, 2021

Ms. Kathy Davis Howatt
Hydropower Coordinator
Bureau of Land Resources
17 State House Station,
Augusta, Maine 04333-00017

RE: Comments on Draft Order, Brookfield White Pine Hydro LLC, L-19751-33-H-N

Dear Ms. Howatt:

On behalf of the Atlantic Salmon Federation, the Conservation Law Foundation, Maine Rivers, the Natural Resources Council of Maine and the Kennebec Valley Chapter of Trout Unlimited (collectively, "Maine NGOs"), we wish to express strong support for the Department's Draft Order, Brookfield White Pine Hydro LLC, L-19751-33-H-N. The Draft Order, pursuant to Section 401 of the Clean Water Act (CWA), 33 U.S.C. § 1341, and Department Rules, including 06-096 CMR Chapters 579-581, denies the application of Brookfield White Pine Hydro LLC ("Brookfield") for a water quality certification in connection with the proposed relicensing and continued operation of the existing Shawmut Hydroelectric Project, P-2322 ("Project" or "Shawmut Dam"), located on the Kennebec River in the Towns of Skowhegan, Fairfield, Clinton and Benton, Kennebec and Somerset Counties, Maine. The Department's extensive analysis of the application makes clear that the continued operation of the Shawmut Dam will prevent the Kennebec River from meeting the water quality standards set by the Maine Legislature, and in particular those standards that apply to native fish species, especially the endangered Atlantic salmon and other sea-run fish.

The Maine NGOs submit these comments to address the Department's authority to reach this decision and to suggest some modifications to some of its findings that would have no effect on the Draft Order's conclusion but would more accurately reflect the nature and impacts of the Project's operations on the Kennebec River.

1. The Department Has the Legal Authority to Deny Brookfield's WQC Application

More than 15 years ago, the requirement under the Clean Water Act that owners and operators of hydroelectric projects obtain a water quality certification from the state where they operate the project when seeking to license or relicense that project under the Federal Power Act was unequivocally upheld by the U.S. Supreme Court. S.D. Warren Co. v. Maine Board of Environmental Protection, 547 U.S. 370 (2006). In S.D. Warren, the Supreme Court upheld the conclusions reached previously by the Department, the Board of Environmental Protection, the Maine Superior Court and the Maine Supreme Judicial Court that the operation of S.D. Warren's hydroelectric project on the Presumpscot River resulted in a discharge. That conclusion triggered Clean Water Act Section 401's requirement that before S.D. Warren's project could be relicensed by the Federal Energy Regulatory Commission, it needed to receive a certification from the state that the discharge would not violate the applicable water quality standards for the Presumpscot River. In analyzing the purpose and reach of Section 401, the unanimous opinion,

authored by Justice Souter, noted that "Section 401 recast pre-existing law and was meant to 'continu[e] the authority of the State … to act to deny a permit and thereby prevent a Federal license or permit from issuing to a discharge source within such State.' S. Rep. No. 92–414, p. 69 (1971). Its terms have a broad reach, requiring state approval any time a federally licensed activity "may" result in a discharge ("discharge" of course being without any qualifiers here), 33 U. S. C. §1341(a)(1), and its object comprehends maintaining state water quality standards, see n. 1, *supra."* 547 U.S. at 380.

Accordingly, it is well established that the Department has the legal authority to approve, approve with conditions or to deny an application for water quality certification based on an analysis of if and how a federally licensed activity resulting in a "discharge" can meet Maine's water quality standards. As set forth in the Draft Order, the Department's extensive analysis with respect to the continued operation of this particular Project is that the impact on native fish species is such that no conditions would allow the continued operation of, and discharge from, the Project to meet the applicable water quality standards for the Kennebec River. As such, the Department is required to deny the application.

2. **The Shawmut impoundment does not operate as a "run-of-river" facility**

Brookfield characterizes its Project as a "run-of-river" facility, but the reality is that the Project's operation more closely resembles a peaking system that has widely fluctuating flows at times in order to meet periods of peak energy use as opposed to the constant flows of a "run-of-river" system. The deviations from "run-of-river" operation at the Shawmut Dam are unlike any other dam on the lower Kennebec and the Department should clearly describe for the record those deviations and analyze the impacts of those fluctuations more closely. This will ensure that the record is correct without having an impact on the decision to deny the application.

Brookfield asserts that deviations from run-of-river operations are infrequent and insignificant, and that no minimum flow requirement should be required to protect aquatic resources if the project continues to operate as it has over the last several decades. The Department seems to accept this assertion based on a "desk top analysis" of reservoir elevations that found that deviations of greater than 6" from full pond occur only 4% of the time, and deviations of 1' occur only 1% of the time over a 6-year period. (Draft Order, Page 15.)

Brookfield's application for relicensing emphasizes multiple times that the project is operated in a run-of-river mode but acknowledges that this includes fluctuation of reservoir levels "within one foot of elevation 112.0'."[1] However, the application fails to discuss short term deviations in flow that are frequently observed by people who work and recreate on the Kennebec River below the Project. These deviations are reflected in data provided by Brookfield in its March 22, 2016 response to the Commission's additional information request. For example:

- "White Pine Hydro proposes no changes in the way the Shawmut Project is currently operated and will continue to operate the Shawmut Project as run-of-river such that Project outflows generally equal inflows, **on a daily basis**. To ensure run-of-river

[1] Brookfield. 2020. Shawmut Hydroelectric Project FERC Number 2322-060 Application for New License. Appendix E-6, Draft Project Operations Monitoring Plan. January. P. 2. FERC Accession Number 20200131-5356.

operation, White Pine Hydro proposes to maintain the impoundment level within 1 foot of the normal pond elevation of 112.0' during normal operations. Temporary and minor fluctuations while managing the pond level may occur while turning units on and off, opening gates, and inflating/deflating the rubber dam segments."[2] (Emphasis added.)

- "The Shawmut Hydroelectric Project (Project) operates as a run-of-river facility and the impoundment experiences little fluctuation during normal operations, maintaining the pond level within a foot of the normal full pond elevation of 112.0 feet U.S. Geological Survey (USGS) datum during normal operations."[3]

The application also acknowledges deviations from run-of-river flows, but does not describe their magnitude, frequency, or duration, nor does it indicate the conditions under which such deviations occur.

- "Total project outflow may vary as units, gates, and spillway mechanisms (i.e., rubber dam bladders or flashboards) are opened or closed to manage pond elevations within a run-of-river mode."[4]

River users in the reach below the Lockwood Dam (located about 6-7 river miles below the Project) including fishing guides, anglers, and state employees, have long observed flows that fluctuate on a short-term basis. For example, anglers and MDMR staff who boat in that reach observe that flows often change while they are on the river, in some cases allowing them to motor upstream from the Waterville boat launch to the base of Lockwood Dam, but dropping so low that shallow water precludes motoring back downstream via the same route.[5] Fluctuations in flow have also been observed by fishing guides who track flows on the USGS river gage at Sidney Maine.[6]

Brookfield concedes that these fluctuations are due to the operations at the Shawmut Dam. In correspondence between Kathy Howatt at the Maine DEP and Kevin Bernier at Brookfield, Mr. Bernier acknowledged fluctuations in flows are due to operation of the rubber crest control structure at Shawmut Dam.

- "[T]he May 27 to June 2 time period that you inquired about . . . illustrated the operation of the rubber dam sections at Shawmut to manage pond levels and flows during high inflow periods. The rubber dam cannot be operated in a partially inflated condition—it has to be either fully inflated or fully deflated. Thus, at certain flows when water needs to be spilled at Shawmut, the rubber dam needs to be operated to manage river flows and

[2] Brookfield. 2020. Shawmut Hydroelectric Project FERC Number 2322-060 Application for New License. Exhibit E, Environmental Report. January. P. E-3-10. FERC Accession Number 20200131-5356. Emphasis added.
[3] Brookfield. 2020. Shawmut Hydroelectric Project FERC Number 2322-060 Application for New License, January. Exhibit B, Project Operation and Resource Utilization. January. P. B-1. FERC Accession Number 20200131-5356
3. Brookfield. 2020. Shawmut Hydroelectric Project FERC Number 2322-060 Application for New License, January. Exhibit B, Project Operation and Resource Utilization. January. P. B-1. FERC Accession Number 20200131-5356
[4] Brookfield. 2020. Shawmut Hydroelectric Project FERC Number 2322-060 Application for New License. Exhibit B, Project Operation and Resource Utilization. January. P. B-1. FERC Accession Number 20200131-5356.
[5] Nate Gray, Maine Department of Marine Resources biologist and William Grenier, angler and Kennebec Valley Chapter TU member, personal communication with Jeffrey Reardon, TU.
[6] Richard Behr, Three Rivers Guide Service, personal communication with Jeffery Reardon, TU.

pond levels, i.e., the rubber dam is deflated to release the high flows and then re-inflated after an appropriate period of time to minimize impoundment drawdown.[7]

Flow fluctuations involving the rubber crest control structures are likely limited to periods of high flow, when river flow exceeds the hydraulic capacity of the turbines. But flow fluctuations are also frequently observed during periods of low flows, when operation of the rubber crest control structures is unlikely. The licensee's proposed operation is that "Project outflows generally equal inflows, **on a daily basis**"[8]—allowing considerably more flexibility than other projects on the lower Kennebec.

FERC requested that the Applicant provide additional information about fluctuations in reservoir levels and flows in its January 16, 2016 Comments on Pre-Application Document (PAD), Comments on Preliminary Study Plan, and Requests for Additional Information:

- "Section 4.1 of the PAD states that the impoundment experiences little fluctuation in surface elevation. In order to determine actual fluctuation, include historic data on reservoir levels to describe the daily, monthly, and annual elevations and fluctuations while operating under "run-of-river" operation in any study plans which will be developed." [9]

Brookfield responded in a March 22, 2016 Additional Information Filing. Attachment B of that document includes graphs of hourly headpond elevation, project discharge, and tailwater elevation from January 1, 2001 to December 31, 2015.[10] Attachment B-1 contains hourly operational data from the same period and a table of prorated Shawmut inflow.[11]

The graphs in Attachment B show more than two dozen periods of short-term fluctuations in project discharge of 1000 cfs or more that do not appear to be related to rapid fluctuations in project inflow or to high flow events that might cause deflation of the rubber crest control structure.[12]

More detailed examination of a few of these events selected at random clearly shows that operations frequently deviate from run-of-river flows with short term changes of 600 to 1000 cfs, often with repeated cycles up and down on consecutive days during periods of inflow below the

[7] June 19, 2014 Email from Kevin Bernier, Brookfield, to Kathy Howatt, DEP. June 19, 2014 Email from Kevin Bernier, Brookfield, to Kathy Howatt, Maine Department of Environmental Protection. Included as an attachment to the Kennebec Coalition's January 19, 2016 Scoping Comments on the Shawmut Project (P-2322). Included in the Application package in Appendix E-2, Relicensing Consultation Documentation. FERC Accession Number 20200131-5356.

[8] Brookfield. 2020. Shawmut Hydroelectric Project FERC Number 2322-060 Application for New License. Exhibit E, Environmental Report. January. P. E-3-10. FERC Accession Number 20200131-5356. Emphasis added.

[9] January 19, 2016 letter from Stephen Bowler, FERC, to Frank Dunlap, Brookfield. FERC Accession Number 20160119-3044.

[10] Brookfield. 2016. Additional Information of Brookfield White Pine Hydro LLC for Shawmut Project Relicensing under P-2322. Attachment B. Historic Flows and Reservoir Data. FERC Accession Number 20160322-5191.

[11] Brookfield. 2016. Additional Information of Brookfield White Pine Hydro LLC for Shawmut Project Relicensing under P-2322. Attachment B-1. FERC Accession Number 20160322-5191.

[12] Those events occurred during following approximate date ranges: July 5-12, 2002; July 17-27, 2003; July 2-6, 2004; October 20-28, 2004; November 3-26, 2004; July 1-4, 2005; July 15-23. 2005; September 27-October 8, 2005; August 5-19, 2006; September 1-30, 2006; October 4-10, 2006; June 17-27, 2007; July 30-August 7, 2007; August 20-September 16, 2007; September 10-23, 2009; June 20-27, 2010; October 4-15, 2010; July 22-August 20, 2011; October 22-November 1, 2011; January 9-22, 2012; February 5-17, 2012; July 8-16, 2012; January 18-February 1, 2013; September 16-30, 2013; October 1-10, 2013; December 3-15, 2013; October 29-November 22, 2014; July 29-August 15, 2015; October 10-20, 2015; November 5-15, 2015.

project's turbine capacity. For examples, see Table 1 below. [13]

Table 1: Observed Daily Flow Fluctuations at Shawmut Dam.

Date	Daily Minimum Discharge[44] (CFS)	Daily Maximum Discharge (CFS	Daily Difference (CFS)	Prorated Shawmut Inflow[45] (CFS)
June 20, 2010	2282	3312	1030	3228
June 21, 2010	2240	3288	1048	3465
June 22, 2010	2243	2904	661	3328
June 25, 2010	2203	3008	805	3195
July 8, 2012	3021	4661	1640	4396
July 9, 2012	3655	4513	858	4327
July 10, 2012	3642	4678	1036	4290
July 30, 2015	6304	7317	1013	6363
August 1, 2015	6257	7310	1053	6409
August 5, 2015	6243	7345	1003	6857

Straightforward arithmetic demonstrates that at the Shawmut Project, a 1310-acre reservoir that can be fluctuated by up to 1 foot, provides up to 1310 acre-feet (57,063,300 cubic feet) of stored water. That stored water—combined with instantaneous inflow—can be released through any combination of Shawmut's eight generating units, up to maximum station hydraulic capacity with all turbines running full at 6,690 cfs.

Table 2: Shawmut Dam Generating Unit Capacities[14]

Unit	Max Flow (CFS)
1	648
2	645
3	641
4	672
5	742
6	667
7	1312
8	1347
Total	**6674 cfs**

[13] Brookfield. 2016. Additional Information of Brookfield White Pine Hydro LLC for Shawmut Project Relicensing under P-2322. Attachment B-1. FERC Accession Number 20160322-5191. Daily maximum and minimum discharge data taken from hourly data in Excel file included in Attachment B-1 under column entitled "Project Discharge". Pro-rated Shawmut Inflow data taken from Excel file included in Attachment B-1 from column entitled "Prorated Shawmut Inflow".

[14] From NextEra. 2011. Shawmut Dam Fact Sheet. Attached as "Attachment A".

When flows are below the turbine capacity, it might be advantageous to take advantage of 6" or 1' of stored water to cycle units on and off in response to electricity demand, price or other considerations of the operator. Using even half the allowed fluctuation of one foot, 57,063,300 cubic feet of stored water, can support substantial periods of cycling, followed by a similar period of flows reduced below inflow to refill (assuming inflow remains about the same).

Table 3: Time to operate selected units with 6" or 1' reservoir fluctuation.

Unit	**Flow Per Unit**	**Hours in 6" of Storage**	**Hours in 12" of Storage**
Unit 1	648	12 hours	24 hours
Unit 8	1347	6 hours	12 hours

Units 2-6 would all be sustained for periods similar to Unit 1; Unit 7 would be similar to Unit 8. Any combination of units could be turned on or off, subject only to inflow and the 12" restriction on draw down. Assuming an average August inflow 4509 cfs, one could imagine cycling Unit 8 on and off. This would convert a steady flow of 4509 cfs below the dam into alternating cycles of 5856 cfs (1347+4509) and 3162 cfs (4509 – 1347). The impacts of such a fluctuation will increase as the number and hydraulic capacity of units that are cycled go up. Proportional to river flows, these fluctuations will increase in significance as inflows are reduced.

Table 4: % Flow Fluctuations from cycling smallest (Unit 3) and Largest (Unit 8) Turbines at Moderate and Low Flows.

	Moderate Flow: 5500			**Low Flow: 1947 cfs (Weston Min. Flow)**		
Unit	**Hydraulic Capacity**	**Min Flow**	**Max Flow**	**Min as % of Max**	**Min Flow**	**Max Flow**	**Min as % of Max**
Unit 3	**641**	**4859**	**6141**	**79%**	**1306**	**2588**	**51%**
Unit 8	**1347**	**4153**	**6847**	**61%**	**600**	**3294**	**18%**

There is clearly the capacity to support relatively large flow fluctuations— +/- 1000 cfs or more—that would have substantial impacts on downstream wetted habitat, fish passage at high gradient reaches, or fish attraction to fishways. This will be particularly true during extended periods of low baseflow, when the impacts of cycling even the smallest turbines with approximately 650 cfs capacities could result in significant flow variation at a time when conditions for migrating fish are already stressful. Notably, the flow fluctuations observed in the data Brookfield provided in response to FERC's information requests are frequently in the range of 600-1200 cfs, consistent with the capacities of Shawmut's smaller and larger units, respectively. (See Table 1, Column headed "Daily Difference".)

DEP's analysis in the Draft Order should be modified to address these kinds of short-term, but significant-in-magnitude, deviations from run-of-river operations that in practice make the Project more like a peaking project than a "run-of-river" one. The potential impacts of that operation on aquatic habitat below the Project, attraction flow to the fishways at the Project, or fish migration

in the Kennebec River between the Project and tidewater should be addressed accordingly. As set forth above, this information allows a more thorough assessment of how variable discharges from the Shawmut Project may affect downstream resources and uses on the Kennebec River. Anecdotal information from river users suggests these changes can impact boat access to some river segments, particularly the tailrace of the Lockwood dam. Variations in flow might also affect upstream and downstream salmon and clupeid passage at the Shawmut, Hydro-Kennebec, and Lockwood dams, and, if they occur during periods of extreme low flows or are of large magnitude, aquatic habitat as well – particularly spawning habitat for riverine spawners such as American shad, blueback herring and sea lamprey.

These fluctuations at the Shawmut Dam are especially worthy of further analysis as none of the other lower Kennebec dams licensed allow so much freedom to alter flows. Indeed, all of the other lower Kennebec River dams have specific FERC license or Water Quality Certificate terms to minimize flow fluctuations, and in all cases these are substantially more protective than the 1' of reservoir surface elevation proposed by the Licensee.[15]:

The Project is most similar to Weston: both have impoundments that are approximately12 miles long. Such a long reservoir, combined with the ability to make use of 12" of fluctuation in reservoir surface elevation, provide substantial opportunity for operational flexibility that could result in fluctuations in downstream flows. These are likely of relatively little consequence during periods of inflows that approach or exceed the hydraulic capacity of each project's generating units. But they could be significant during times when flows are substantially below the hydraulic capacity of the units. These deviations are constrained at the Weston project by the requirement for a 1947 cfs minimum flow. The applicant proposes no such constraint at Shawmut.

3. The Draft Order should be modified to be more consistent with Maine's most recent Integrated Water Quality Monitoring Report.

In its Draft Order, the Department states that "[b]ased 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…" (Draft Order, P. 17).

However, according to DEP's most recent Integrated Water Quality Monitoring Report Appendices, the Shawmut impoundment is listed under "Category 3: Rivers and Streams with Insufficient Data or Information to Determine if Designated Uses are Attained (One or More

[15] At the Weston Dam, the licensee is limited to the same 1-foot variation from a full head pond elevation proposed for Shawmut, but this is coupled with a requirement for a minimum flow of "1947 cfs or inflow, whichever is less."[15] At the Hydro Kennebec Project, "instantaneous run-of-river" is required and the licensee . . . shall at all times act to minimize the fluctuation of the reservoir surface elevation by maintaining a continuous discharge form the project that approximates the instantaneous sum of all the inflow to the reservoir." And at the Lockwood Project, only a 6" deviation from full pond is allowed under normal operating conditions, and minimum flows are required into the bypass channel (50 cfs) and below the powerhouse during flashboard replacement (2114 cfs). Deviations from run-of-river flow are substantially constrained by the 6" limit on reservoir fluctuation and the very limited surface area of the Lockwood impoundment. See, FERC Order Issuing New License, P-2325, November 25, 1997, pp. 24-25, FERC Accession Number 19971201-0190 (Weston); FERC Order Issuing New License, P-2611. October 15, 1986, p. 6, FERC Accession Number 19861022-0033, (Hydro Kennebec); and FERC Order Issuing New License, P-2574 March 4, 2005, pp. 7-8, FERC Accession Number 20050304-3069, (Lockwood).

Uses may be Impaired)".[16] The Appendices further state, in reference to the segments of the Kennebec above and below the Shawmut Dam "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."[17]

DEP's final order should be consistent with its own Integrated Water Quality Monitoring Report. Moreover, removal of the Shawmut Dam would decrease sedimentation in the reach, lower temperatures, and improve oxygenation. This would increase assimilative capacity of the river and make it far easier for dischargers, such as Sappi, to attain water quality standards.

4. **The record does not support a finding that Brookfield's proposed Shawmut fishway was designed for an upstream passage rate of 95% for adult Atlantic salmon.**

Fishways are not designed to meet a certain passage standard or efficiency rate, nor does a fishway meeting USFWS standards reliably guarantee a particular passage standard or efficiency rate. Fishways are designed for capacity – pounds of fish to be lifted or passed, the size of hoppers, the rate hoppers can complete lift cycles, the size/width of fish ladders or of pools, etc. The *efficacy* of a given design – its ability to meet a certain passage percentage or efficiency rate– is never guaranteed because, as clearly stated in the USFWS Fish Passage Engineering Design Criteria manual (USFWS 2019), "The efficacy of any fish passage structure, device, facility, operation, or measure is highly dependent on local hydrology, target species and life stage, dam orientation, turbine operation, and myriad other site-specific considerations."[18]

Simply stating that a fishway will meet a standard does not mean that it will. Moreover, this particular fishway was not designed to meet a 95% passage standard; rather, it was designed to pass fish given the configuration of the dam and powerhouses in issue sized to pass the estimated capacity needs. The Draft Order should be modified to reflect this fact.

5. **Brookfield's downstream passage survival rate at Shawmut is not 93% as the company claims.**

The Draft Order states that "Based on a radio telemetry study of downstream fish passage structures and operations at the Shawmut facility, baseline survival of downstream migrating Atlantic salmon smolts averaged 93%." This is not correct and is based on Brookfield's greatly exaggerated downstream survival data.

On behalf of the Maine NGOs, Don Pugh, a fish passage expert with decades of experience, including many years at the S.O. Conte Anadromous Fish Research Center,[19] evaluated

[16] Maine DEP. 2018. 2016 Integrated Water Quality Monitoring Report. Appendices. P. 60. Accessed at https://www.maine.gov/dep/water/monitoring/305b/2016/28-Feb-2018_2016-ME-IntegratedRptLIST.pdf.
[17] Maine DEP. 2018. 2016 Integrated Water Quality Monitoring Report. Appendices. P. 60. Accessed at https://www.maine.gov/dep/water/monitoring/305b/2016/28-Feb-2018_2016-ME-IntegratedRptLIST.pdf.
[18] USFWS (U.S. Fish and Wildlife Service). 2019. Fish Passage Engineering Design Criteria. USFWS, Northeast Region R5, Hadley, Massachusetts at Section 1.3 p. 1-1.
[19] Mr. Pugh's curriculum vitae is attached to these Comments.

Brookfield's downstream smolt passage data from 2012 to 2015[20] [21] [22] [23]and identified two key factors that inflated smolt survival percentages.

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.[24] Using this methodology with small numbers of Atlantic salmon smolts in the Kennebec, as Brookfield's consultant did, actually "creates fish" statistically, with calculated survival rates exceeding the number of fish that actually survived.[25]

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.[26] 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 Weston impoundment. Based on Mr. Pugh's calculations, Brookfield's contention that it can meet an "end-of-pipe" downstream passage goal of 88.5% is not just wishful thinking but also perilous for 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 5 below, not the 93% the Department appears to have accepted. Brookfield's claimed dam survival estimates for the Shawmut project of 96.3%, 93.6%, and 90.6%, for an average 93.5%,[27] overestimate actual survival of fish that pass the Shawmut project. For fish released above Shawmut passing to the telemetry station above the Hydro-Kennebec, survival was just 78.3%.

[20] Normandeau (Normandeau Associates, Inc.). 2013. Downstream passage effectiveness for the passage of Atlantic salmon smolts at the Weston, Shawmut and Lockwood projects, Kennebec River, Maine. Prepared for FPL Energy Maine Hydro LLC and The Merimil Limited Partnership.

[21]Normandeau (Normandeau Associates, Inc.). 2014. Evaluation of Atlantic salmon Passage at the Weston, Shawmut, Hydro Kennebec, and Lockwood Projects, Kennebec River and Brunswick Project, Androscoggin River, Maine, Spring 2013. Prepared for Brookfield White Pine Hydro LLC and The Merimil Limited Partnership.

[22] Normandeau (Normandeau Associates, Inc.). 2015. Evaluation of Atlantic salmon Passage at the Weston, Shawmut, Hydro Kennebec, and Lockwood Projects, Kennebec River and Brunswick Project, Androscoggin River, Maine, Spring 2014. Prepared for Brookfield White Pine Hydro LLC and The Merimil Limited Partnership.

[23] Normandeau (Normandeau Associates, Inc.). 2016. Evaluation of Atlantic salmon Passage at the Weston, Shawmut, and Lockwood Projects, Kennebec River and Pejepscot and Brunswick Projects, Androscoggin River, Maine, Spring 2015. Prepared for Brookfield White Pine Hydro LLC and The Merimil Limited Partnership.

[24] Zydlewski, J., D. Stich and D. Sigourney. 2017. Hard choices in assessing survival past dams – a comparison of single- and paired-release strategies. Can. J. Fish. Aquat. Sci. 74(2): 178-190.

[25] Kennebec Coalition. 2020. MOTION TO INTERVENE, WITH PROTESTS AND COMMENTS OPPOSING THE ISSUANCE OF A NEW LICENSE FOR THE SHAWMUT PROJECT NUMBER 2322-069, WITH RECOMMENDATION FOR ORDER OF PLAN FOR DECOMMISSIONING AND REMOVAL. P. 41. FERC Accession Number 20200831-5332.

[26] Kennebec Coalition. 2020. MOTION TO INTERVENE, WITH PROTESTS AND COMMENTS OPPOSING THE ISSUANCE OF A NEW LICENSE FOR THE SHAWMUT PROJECT NUMBER 2322-069, WITH RECOMMENDATION FOR ORDER OF PLAN FOR DECOMMISSIONING AND REMOVAL. P. 38. FERC Accession Number 20200831-5332.

[27] 2020. Kleinschmidt Associates. Brookfield White Pine Hydro LLC. Application for New License for Major Water Power Project – Existing Dam. Shawmut Hydroelectric Project (FERC Number 2322). January 30. P. E-4-52.

The numbers of smolt arriving at the Weston project and detected at the telemetry stations below the projects are from the study reports prepared by Normandeau Associates, Inc.[28] [29] [30] [31] Tables 12-15 and Appendix A in the 2012 report and Appendices C in the 2013 to 2015 reports list the number of fish that arrived at the Shawmut and Weston projects and that were detected below each of the projects, at the Hydro-Kennebec station, and at the lowermost telemetry station below the Lockwood dam. Mr. Pugh calculated survival as the number of fish detected at the lowermost telemetry station below Lockwood (Weston arrivals) or at the Hydro-Kennebec dam, divided by the number of smolts arriving at a project (Weston or Shawmut), times one hundred (See Tables 5 and 6 below). Fish that are released above Weston encounter the Weston dam and the downstream projects like naturally outmigrating smolts. This estimate is conservative when compared to wild smolts as it does not include the impact of the Weston impoundment.

Table 5. Number of smolts arriving at the Weston project and detected at the lowermost telemetry station below the Lockwood project and annual and combined survival rates.

Year	Arrive Weston	Detected Lowest Station	%
2012	**115**	**34**	**29.6**
2013	**100**	**70**	**70.0**
2014	**99**	**69**	**69.7**
2015	**98**	**59**	**60.2**
All	**412**	**232**	**56.3**

Table 6. Number of smolts arriving at the Shawmut project, number detected arriving at the Hydro-Kennebec station and the percent survival for each of three years and the combined survival.

Year	Arrive Shawmut	Detected Hydro-K	%
2013	**102**	**86**	**84.3**
2014	**100**	**82**	**82.0**
2015	**93**	**63**	**67.7**
All	**295**	**231**	**78.3**

[28] Normandeau (Normandeau Associates, Inc.). 2013. Downstream passage effectiveness for the passage of Atlantic salmon smolts at the Weston, Shawmut and Lockwood projects, Kennebec River, Maine. Prepared for FPL Energy Maine Hydro LLC and The Merimil Limited Partnership.

[29] Normandeau (Normandeau Associates, Inc.). 2014. Evaluation of Atlantic salmon Passage at the Weston, Shawmut, Hydro Kennebec, and Lockwood Projects, Kennebec River and Brunswick Project, Androscoggin River, Maine, Spring 2013. Prepared for Brookfield White Pine Hydro LLC and The Merimil Limited Partnership.

[30] Normandeau (Normandeau Associates, Inc.). 2015. Evaluation of Atlantic salmon Passage at the Weston, Shawmut, Hydro Kennebec, and Lockwood Projects, Kennebec River and Brunswick Project, Androscoggin River, Maine, Spring 2014. Prepared for Brookfield White Pine Hydro LLC and The Merimil Limited Partnership.

[31] Normandeau (Normandeau Associates, Inc.). 2016. Evaluation of Atlantic salmon Passage at the Weston, Shawmut, and Lockwood Projects, Kennebec River and Pejepscot and Brunswick Projects, Androscoggin River, Maine, Spring 2015. Prepared for Brookfield White Pine Hydro LLC and The Merimil Limited Partnership.

Brookfield proposes the whole river (end-of-pipe) survival as a multiplication of the immediate dam survival estimates at each project. But a more accurate picture of smolt survival would be gained by analyzing the number of fish that pass all four projects, as it accounts for project impacts in addition to dam passage. These impacts include increased water temperature in the impoundments[32] [33]; reduced migration speed through the impoundments[34] [35] [36] [37] [38] [39]; increased predation in the impoundment and tailraces[40] [41] [42] [43]; and the cumulative impacts of injury during dam passage[44] [45]. Each of these impacts can negatively affect survival. Outmigration must be considered as a complete movement past all four projects, not as the subset of only passage from the lower end of the impoundment to the base of a single dam. A direct analysis of smolt survival from arrival at the Weston project to detection below the Lockwood project accounts for these factors—and shows survival rates much lower than Brookfield reports.

Brookfield's analysis is further undermined by inappropriately using "paired release" analysis to determine survival in 2013, 2014, and 2015. The paired release analysis is designed to determine the 'natural', no dam in place, mortality from immediately above the dam to below it and adjust dam passage survival at the project to account for this 'natural' mortality. Again, a paired release analysis is not appropriate for the Kennebec studies as the sample sizes were too low. Multiple tables in the reports from 2013 to 2015 show a paired survival estimate greater than either survival for S1 or S2 (test release and tailrace release survivals) for both group releases and all releases combined for a project (e.g., Normandeau,2013 - Tables 40, 41 & 46: Normandeau 2015 - Tables 4-11 & 4-15). In essence, the paired release calculation in these instances 'makes' fish. Table 4-15 (Weston 2015 whole station survival estimates) combined releases survivals for S1

[32] Marschall, E., M.Mather, D.Parish, G.Allison, and J. McMenemy. 2011. Migration delays caused by anthropogenic barriers: modeling dams, temperature, and success of migrating salmon smolts.
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[35] Havn, T., E. Thorstad, M.Teichert, S.Saether, L.Heermann, R.Hedger, M.Tambets, O.Diserud, j.Borcherding, and F. Økland. 2018. Hydropower-related mortality and behaviour of Atlantic salmon smolts in the River Sieg, a German tributary to the Rhine. Hydrobiologia 805**,** 273–290.
[36] Holbrook, C., M.Kinnison, and J.Zydlewski. 2011. Survival of migrating Atlantic salmon smolts through the Penobscot River, Maine: a prerestoration assessment. Trans. Am. Fish. Soc. 140:1255–1268.
[37] Marschall, E., M.Mather, D.Parish, G.Allison, and J. McMenemy. 2011. Migration delays caused by anthropogenic barriers: modeling dams, temperature, and success of migrating salmon smolts.
Ecological Applications, 21(8), pp. 3014-3031.
[38] Norrgard, J., L.Greenberg, J.Piccolo, and M.Schmitz. 2013. Multiplicative loss of landlocked Atlantic salmon *Salmo salar* L. smolts during downstream migration through multiple dams. Rivers Research and Applications, Vol.29, no 10, pp. 1306-1317.
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[41] Jepsen, N., K.Aarestrup, F Okland, and G. Rasmussen. 1998. Survival of radio-tagged Atlantic salmon (*Salmo salar* L.) and trout (*Salmo trutta* L.) smolts passing a reservoir during seaward migration. *Hydrobiologia* **371/372:** 347–353.
[42] Havn, T., E. Thorstad, M.Teichert, S.Saether, L.Heermann, R.Hedger, M.Tambets, O.Diserud, j.Borcherding, and F. Økland. 2018. Hydropower-related mortality and behaviour of Atlantic salmon smolts in the River Sieg, a German tributary to the Rhine. Hydrobiologia 805**,** 273–290.
[43] Økland, F., Teichert, M.A.K., Thorstad, E.B., Havn, T.B., Heermann, L., Sæther, S.A., Diserud, O.H., Tambets, M., Hedger, R.D. & Borcherding, J. 2016. Downstream migration of Atlantic salmon smolt at three German hydropower stations. NINA Report 1203: 1-47.
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and S2 are 0.888 and 0.850. The calculated paired release survival is 100.0% (S1 ÷ S2 * 100). Similarly, the 2013 report estimated Lockwood survival is 100% when both S1 and S2 are 0.95. In neither release did all fish survive yet the estimate is that all survived.

The Kennebec presents a particularly egregious example of the impact of impoundments – the still waters created by dams. Between Lockwood and the confluence of the Sandy River, 85% of the river is impounded – nearly 30 river miles from the upper end of the Weston impoundment to the Lockwood dam. NMFS clearly states that impoundments constitute a serious risk to Atlantic salmon in its 2013 Biological Opinion:

> Impoundments created by these dams limit access to habitat, alter habitat, and degrade water quality through increased temperatures and lowered dissolved oxygen levels. Furthermore, because hydropower dams are typically constructed in reaches with moderate to high underlying gradients, significant areas of free-flowing habitat have been converted to impounded habitats in the Kennebec and Androscoggin River watersheds Coincidently, these moderate to high gradient reaches, if free-flowing, would likely constitute the highest value as Atlantic salmon spawning, nursery, and adult resting habitat within the context of all potential salmon habitat within these reaches. [46]

Brookfield's analysis of downstream fish passage effectiveness for salmon for the years 2012 to 2015 does not consider any of the above effects. Rather it is designed to assess survival merely from arrival to below the dam. For the four projects combined, this is just over a half of a river mile, less than 2% of length of the four projects' impact on smolts.

In short, Brookfield's radio tagging studies greatly inflated downstream smolt survival rates at the Shawmut Dam and the other three dams. DEP's Draft Order should not credit Brookfield with achieving 93% passage at Shawmut. That actual passage rate was 78.3% or lower. The Department of Marine Resources stated it best when it noted that none of Brookfield's downstream passage "improvements", such as a guidance boom and unit cycling, can bridge the gap between reality and Brookfield's proposed downstream passage rate of 96%.

Conclusion

The Maine NGOs strongly support DEP's denial of water quality certification for the Shawmut Project. The denial falls well within the scope of its legal authority and is amply supported in the record by evidence that the "discharge" from the Project cannot meet the applicable water quality standards for the Kennebec River, particularly because of the harm it does to native fish species. However, we also urge DEP to modify and/or supplement its analysis to reconsider the facts regarding the following: (1) the Shawmut Project's impoundment is not in attainment with aquatic life standards; (2) operations at the Shawmut dam in are in practice more like a reservoir peaking facility than a "run-of-river" facility; (3) the proposed fish lift is not designed to meet a

[46] National Marine Fisheries Service (NMFS). 2013. Endangered Species Act Biological Opinion, Amendment of the Licenses for the Lockwood (2574), Shawmut (2322), Weston (2325), Brunswick (2284), and Lewiston Falls (2302) Projects. July 19, 2013. Page 46 [FERC Accession Number 20130723-0012].

95% upstream passage standard: and (4) the true downstream survival rate for salmon smolts is far lower than Brookfield claims.

Thank you for your consideration of these comments.

Very truly yours,

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