August 14, 2021

UNITED STATES OF AMERICA

BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Brookfield White Pine Hydro LLC	Project No. 2322-069

KENNEBEC COALITION'S AND THE CONSERVATION LAW FOUNDATION'S JOINT PROTESTS AND COMMENTS IN OPPOSITION TO THE "DRAFT ENVIRONMENTAL ASSESSMENT FOR HYDRPOWER LICENSE" FOR THE SHAWMUT PROJECT NUMBER 2322-069, MAINE

Pursuant to the Notice of Availability of Draft Environmental Assessment and Revised Procedural Schedule (July 1, 2021), the Kennebec Coalition and the Conservation Law Foundation jointly submit these Protests and Comments in opposition to the Draft Environmental Assessment for Hydropower License.[1]

In accordance with the Commission's Rules of Practice and Procedure, 18 C.F.R. §385..214, the Atlantic Salmon Federation U.S. ("ASF"), the Kennebec Valley Chapter of Trout Unlimited ("KVTU"), the Natural Resources Council of Maine ("NRCM"), and Maine Rivers (hereinafter collectively referred to as the "Kennebec Coalition") timely moved to intervene in the above-captioned proceeding on August 31, 2020[2] with the

[1] Commission staff also indicated that the Draft EA would serve simultaneously as the Commission's Biological Assessment for purposes of initiation of formal section 7 consultation with NMFS under the Endangered Species Act (the "ESA"), 16 U.S.C. § 1536, for the relicensing of the Shawmut Project. FERC Accession No. 20210709-3034 (Turner to Petony correspondence requesting formal consultation on the relicensing of the Shawmut Project, July 9, 2021) ("The DEA [Draft EA] serves as our biological assessment and EFH [essential fish habitat] assessment."). Hence these Comments will also serve as the Kennebec Coalition's and Conservation Law Foundation's protests and comments on the Biological Assessment under the ESA, and on the EFH assessment.

[2] FERC Accession No. 20200831-5332; Draft Environmental Assessment (hereafter "Draft EA") section 1.4.2.

Kennebec Coalition's protest and comment on the hydroelectric application for issuance of a new license for the Shawmut Project FERC No. 2322-069. The Kennebec Coalition has therefore been granted party status by operation of 18 C.F.R. 385.214(c)(1).

The Conservation Law Foundation ("CLF") joins the Kennebec Coalition in these Protests and Comments in opposition to the Draft Environmental Assessment for Hydropower License, and has filed a motion to intervene pursuant to 18 C.F.R. 385.214(b)(1).[3]

THE NEPA FINDINGS AND ANALYSIS ARE ARBITRARY AND CAPRICIOUS

The Commission staff determination in the Draft Environmental Assessment ("Draft EA") that issuance of a new license for the Shawmut Project, with the additional staff-recommended measures, would not constitute a major federal action affecting the quality of the human environment, is clearly arbitrary and capricious. As we demonstrate in these comments, the Draft EA does not take a "hard and honest look" at the environmental consequences of relicensing the Shawmut Project. As a result, the measures proposed by Commission staff are not sufficient to reduce those consequences to a minimum. For this reason, the proposed finding of no significant impact means this Draft EA must be rejected, and an environmental impact statement ("EIS") must be prepared before the Shawmut relicensing application is considered by the Commission.[4]

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[3] FERC Accession No. 20210813-5093.

[4] The Kennebec Coalition and resource agencies object to the Commission's failure to exercise its discretion and order an EIS at the outset of this proceeding as authorized by 18 C.F.R. § 380.5(a). Exercise of this discretionary authority may still occur by this Commission now ordering resubmission to staff for reconsideration of the inadequacies in the EA. *Id.* ("Depending on the outcome of the environmental assessment, the Commission may . . . prepare an environmental impact statement."). We repeat that at the

I. Introduction

The primary function of the National Environmental Policy Act ("NEPA")[5] is to compel federal agencies "to take a hard and honest look at the environmental consequences of their decisions."[6] In *American Rivers and Alabama Rivers Alliance v. Federal Energy Regulatory Commission*, 895 F.3d 32, 49 (D.C. Cir. 2018), the Court articulated the following analytic steps required by NEPA:

- Identify accurately the relevant environmental concerns;
- Take a hard look at the problem in preparing the environmental assessment;
- Make a convincing case for any finding of no significant impact;
- Show why, if there is an impact of true significance there are sufficient safeguards to reduce the impact to a minimum; and
- If such safeguards are not in place or insufficient, then an EIS must be prepared before the action is taken.[7]

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outset of these proceedings on the final license application, USFWS, NMFS and MDMR all called for preparing an EIS rather than an EA: Letter to Vince Yearick, Director , Division of Hydropower Licensing, FERC, from Anna Harris, Project Leader, Maine Field Office, Fish and Wildlife Service, United Sates Department of the Interior, August 9, 2017 [**FERC Accession No. 20170809-5067**]; Letter to Secretary Bose, Federal Energy Regulatory Commission from Julie Crocker, ESA Fish Recovery Coordinator, (NMFS Greater Atlantic Regional Fisheries Office), August 16, 2017 [**FERC Accession No. 20170816-5134**] ("given the existing information on project effects, we recommended that FERC analyze the impacts of the project by preparing an EIS, rather than an EA."); Letter to Secretary Bose, Federal Energy Regulatory Commission from Patrick C. Keliher, Commissioner, MDMR, August 9, 2017 **[FERC Accession No. 20170817-5120**] ("However, given the existing information on project impacts, summarized below, we recommend that the Commission analyze the impacts of the project by preparing an EIS, rather than an EA.").

[5] 42 U.S.C. 4321 et seq.

[6] *American Rivers and Alabama Rivers Alliance v. Federal Energy Regulatory Commission*, 895 F.3d 32, 49 (D.C. Cir. 2018).

[7] *American Rivers*, 895 F.3d at 49.

Under this test, "the Commission's Assessment will pass muster only if it undertook a 'well-considered' and 'fully informed' analysis of the relevant issues and opposing viewpoints."[8]

The context in which the proposed action is to be taken is the "baseline" and must include the existing conditions and the enduring effect of past actions.[9] The analysis must then turn to a searching evaluation of the likely impact of the proposed action, including "cumulative effects" which are impacts on the environment that result from "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."[10]

While "significance typically depends on the action's effects in the immediate locale, rather than in the broader ecosystem or world as a whole," "intensity" refers to the " 'severity' or acuteness of the impact on the contextualized environment."[11] Obviously, this is a fact driven analysis, but there is little doubt about the scope and impact of the federal action involved here: relicensing of a hydropower project that is one of four adjacent hydropower projects owned and operated by the same entity that have a cumulative and combined impact. This relicensing review is taking place at the same time that 1) the State of Maine is undertaking a significant revision of its proposed river

[8] *Id*. (citing and quoting in part *Myersville Citizens for a Rural Cmty., Inc. v. FERC*, 783 F.3d 1301, 1324-25 (D.C. Cir. 2015)).

[9] *Id*. ("Evaluating an action's environmental 'significance' requires analyzing both the context in which the action would take place and the intensity of its impact.") (citing 40 C.F.R. § 1508.27).

[10] 40 C.F.R. § 1508.27 (quoted in *American Rivers*, 895 F.3d at 54); Draft EA at § 3.2, p.24 n.21 (referencing CEQ's 1978 regulations).

[11] *American Rivers*, 895 F.3d at 49-50.

management plan encompassing the same four projects;[12] 2) state and federal natural resource agencies are recommending the removal of the Shawmut Project; and 3) the Shawmut Project relicensing is undergoing an almost simultaneously initiated ESA section 7 consultation process with the other three hydropower projects.[13] The environmental impacts of relicensing of the Shawmut Project in this context are clearly significant and intense.

The baseline in this proceeding is unique because the Shawmut Project is the third dam on the Kennebec River and currently has no fish passage. The first dam on the Kennebec (Lockwood, FERC Project No. P-2574) has a fish lift that is a dead-end for endangered Atlantic salmon,[14] which are trapped in the lift and then trucked past the Hydro-Kennebec Project (FERC No. 2611), Shawmut (FERC No. 2322), and the Weston Project (FERC No. 2325) up to the Sandy River – the locale of critical, ideal spawning habitat; other species captured at Lockwood, including alewives, blueback herring, and shad, are trucked to various upstream impoundments.[15] All four of these dams are located within the designated critical habitat of the Gulf of Maine Distinct Population Segment ("GOM DPS") of endangered Atlantic salmon.[16] The Draft EA cites a dismal 79% for salmon passage effectiveness at Lockwood, but even this number is too high, by

[12] Draft EA at p. 188 (referencing and acknowledging MDMR process of plan revision).

[13] FERC Accession No. 20210709-3034 (Turner to Petony correspondence requesting formal consultation on the relicensing of the Shawmut Project, July 9, 2021); FERC Accession No. 20210726-3031 (Nguyen to Crocker correspondence requesting formal consultation on Final Plan proposing actions for the remaining license terms of the Lockwood, Hydro-Kennebec and Weston Projects).

[14] Draft EA at p. 40.

[15] Draft EA at p. 77.

[16] 74 Fed. Reg. 29,300 (Designation of Critical Habitat for Atlantic Salmon (*Salmo salar*) Gulf of Maine Distinct Population Segment) (June 19, 2009).

significantly ignoring other impacts. The fish-lift causes severe delays as well. The National Marine Fisheries Service ("NMFS") stated in a 2018 letter to Brookfield that:

> We note that consistent with the first season, the results of the second season demonstrated unequivocally that: 1) The Lockwood facility demonstrates poor upstream passage efficiency for Atlantic salmon; 2) Atlantic salmon are highly attracted to the "bypass" reach of the Lockwood facility; and 3) the Lockwood facility imposes a significant delay upon the upstream migration of Atlantic salmon. Although the study did not address the facility's upstream passage effect on other species, it is reasonable to assume that other diadromous species experience similar effects.[17]

Thus, at the present time, no fish pass upstream by the Shawmut project (except in tank trucks after being trapped at Lockwood). Under the required "cumulative analysis" of NEPA, the "reasonably likely" future actions proposed by the project licensees, including those not yet approved by the Commission,[18] must be included in the baseline and cumulative effects analysis. For example, the untested efficiency of the Hydro-Kennebec fish passage facilities (which are just above Lockwood), and the planned fish passage at the Weston Dam which has not yet been approved by any of the resource agencies, must be included in the baseline context, despite their uncertain future results. The following Comments of the Kennebec Coalition and CLF set forth the best available information establishing, beyond cavil, that the four-dam fish passage regime is reasonably certain to *fail*.[19] The Draft EA conclusion that "the development of fishways [at all four projects in the system] are reasonably certain to facilitate fish passage on an annual basis for the numbers of each species specified by NMFS and recommended by

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[17] Letter from Dan Kircheis (Acting ESA Fish Recovery Coordinator, NMFS Greater Atlantic Regional Fisheries Office) to Kelly Maloney, Brookfield re NOAA Fisheries comments on draft 2017 KHDG report (March 27, 2018) at 1 [FERC Accession No. 20180329-5166].

[18] Brookfield has just filed a Final Species Protection Plan and Biological Assessment for the four-dam watershed, FERC Accession No. 20210601-5152.

[19] The List of References to literature cited in these Comments is attached hereto.

Maine DMR" is arbitrary and capricious, especially in light of the record dispute with this conclusion by NMFS and the Maine Department of Marine Resources ("MDMR").[20] Part of taking an "honest" look at environmental consequences under NEPA is to undertake a "fully informed" and "well-considered" analysis of "opposing viewpoints."[21] As demonstrated below in these Comments, the Draft EA fails to do such an analysis.

Another glaring deficiency with the Draft EA is the complete lack of performance standards for alosine or other anadromous species in the Brookfield fishway proposals.[22] The absence of performance standards for these fish is a clear failure in the staff-recommendations and environmental impact analysis of the proposal, since the presence of such fish plays a significant role not only in the recovery of Atlantic salmon, but also in the health and quality of the riverine environment extending far beyond the project boundaries. To put it bluntly, those other species have a profound effect on the environmental analysis, yet they are not even included in the staff-recommended additional measures. That omission completely undermines a finding of no significant impact.

Indeed, the only support for the Commission staff's finding of no significant impact is anchored in staff's acceptance of the performance criteria for upstream and

[20] **FERC Accession No. 20200828-5176** (NMFS Comments, Recommendations, etc. for the Shawmut Project) at pp. 43-44 ("Accordingly, a decision to decommission and remove the Shawmut Project and thereby remove a significant barrier to recovering an endangered species, and support the restoration of several anadromous fish, would fulfill the Commission's mandate under the FPA to ensure the best comprehensive use of a waterway."); **FERC Accession No. 20200828-5199** (Maine Department of Marine Resources ("MDMR") Comments on the Final License Application for Shawmut) at Executive Summary on Shawmut FLA) at Executive Summary p. 2 (noting MDMR's development of an amendment to the 1993 Kennebec Management Plan "as a comprehensive plan that will include dam decommissioning and removal' and supporting request to FERC to "analyze decommissioning and removal as a preferred option").

[21] *American Rivers*, 895 F.3d at 49.

[22] Draft EA at p. 38.

downstream salmonid passage at Shawmut and the other three dams in the watershed proposed by Brookfield, supplemented by a staff recommendation for effectiveness studies for salmon passage only.[23] Brookfield might as well have just written the environmental assessment itself. At a minimum, staff's conclusion that "[b]ased on our independent analysis, we find that the issuance of a new license for the Shawmut Project, with the additional staff-recommended environmental measures would not constitute a major federal action affecting the quality of the human environment" cannot survive the required level of review and must be rejected by the Commission. Specifically, the Commission must reject that conclusion because:

1. The "independent analysis" failed to take a hard look at the environmental consequences of the performance standards for upstream passage of endangered Atlantic salmon at Shawmut (95%) and for the four dams collectively (81.4 %) proposed by Commission staff, including whether those performance standards were reasonably likely to even be achieved under best available information. Draft EA at 15;

2. The "independent analysis" failed to take a hard look at the environmental consequences of proposed downstream passage performance standards of endangered Atlantic salmon at Shawmut (96%) and for the four dams collectively (84.9%), including whether those performance standards were reasonably likely to even be achieved under best available information. Draft EA at 16;

3. The failure to include performance standards for passage of alosines in the staff recommendation based on monetary costs is erroneous and fails the hard look test, and;

4. The failure to take a "hard and honest" look at dam removal and decommissioning of Shawmut, characterizing it as "speculative and premature" (Draft EA at 188), and the implication that the relicensing with the staff recommendations is a "better than nothing approach," falls far short of the NEPA and *American Rivers* analytic standards.

[23] Draft EA at Section 5.1.2, pages 106-117, and Section 5.1.3 at 117-121 ("We conclude that any passage benefits of performance standards for alosines (including shad) are not justified by the additional cost of up to $894,470 . . . ." Draft EA at p.120.

Each of these deficiencies of the Draft EA are addressed in the following four sections of these Comments.

A. Failure to take a "Hard Look" at Upstream Fish Passage Performance Standards

While the Shawmut fish lift was not designed to meet a passage effectiveness standard for Atlantic salmon of 95%, despite Commission staff's claims that it was, this standard was used in the Draft EA analysis and findings.[24] In the Interim SPP filed by Brookfield for the Shawmut Project on May 31, 2021, Brookfield proposes a passage effectiveness of 96%, which is the same standard that was included in an NMFS prescription. In the Draft EA, Commission staff does not question the discrepancy between the standards, while observing that there is no guarantee the 96% passage effectiveness standard could be met with the proposed Shawmut fish lift, and that if Brookfield is "to achieve the higher [96%] standards, then Brookfield would likely need to construct additional fishways such as a second fish lift to attempt to meet them." But then the staff concludes that the estimated gains in passage effectiveness for a critically endangered species were insufficient to justify the annual costs of an additional fishway.[25]

From these mixed signals, it is clear that the Draft EA dodges taking a hard look at the record and in formulating an assessment of available and appropriate mitigation, protection and enhancement measures. While the difference between a 95% and a 96% passage effectiveness rate may not appear numerically significant, when it is considered

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[24] Draft EA at p. 118.

[25] Draft EA at p. 118.

that under best current information the 95% passage standard is itself as unlikely to be achieved as the 96% standard, and that the standards all address passage of an endangered species which, without game-changing recovery actions, is on the brink of extinction, the Draft EA clearly fails to take a hard look at issues underlying the reliability of actual performance of fishways at Shawmut, and the role that unreliability of effective passage plays in the system as a whole.

i. The proposed 95% upstream passage standard is unrealistic, and we are unaware of other dams that meet this standard.

Commission staff is proposing an unrealistic 95% upstream passage standard for Atlantic salmon at the Shawmut Dam. There is no justification for that proposed standard in peer-reviewed literature; in fact, extensive research shows that such standards have never been consistently reported within 48 hours of approach at any dam, on any river in the world.

While high passage success has been achieved at some hydropower dams, such as the Milford Dam on the Penobscot River in Maine, the Finsjö Dam on the Emån River in Sweden, and the Herting Dam on the Ätran River in Sweden, delays are quite common and passage is highly variable between years (Dauble and Mueller, 1993; Calles and Greenberg, 2006; Caudill et al., 2007; Holbrook, 2009; Noonan et al., 2012; Sigourney et al., 2015).[26] The reality of passage effectiveness standards is much less rosy. An extensive review of upstream salmonid passage studies revealed a mean passage efficiency of 61.7% (Noonan et al., 2012). Analyses of cumulative success passing multiple dams, as is required to reach spawning grounds above the Kennebec/Sandy

[26] As stated previously, the Appendix to these Comments contains the list of References to literature cited in these Comments.

River confluence in this case, are even greater cause for concern, with numbers well below 50% (Holbrook et al., 2009; Gowans et al., 2003; Stevens et al., 2019). And, when passage at several dams is required for successful migration, the cumulative effect of even slightly reduced passage at these dams can be substantial (Holbrook et al., 2009).

The Draft EA's reference to passage success at the Milford Dam on the Penobscot River is misplaced. It ignores the serious, self-reported delays in salmon passage at Milford during tagging studies of adult passage. Specifically, the Draft EA neglects to recognize that at Milford in 2014, according to Brookfield's own data, 95% of tagged salmon that approached within 200 meters of the Milford Dam failed to pass the fish lift within the required timeframe of 48 hours.[27] The Draft EA also neglects to recognize that, again according to Brookfield's own data, 83% of the tagged adult salmon did not pass the fish lift within 48 hours in a 2015 study.[28] Similarly, the Draft EA neglects to acknowledge that University of Maine researchers also found in a 2015 study that 65% of adults did not pass the fish lift within 48 hours.[29]

These delays are biologically significant, as discussed below, and the Draft EA's failure to acknowledge them is unacceptable.

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[27] HDR Engineering. 2015. ATLANTIC SALMON PASSAGE STUDY REPORT ORONO, STILLWATER, MILFORD, WEST ENFIELD, AND MEDWAY HYDRO PROJECTS. P. 58. October. FERC Accession No. 20150324-5214.

[28] Kleinschmidt. 2016. 2015 ADULT ATLANTIC SALMON UPSTREAM PASSAGE STUDY MILFORD HYDROELECTRIC PROJECT. P. 21. May. FERC Accession No. 20160531-5663.

[29] Kleinschmidt. 2016. 2015 ADULT ATLANTIC SALMON UPSTREAM PASSAGE STUDY MILFORD HYDROELECTRIC PROJECT. P. 21. May. FERC Accession No. 20160531-5663.

ii. The biological significance of delays in upstream passage

Delays in upstream migration at dams can be extensive – up to 52 days reported by Gowans et al. (2003) – and these delays have the potential to devastate a population and erase any potential passage successes. Delays reduce survival and spawning success by increasing vulnerability to parasites and predation, depleting energy reserves, and creating missed spawning opportunities (Geist et al., 2000; Calles and Greenberg, 2009; Holbrook et al., 2009; Nyqvist et al., 2017(3); Izzo et al., 2016). The dangers of each of these possible outcomes is particularly alarming for the individuals that make up small populations, as in the case of the Kennebec's small endangered Atlantic salmon population.

Caudill et al. (2007) found that fish may ultimately be successful in passing one or more dams, but never make it to spawning grounds; this was attributable to the delayed passage at the dams. Geist et al. (2000) predicted that salmonids delayed more than five days passing each dam would have insufficient energy reserves to complete spawning, because migrating adults rely on energy reserves obtained in marine environments. When those energy reserves obtained from the marine environment are depleted by delays in reaching spawning habitat, spawning cannot be completed or is impaired because of insufficient energy reserves (Geist et al., 2000). Best current information and scientific literature also emphasizes the critical importance of repeat spawners – older, larger, repeat spawning fish are critical for population resilience and therefore recovery.[30]

[30] Zydlewski, Joseph. 2021. Email to Landis Hudson, Maine Rivers Executive Director. Re: "Rubenstein Defense This Friday August 6." Received August 7. This communication is attached to these Comments. This current information is discussed further in Part B.v. herein.

Fungal infections in fish that failed upstream dam passage reported in Conon River in Scotland (Gowans, 2003) were attributed to combined stress of handling and accumulating with other fish below the dam. Similar results were found for steelhead trout and chinook salmon on the Columbia River associated with head burns and cranial legions (D.A. Neitzel et al., 2004).[31] Holbrook et al. (2009) observed frequent fallbacks into estuary among adults that failed to pass dams. They associated fallbacks with temperatures exceeding 22°C, suggesting the fallbacks to be a coping mechanism for thermal stress and migratory delays.

Even after substantial remediation efforts – replacing a technical fishway with a nature-like pool fishway – increased overall passage success to 97% from the 72% seen with the Denil fish pass, more fallbacks were reported by Nyqvist et al 2017(3). Fallbacks can cause lethal or sublethal injuries, delay or terminate migration or simply demand greater energy expenditure which has the potential to harm spawning success (Dauble and Mueller, 1993; Geist et al., 2000; Holbrook et al., 2009). Rubenstein found that Atlantic salmon experience extensive delays before passing the Lockwood Dam on the Kennebec. These delayed salmon lose more energy stores – compared to salmon that successfully reach cooler upstream habitat – due to the need to thermoregulate and/or seek-out coldwater refugia in order to survive the increased and prolonged exposure to higher water temperatures that exist below the dam. This additional expenditure of

[31] Likewise, injuries to delayed salmon "rescued" at the Lockwood Project (FERC No. 2574) in June of this year, are fully and vividly documented. FERC Accession No. 20210701-5242 (Attachment 1, Maine Department of Marine Resources (Jennifer Noll). June 17, 2021. Field Summary of Atlantic Salmon Stranding Rescue at Lockwood Dam.)

energy causes increased pre-spawning mortality, decreased spawning success, and increased loss of iteroparity from the population.[32]

This best available information highlights the need to take a comprehensive and holistic look at the complete hydropower system on any river and not just the impacts of one individual dam on fish passage, flows, ecological changes, etc. That detail and information is part and parcel of the "hard look" required by NEPA. The Draft EA fails that test.[33]

iii. Commission staff's selection of a 95% upstream passage standard is arbitrary.

It is further unclear why Commission staff chose a 95% upstream salmon passage rate when Brookfield itself proposed a 96% rate in its draft Species Protection Plan (SPP) for the Lockwood, Hydro-Kennebec, and Weston projects.[34] In its draft SPP, Brookfield stated:

> Although the Shawmut Project is not part of this SPP, the performance standards considered and included in this SPP are based on the reasonable expectation that the Shawmut Project will be relicensed with the fish passage facilities and measures currently proposed or prescribed. These include installation of a new upstream fish lift, improvements to the downstream fish passage facilities proposed by the Licensee, and implementation of preliminary fish passage prescriptions issued by NMFS in August 2020, including a project-specific upstream performance standard of 96% and a downstream standard of 97%.[35]

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[32] Rubenstein, S.R. Energetic impacts of delays in migrating adult Atlantic salmon. August 6, 2021 Presentation (discussed in Zydlewski, Joseph. 2021. Email to Landis Hudson, Maine Rivers Executive Director. Re: "Rubenstein Defense This Friday August 6." Received August 7) (attached hereto).

[33] *American Rivers*, 895 F.3d at 49-50, 54-55.

[34] FERC Accession No. 20210601-5152.

[35] Kleinschmidt. 2021. SPECIES PROTECTION PLAN FOR ATLANTIC SALMON, ATLANTIC STURGEON, AND SHORTNOSE STURGEON AT THE LOCKWOOD, HYDRO-KENNEBEC, AND WESTON PROJECTS ON THE KENNEBEC RIVER, MAINE. May. P. 8-1, footnote 27. FERC Accession No. 20210601-5152.

Commission staff should clearly not recommend a lower passage standard than Brookfield itself has already said it would meet (albeit all without reliable basis), and doing so strains credulity.

But more significantly, Commission staff then assert that meeting the 96% standard might result in the need to build an additional fish lift:

> However, as we said in section 3.3.1.2, the fish lift was designed to meet a passage effectiveness standard for Atlantic salmon of 95% and our analysis shows that, while Brookfield should be able to meet this proposed standard, there is no guarantee that the new fish lift would be able to meet the higher standards specified by NMFS's prescription or recommended by Maine DMR. If Brookfield is unable to achieve the higher standards, then Brookfield would likely need to construct additional fishways such as a second fish lift to attempt to meet them.[36]

While these standards are themselves unrealistic, as noted above, within the parameters of the Commission staff's own analysis, the mathematics themselves do not meet the straight-face test: Commission staff is suggesting that a standard of 95% passage of their estimated 44 salmon per year is not meaningfully different from 96%. While the difference amounts to less than half an individual salmon (using the Draft EA's beginning estimate of 44), this difference is meaningful because of the alarmingly small numbers of the Kennebec's endangered Atlantic salmon population. This is a failure to take an honest and hard look at environmental consequences, as Commission staff's conceptual difference between what is assumed to meet a 95% standard instead of a prescribed 96% upstream salmonid passage standard finds no support in the record or in information of any professional integrity. In the end, Commission staff fail to comprehend the critical need to restore salmon to the Kennebec, one of only two major

[36] Draft EA at p. 118.

river systems, and one of just a small handful of rivers altogether, in the U.S. – all in the State of Maine – that still support wild Atlantic salmon populations. Though the NGOs support removal of Shawmut entirely, the Commission should certainly not decide the appropriate passage standards for Brookfield based on the "burdens" associated with the number of required fish lifts. FERC must base passage standards for Atlantic salmon on the needs of this endangered species and the goals for Atlantic salmon recovery in the Final Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (*Salmo salar*).[37]

Moreover, the Draft EA misapprehends the process of fish passage *design*. Fishways are not designed to meet a certain passage or efficiency standard, nor does a fishway meeting USFWS standards reliably guarantee a particular passage standard or efficiency. 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 of efficiency – is never guaranteed. The USFWS Fish Passage Engineering Design Criteria manual (USFWS 2019) states:

> 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.[38]

[37] U.S. Fish and Wildlife Service and NMFS. 2018. Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (*Salmo salar*) 74 pp.

[38] 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.

Simply stating that a fishway will meet a standard does not mean that it will, and 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. NEPA analysis requires the Commission to grapple with the uncontested *uncertainty* of ever meeting a 95% or 96% salmonid upstream passage effectiveness rate at Shawmut, and the significance of the environmental consequence should that passage effectiveness rate not be met. And it must grapple with that uncertainty in light of current information, set forth above, that in truth it appears no dam in the world has ever consistently met that standard.

iv. The Draft EA ignores compounding effects and compensatory and depensatory processes.

Commission staff's evaluation of the different passage effectiveness percentages ignores the profound significance of compounding effects and compensatory processes. McElhany et al., 2000 explain the density dependent compensatory and depensatory processes that strongly influence population dynamics. When populations are small, compensatory processes act to mitigate the threats of small population size through increased productivity, creating a stabilizing effect. Therefore, the contributions of each individual in a small population is higher at small population sizes. However, when populations are depleted below critical sizes, depensatory processes occur that reduce productivity and increase likelihood of extinction through inbreeding depression and increased relative predatory pressure on each individual fish (McElhany et al., 2000). For populations depleted below critical levels like the Atlantic salmon, protecting each spawning individual may be vital to recovery of the GOM DPS. While minor losses of spawner numbers may appear insignificant in a vacuum, for a critically depleted population such as Atlantic salmon, the contributions of each spawner on the number of emerging smolts must be considered (McElhany et al., 2000; Holbrook et al., 2009). In this respect, the Draft EA's dismissal of the difference between hypothetically passing (within 48 hours of approach) 35 individuals instead of 36 is an egregious error,[39] ignoring best information on the effects of compensatory and depensatory processes on a population that is indisputably on the verge of extinction.

As established by Hutchings (2001), the longer a population is burdened by such pressures, the lower its chances are of recovering. Poor returns of spawners to upstream river segments and combined inefficiencies of fishways indicate that recolonization will be slow (Bryant et al. 1999). Opening the river for passage for spawners and ensuring the greatest potential for successful repeat spawning must be prioritized to ensure the best chance of recovery.

In its rejection of 96% and 99% performance standards for Atlantic salmon, the Draft EA presents an analysis in Table 4 of adult salmon passage above the Weston Project,[40] concluding that:

> Under a[sic] 96 and 99 percent upstream survival standards, the average number of returning salmon surviving passage through all four dams would increase to about 37 to 42 adult salmon, respectively. This would represent an increase in survival of about 5.7 percent to 20 percent over existing conditions. Maine DMR's goal for Atlantic salmon is to restore a minimum population of 2,000 adults annually to historic high-quality habitats in the Kennebec River above Weston Dam (Maine DMR, 2020a). Likewise, Commerce chose 2,000 spawners as a number that can weather downturns in survival (74 CFR 29300). Thus, the average return for 2014-2020 represent about two percent of the restoration goal of 2,000 adult salmon. Based on these existing low run sizes compared to the

[39] Draft EA at p. 40.

[40] Draft EA at p. 41.

restoration goals, the higher performance standards stipulated by NMFS and recommended by Maine DMR would provide minimal benefits to the Atlantic salmon population at this time.[41]

This analysis casually dismisses MDMR's recommendation for an upstream passage standard that would cut losses by more than 75% of migrating adult salmon to spawning habitat caused by passage inefficiencies at the four lower Kennebec dams. It also assumes that ongoing restoration activities, including improved fish passage, will not result in increasing numbers of spawning salmon returning to the Kennebec River during the long term of a new license. Projecting increases in salmon returns that may occur as restoration efforts ramp up, the benefits of increased passage survival are obvious. With passage success at 95% at each dam, more than 18% of returning salmon are prevented from reaching spawning habitat above the Weston Dam. Increasing passage success to 99% reduces losses to less than 5%. This is shown on the following Table A (below).

Table A. Annual returns of adult Atlantic salmon to the Lockwood project, from current estimate (44) to 2,000, calculated to pass above four dams at the current rate (trucking of 79%), 95, 96 and 99% at each project.

Species	Annual Return	Baseline w/Lockwood Lift + Trucking (79%)	95% (4 dams)	96% (4 dams)	99% (4 dams)
Atlantic Salmon	44	35	36	37	42
	100	79	81	85	96
	500	395	407	425	480
	1,000	790	815	849	961
	2,000	1,580	1,629	1,699	1,921

[41] Draft EA at p. 41.

The Draft EA also errs in evaluating the benefits of fish passage solely on the current number of returning adult salmon, and assuming that it will not change over the 30+ year term of a FERC license. The current critically low number of spawners returning to the Kennebec is not surprising given that (1) restoration efforts for salmon in the Kennebec watershed are in their very early stages; and (2) restoration efforts so far have been severely hampered by the Shawmut Project and the three other dams.

v. The Draft EA's proposed operating periods for upstream passage are inadequate.

The NGO's agree with MDMR that, based on the most current information, "Atlantic salmon have been documented in the Kennebec River migrating upstream for a longer season and sea lamprey predominately migrate during the night. Fish passage should be provided from May 1 through November 10 with operations occurring 24 hours per day from May 1 through June 30 to accommodate diurnal and nocturnal migrants."[42] The Draft EA rejects MDMR's recommended operating periods for upstream passage, with no reasonable rationale provided for that rejection.

vi. The design and location of the proposed Shawmut fish lift are inadequate.

The Kennebec Coalition reasserts its comments on this issue, submitted in protest to the Shawmut license application.[43] Although an express purpose of the ISPP was to allow Brookfield to study and test methods for passing fish at Shawmut and other dams,

[42] MDMR. 2021. Comments on Brookfield White Pine Hydro, LLC's Shawmut (FERC No. 2322) Hydroelectric Project, State Water Quality Certification. July 17. P.6 This MDMR filing is attached hereto for reference.

[43] CLF, which did not join in the protest to the Shawmut Project license application, joins in those comments now.

Brookfield has done almost nothing to study this issue since the ISPP (now expired) went into effect in 2013. Brookfield has selected the location and type of fish passage facility without evidence indicating where salmon or shad downstream of Shawmut would congregate below the dam. The single study on which Brookfield has apparently based the location of its proposed fishway was a one-time release of 150 tagged alewives in 2016.[44] Such a limited study in a single year, with small numbers of just one of the five target species of anadromous fish under a limited set of flow conditions, does not come close to providing adequate data on which to base the location of fish passage that must work for multiple species across the full range of flow conditions that may occur for decades. Brookfield cannot point to any empirical evidence that the location and type of fish passage facility are appropriate for salmon and shad at Shawmut, and there is only extremely limited evidence for river herring. A similar lack of pre-construction study has had disastrous results at the Lockwood fish lift. That project does not pass shad[45] or salmon[46] adequately. With the current upstream passage rate at Lockwood of 79%, even if all other dams passed salmon at 99%, only 77% of fish returning to Lockwood would pass the Weston Project.

Moreover, Brookfield has refused to take steps to provide effective fish passage at Lockwood since the construction of the "interim" fish lift in 2006. So not only does

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[44] Kleinschmidt. 2020 Brookfield White Pine Hydro LLC. Application for New License for Major Water Power Project – Existing Dam. Shawmut Hydroelectric Project (FERC No. 2322). January 30. Pp. E-4-48-49; FERC Accession No. 20200131-5356.

[45] MDMR. Intervention letter from Commissioner Keliher to Secretary Bose, FERC (May 2, 2014) at 2 [FERC Accession No. 20140502-5080].

[46] Letter from Dan Kircheis (Acting ESA Fish Recovery Coordinator, NMFS Greater Atlantic Regional Fisheries Office) to Secretary Bose, FERC re NOAA Fisheries comments on the draft 2017 KHDG report (March 27, 2018) at 1 [FERC Accession No. 20180329-5166].

Brookfield have essentially no empirical evidence to support the construction of the Shawmut fish passage facility, but it has demonstrated at Lockwood that it would likely do nothing to remedy future fish passage failures at Shawmut.[47]

In addition, the proposed attraction flow adjacent to the fish lift entrance could create a false attraction delaying both salmon and shad passage, particularly for fish moving across the face of the dam. The fish lift design incorporates a standard design for the crowder V-gates, which have been shown at other projects to allow shad that have passed through the V-gate to then pass downstream, contrary to the design plan to contain fish prior to lifting. Regarding the "fish ladder" portion of the proposed facility, designed to move fish attracted to units 7 and 8 to the tailrace of units 1-6, the concern is that shad would have difficulty navigating the turbulent tailrace waters. There are also questions concerning the ability for fish to find the "fish ladder" entrance. The ladder is expected to pass roughly 100 cfs. Adjacent to it, the Taintor gate will pass 600 cfs for downstream fish passage. Units 7 and 8 each can pass 1,430 cfs. With both units running, the ladder will be less than 3% of flows at the fishway entrance, well below agency standards.[48]

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[47] *See American Rivers*, 895 F.3d at 53 (recognizing that the Commission cannot ignore its own licensing record in determining whether a licensee will "regularly and predictably" comply with conditions). Brookfield has a license history of ignoring or delaying steps to improve fish passage conditions, when existing conditions have proven indisputably inadequate. Indeed, Brookfield allowed the interim Biological Opinion and associated incidental take authorization therein governing Shawmut to lapse on December 31, 2019, and has taken now nearly 3 years to even begin to take steps to confront that lapse. The Lockwood Project fish passage deficiencies have been known and acknowledged for over a decade.

[48] Kennebec Coalition. 2020. KENNEBEC COALITION'S 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. Pp. 43-45. August 29. FERC Accession No. 20200831-5332.

MDMR has issued similar comments about the poor design of the proposed Shawmut upstream fish passage facility. In comments on Brookfield's application for water quality certification, MDMR stated:

> The Licensee has proposed to construct permanent upstream fish passage (a single fish lift) at the Shawmut project. Successful fishways must create hydraulic signals strong enough to attract fish to one or multiple entrances in the presence of competing flows (i.e., false attraction). The Shawmut dam is extremely long and has multiple discharge locations that will provide significant false attraction flows during the passage season. MDMR has serious concerns about the design, operation, and location of the fishway and believes the current proposal will result in significant delays and likely poor upstream passage efficiency for multiple species. MDMR also has serious concerns about the cumulative adverse impacts of the Lockwood, Hydro-Kennebec, and Weston projects, which has similar issues.
>
> MDMR is very concerned about the effectiveness of the proposed fishway in May, June, and July when the majority of anadromous species are migrating upstream (Table 1). The maximum station hydraulic capacity of the Shawmut Project is 6,690 cfs, which is exceeded approximately 65% of the time in May, 35% of the time in June, and 20% of the time in July. Water in excess of station capacity is spilled at the sluice gate in the middle of the 1,435-foot long dam, the hinged flashboards on the west side of the dam, or the rubber crest(s) on the eastern half of the dam, providing multiple false attractions. As a result, there will be false attraction at the project during the majority of the upstream migration season to multiple areas without a fishway to the headpond. A proposed cross channel egress from an identified false attraction zone would not provide passage to the headpond or directly to the lift.
>
> The location of the fishway was based on very speculative assumptions using limited information. The CFD modeling that was conducted looked at a very limited range of flows that are not representative of the majority of the migration period. Furthermore, the siting study, conducted from May 19-June 14, 2016 with radio-tagged alewife, occurred during a low flow period, which is not representative of flows during the passage season. Alewives are not necessarily a good proxy for fish attraction of other species, as the Lockwood and Brunswick projects demonstrate. The existing American Eel fishway locations were selected based on flow conditions that will be changing based on the proposal.[49]

[49] MDMR. 2021. Comments on Brookfield White Pine Hydro, LLC's Shawmut (FERC No. 2322) Hydroelectric Project, State Water Quality Certification.. P.5. July 17. (Note: Not submitted to FERC so we may have to attach)

The consequences of multiple discharge locations and false attraction are well illustrated at the Lockwood Dam, where false attraction to the bypass channel, combined with annual fluctuations in station discharge caused by flashboard installation, require a "fish rescue" every time flashboards are installed. According to MDMR, in 2021 this event resulted in at least three adult Atlantic salmon becoming stranded in isolated pools in the Lockwood bypass channel. One of these salmon captured and trucked upstream suffered extensive injuries, including "scraped up body dorsally, scraped up sides (both left and right), an abrasion ventrally, a bruise on its left side, a lamprey wound scar on its right side, a split dorsal fin, a split caudal fin and a bruised snout."[50] At least two other adult Atlantic salmon, one with "significant scars located dorsally on its body"[51] were also trapped during this event, but could not be captured and transported. In 2021, three endangered Atlantic salmon (compared to 15 that had been trapped and trucked from the Lockwood Dam fish lift as of August 9, 2021[52]) were subjected to this stress—two with significant injuries. That is 17% of total salmon returns to the Kennebec—at just a single dam. The future suggested by this Draft EA would include similar inefficiencies at four dams, before endangered salmon reach spawning habitat in the Sandy River. The impacts of these inefficiencies and injuries are not evaluated or even acknowledged in the Draft EA.

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[50] MDMR (Jennifer Noll). June 17, 2021. Field Summary of Atlantic Salmon Stranding Rescue at Lockwood Dam. (This report was included as Attachment 1 to a filing about the event by Trout Unlimited submitted on July 1, 2021: FERC Accession No. 20210701-5242.)

[51] Ibid.

[52] Maine Department of Marine Resources "Recent Trap Counts for Fish Returns to Maine by River," accessed at https://www.maine.gov/dmr/science-research/searun/programs/trapcounts.html on 8/11/2021.

All told, the Draft EA does nothing to confront or "grapple with" the opposing views.[53] In conducting its NEPA analysis, the Commission "cannot overlook a single environmental consequence even if it is 'arguably significant.'"[54] It must "comply with NEPA's exacting procedural requirements to 'to the fullest extent possible.'"[55] This Draft EA fails that test.

B. The Failure to take a "Hard Look" at Downstream Fish Passage Performance Standards

The Draft EA's analysis of a downstream salmon passage standard has many flaws. "Put simply, an agency's [EA] 'must give a realistic evaluation of the total impacts and cannot isolate a proposed project, viewing it in a vacuum.'"[56] Unfortunately, that is exactly the analytical flaw of the Draft EA, and as such it cannot stand.

i. Both a 96% downstream passage at Shawmut and an overall 4-dam passage survival rate of 88.5% are unrealistic and unattainable.

Brookfield's own data show that 96% downstream passage is not attainable at the Shawmut Project, and neither is an overall survival rate of 88.5% over all four of the Kennebec dams. On behalf of the Kennebec Coalition, Don Pugh, a fish passage expert with decades of experience at the S.O. Conte Anadromous Fish Research Center,[57] evaluated Brookfield's downstream smolt passage data from 2012 to 2015 and identified two key factors that inflated smolt survival percentages.

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[53] *American Rivers*, 895 F.3d at 49 & 51.

[54] *Id*. (quoting *Myersville Citizens for a Rural Cmty., Inc. v. FERC*, 783 F.3d 1301, 1322 (D.C. Cir. 2015)).

[55] *Id*. (citing *Delaware Riverkeeper Network v. FERC*, 753 F.3d 1304, 1310 (D.C. Cir. 2014)).

[56] *Id*. (quoting *Grand Canyon Trust v. FAA*, 290 F.3d 339, 342 (D.C. Cir. 2002)).

[57] Mr. Pugh's curriculum vitae is attached to these Comments.

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. Using this methodology with the 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.[58] The Draft EA ignores this significant flaw in Normandeau's analysis.[59]

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.[60] 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.[61] This is likely an overestimate of survival because Normandeau released smolts just above the Weston Dam, excluding the likely significant impacts on smolt survival of the long Weston impoundment, which is approximately 12 miles long. Based on Mr. Pugh's calculations, Brookfield's contention that it can meet an "end-of-

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[58] 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 No. 20200831-5332.

[59] *Id*.

[60] See also, Part B.iv., herein, discussing best available information on the additional significant issue of delayed and estuarine mortality. This critical information is also relevant to this discussion.

[61] 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 No. 20200831-5332

pipe" downstream passage goal of 88.5% is both absurd and perilous for the future of the endangered Atlantic salmon.

Similarly, Mr. Pugh's analysis showed that average survival at the Shawmut dam between 2013 and 2015 was 78.3%, not the 93.9% that appears to have been accepted in the Draft EA.[62] It is extremely unlikely that any measures that Brookfield proposed in its license application could increase downstream survival to 93.9%, let alone 96%, as discussed below.

Throughout the Draft EA, downstream passage survival numbers referenced are the paired release "baseline" numbers from Brookfield's annual diadromous fish reports for 2013 to 2015. In order to understand the effect of a 24-hour downstream passage requirement, Brookfield included a paired release analysis of downstream survival that considered fish that did not pass within 24 hours as mortalities. These results are called 'adjusted'. Table B (below) compares the baseline (all fish that passed) and adjusted results for the years 2013 to 2015.

Table B. Comparison of baseline and adjusted survivals for Weston, Shawmut, Hydro-Kennebec, and Lockwood projects by year and averaged.

	Weston		Shawmut		Hydro-Kennebec		Lockwood	
Year	Base	Adj	Base	Adj	Base	Adj	Base	Adj
2013	95.7	79.7	96.3	83.2	94.1	88.1	100	93.7
2014	89.5	86.4	93.6	88.5	98.0	90.0	97.7	94.6
2015	99.7	66.0	90.6	83.8	n/a	n/a	98.0	88.8
Mean	95.0	77.4	93.5	85.2	96.1	89.1	98.6	92.4

When fish that did not pass within 24 hours are considered mortalities, **even with** a paired release analysis, survival is far below the 96% downstream bypass standard of

[62] Draft EA at p. 52.

Brookfield's ISPP, ranging from 3.6% to 18.6% lower than the standard. As noted above, these are survivals for fish passing only one dam and do not consider the effect of passing four dams, as wild smolts must, or of the effect of passing approximately 27 miles of impounded river (which is 86% of the river from the head of the Weston impoundment to the Lockwood project).

The impact of passing multiple dams can be seen in the numbers of fish that were released above Weston, and in the Weston tailrace, that passed Lockwood in 2014 and 2015 (Normandeau 2015 & Normandeau 2016, Report Tables 7-4 and 6-4 respectively). Of the 158 fish (98 above pass four dams; and 60 below pass three dams) released at the Weston project in 2015, only 100 were detected below Lockwood (63.3%). In 2014 with similar numbers above and below Weston, 81.8% of the fish released at Weston were detected below Lockwood for a two-year average of only 72.6%. Survival to below Lockwood of fish released at Weston, Shawmut, Hydro-Kennebec, and Lockwood in 2014 of 81.8%, 86.9%, 94.1% and 99.0% clearly reveal the effect of passing multiple dams (Report Table 7-7, Normandeau 2015): Survival decreases as the number of dams passed increases (*see also* Stich et al. 2015).

Commission staff's analysis also fails to even consider delayed mortality of smolts that survive immediate passage at each dam, but suffer increased mortality as they continue their migration beyond the immediate tailrace. Research on the Penobscot River assessing survival of tagged smolts found that the number of dams passed by a salmon smolt had a "strong negative effect of fish survival in the estuary."[63] Building on these empirical results, Stevens et al. modeled salmon smolt survival through multiple

[63] Stich et al. 2015 at pp. 68-86.

Penobscot River dams and showed a clear negative correlation between predicted smolt survival and the number of dams encountered, concluding that "up to 37% of the annual loss of hatchery smolts was attributed directly to dams."[64] They also analyzed the increase in survival from the Penobscot River Restoration Project, which removed the lowest dams on the Penobscot River, and concluded that "a 36% increase (from unrestored) in wild smolt survival to the ocean was possible with the removal of some dams in the Penobscot River."[65]

An analysis of survival that only considers the immediate impact of each dam individually is inadequate and misleading when analyzing the impact of the multiple projects on smolt survival. And it bears repeating that NEPA requires that "an agency's [EA] 'must give a realistic evaluation of the total impacts and cannot isolate a proposed project, viewing it in a vacuum.'"[66]

ii. Brookfield's proposed "improvements" to downstream fish passage at Shawmut are not sufficient to increase downstream survival to 96%.

As set forth in the comments of MDMR on Brookfield's State water quality certification application:

> The Licensee proposes to utilize three gates in the forebay area (Sluice Gate, Tainter Gate, and Deep Gate) and up to four sections of hinged flashboards to pass fish downstream. The licensee also proposes a guidance boom (discussed below) and no screening protection of fish through the Francis Turbines. Unlike the Licensee proposal in the SPP for the Lockwood, Hydro-Kennebec, and Weston projects, the Licensee does not propose any specific low flow thresholds that would require curtailment of generation to provide for additional spill for

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[64] Stevens et al. 2019 at pp. 1795–1807.

[65] Ibid.

[66] *American Rivers*, 895 F.3d at 55 (quoting *Grand Canyon Trust v. FAA*, 290 F.3d 339, 342 (D.C. Cir. 2002)).

protection of downstream passage of Atlantic salmon smolts. The proposal also fails to provide adequate protection for other species during their period of downstream passage. The proposed downstream operational facilities are inadequate to safely and effectively pass Atlantic salmon and all species downstream…

The Licensee proposed to construct a fish guidance boom system that is intended to preclude downstream migrating fish from entrainment in Units 7 and 8. MDMR does not support the Licensee's proposal to use surface guidance booms at the Shawmut Project and finds them to be inadequate to protect the GOM DPS population of Atlantic Salmon and the other diadromous species in the Kennebec River. Data provided by the Licensee in the (SPP, Table 5-1) demonstrates that the guidance booms used at the Lockwood, Hydro-Kennebec, and Weston Projects do not guide 14.3-30.6% of the migrating smolts away from the turbines. Data provided by the Licensee (FLA, Table 4-22) shows that 32.7% of the downstream migrating smolts were entrained into the turbines at the Shawmut Project. The instantaneous survival was 7% lower when fish went through the turbines compared to spill routes at Shawmut and that grossly underestimates the sublethal effects, including injury and disorientation, that would result in higher mortality in the estuary. Studies at the Ellsworth dam on the Union River assessing injury to salmon showed that 22-30% of fish that went through the turbines had injuries compared to 3.8% that went through spill routes, demonstrating that impact quantitatively. The 2015 *Evaluation of Downstream Passage for Adult and Juvenile River Herring* demonstrated that 53 percent of the study fish went through the Lockwood turbines, rather than being guided by the boom to the downstream bypass, and survival was lowest for those fish passing Lockwood via the units (i.e., 77.4% – 81.7% survival). This would indicate that performance standards would not likely be met for these species with the proposed plan…

In addition, MDMR has consulted with the USFWS regarding floating guidance booms and concurs with their comments that are provided below.

> The Service does not know of any studies that have assessed how effective floating guidance booms are at protecting eels as they attempt to migrate downstream past a hydroelectric project. However, we do know that eels are a bottom-oriented species (Brown et al. 2009) and therefore a floating guidance boom with partial depth panels would not be fully protective. As stated in our 2019 Fish Passage Engineering Design Criteria manual, "A floating guidance system for downstream fish passage is constructed as a series of partial depth panels or screens anchored across a river channel, reservoir, or power canal. These structures 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)." Booms have not been

> implemented as a protective measure for eels or alosines anywhere else in our region, which spans fourteen states, unless they are installed with other protective measures that are suitable to ensure the safe, timely, and effective downstream passage of our trust species (e.g., inclined bar screens, angled bar racks, etc.). Therefore, the Service recommends that any protective measure implemented at the mainstem Kennebec River hydroelectric projects, as part of the current SPP process, are protective of all migratory species and that the proposed mitigation measures comport with the Service's fish passage guidelines.[67]

Similarly, Brookfield's and Commission staff's screening proposals are also inadequate.

According to MDMR:

> The licensee did not propose any additional screening, however FERC has suggested screening may be required as this was suggested in NMFS Section 18 preliminary prescription. The preliminary screening suggestion is to equip each powerhouse with full-depth trash rack bars clear spaced at 1.5-inches and 3.5-inches for Units 1-6 and 7-8 respectively. This screening approach is inadequate for Atlantic salmon and does not take into account juvenile river herring, shad, sea-lamprey, or eels so will not result in safe downstream passage of indigenous species. In order to protect downstream migrating Atlantic Salmon smolts and kelts, adult and juvenile Alewife, adult and juvenile American Shad, adult and juvenile Blueback Herring, and adult American Eel, and adult and juvenile sea-lamprey, the Licensee would need to install full-depth inclined or angled screening with much smaller spacing and sized so that the normal velocities should not exceed 2 feet per second measured at an upstream location where velocities are not influenced by the local acceleration around the guidance structures.[68]

It is worth noting that the USFWS has prescribed 0.75-inch inclined screening for downstream eel passage at the Pejebscot Project in Maine.[69]

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[67] MDMR. 2021. Comments on Brookfield White Pine Hydro, LLC's Shawmut (FERC No. 2322) Hydroelectric Project, State Water Quality Certification. July 17. pp. 8-9. This document is attached to these Comments.

[68] MDMR. 2021. Comments on Brookfield White Pine Hydro, LLC's Shawmut (FERC No. 2322) Hydroelectric Project, State Water Quality Certification. July 17. p. 10. (attached to these Comments).

[69] USFWS. 2021. COMMENTS, RECOMMENDATIONS, PRESCRIPTIONS Application Ready for Environmental Analysis Pejepscot Hydroelectric Project, FERC No. 4748-106 Androscoggin River, Androscoggin, Cumberland, and Sagadahoc Counties, ME. P. 14. July 17. FERC Accession Number 20210617-5028.

iii. The Draft EA's proposed operating period and unit prioritization for downstream fish passage are inadequate.

MDMR's comments regarding operation of the downstream fishway as proposed by Brookfield in its application for state water quality certification are also relevant to most of Commission staff's and Brookfield's proposals. Brookfield proposes to operate the downstream fishway as follows:

> The Licensee proposed to operate the downstream fishway as follows:
>
> - Continue to operate the existing forebay surface sluice gate at maximum capacity to pass up to 35 cfs from April 1 to December 31 to provide a continuous surface bypass route for downstream migrating fish;
> - Continue to spill 600 cfs through the existing forebay Tainter gate from April 1 to June 15 to provide a passage route for Atlantic salmon smolts;
> - Continue to provide a total of 6% of Station Unit Flow (about 400 cfs at maximum generation) through the combined discharge of the forebay Tainter and surface sluice gates from November 1 to December 31 to provide a safe passage route for Atlantic salmon kelts;
> - During the interim period between license issuance and the installation of the new fish guidance boom, continue to lower four sections of hinged flashboards to pass 560 cfs via spill from April 1 to June 15 to provide a safe passage route for Atlantic salmon smolts; and.
> - Continue to pass approximately 425 cfs through the forebay deep gate and shut down Units 7 and 8 for 8 hours during the night for 6 weeks between September 15 and November 15 for downstream adult eel passage [Note: FERC recommends shut downs for units 7 and 8 from August 15 to October 31].
>
> This proposed downstream operational period is inadequate to safely and effectively pass all species downstream. Alewives and blueback herring leave the spawning grounds immediately after spawning and begin their downstream migration. American shad exhibit similar behavior. This downstream migration typically occurs between May and September each year. In addition, juvenile lifestages of these three species of alosines begin migrating downstream as early as July when they are only approximately 40mm long. Larger juveniles will migrate downstream as late as November depending on environmental variables

> [and] freshwater nursery habitats. The Licensee has proposed to cease operation of the forebay Tainter gate after June 15, which would leave only the forebay sluice gate in operation. The maximum capacity of the sluice gate is approximately 35cfs, which is 0.52% of station capacity and is 0.43-0.81% of average flow at the Shawmut dam between June and September.
>
> Brookfield also mentions prioritizing units for protection of Atlantic salmon. Based on the average daily inflow reported in Table 2 of the Draft EA, station capacity will be exceeded in all months except July, August, and September. Therefore, station capacity will be exceeded at the project for the majority of the downstream migration of Atlantic salmon smolts and adult alosines in the spring and the majority of the juvenile alosines and adult eels in the summer and fall. While unit prioritization is proposed for these times as a protective measure, the prioritization will not be in effect as all units will be "on".[70]

In addition, Table 6 of the Draft EA[71] lists the percent survival through each passage route at the Shawmut Project from telemetry studies done in 2013, 2014 and 2015. Passage through the hinged flashboards is the lowest of any route. The Commission staff alternative[72] recommends that until the new guidance boom is constructed, the hinged flash boards should continue to be used as downstream passage. As this route has the lowest survival – more than 5% lower than any other route – continuing to pass out-migrating smolts through the hinged flashboards does not make sense.

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[70] MDMR. 2021. Comments on Brookfield White Pine Hydro, LLC's Shawmut (FERC No. 2322). Hydroelectric Project, State Water Quality Certification. July 17. p. 9 (attached to these Comments).

[71] Draft EA at p. 51.

[72] Draft EA at p. 16.

iv. Best available information and scientific literature do not support attainability of these downstream passage standards.

A meta-analysis of downstream passage studies at hydropower dams in temperate regions revealed extensive fish injury as well as immediate and delayed mortality (Alegra et al., 2020). Smolt mortality is commonly reported to be substantially heightened at dams compared to free-flowing river stretches (Calles and Greenberg, 2009; Norrgård et al., 2012; Stich et al., 2015(17); Nyqvist et al., 2017(2); Alegra et al.; 2020). Direct mortality at dams is also frequently underestimated, as dead smolts are difficult to catch and can be carried downstream by drift or scavengers (Keefer et al., 2012; Havn et al., 2013).

Stich et al. (2014) reported remarkably high smolt survival of 91% at Milford Dam. However, Milford Dam has Kaplan runners rather than the Francis runners found at the Shawmut Dam, the former of which are reported in the literature to be significantly less harmful to passing fish (Calles and Greenberg, 2009; Alegra et al., 2020). Therefore, comparisons between the downstream passage rates at the Milford Dam and what is proposed for the Shawmut Dam are not meaningful and, in fact, inflate Brookfield's claims for future successes at Shawmut.

Similarly, smaller trash racks and priority operation of generators proposed by Brookfield would not effectively protect downstream migrating smolts. Current priority operation of generators has not achieved proposed passage standards for smolts, and the proposed trash racks would not exclude smolt from entrainment.

The Draft EA fails to adequately evaluate the overall impacts of hydropower operations and resulting delayed mortality on fish. Rapid pressure changes and high probabilities of striking through turbines and high concentrations of dissolved gas below spillways significantly reduce fitness and increase fish vulnerability to predation by impairing swimming and sensory functions necessary to detect and avoid predators (Johnson et al., 2005; Ferguson et al., 2006; Norgarrd et al., 2012). Indirect mortality is not accounted for in the scope of most passage studies, but most recognize it as a basic caveat to their research (Budy et al., 2002; Ferguson et al., 2006; Norgarrd et al., 2012; Stich et al. 2014; Stich et al,. 2015; Alegra et al., 2020).

Alegra et al. (2020) found 81% of data sets that evaluated fish injury at dams reported higher likelihood of injury than controls, 63% of which were significant. Stich et al. 2015 attributed a 6-7% reduction in estuarine smolt survival for each dam passed along their downstream migration. They reported greater indirect dam-related estuarine mortality than direct passage mortality reported at dams on the Penobscot River. Schaller et al. (2014) related the marine mortality of 76% of out-migrating smolts that had survived passage in the Columbia River Power System to their outmigration experience, and positively related delayed mortality to the number of powerhouse passages. Ferguson et al (2006) demonstrated delayed mortality by comparing survival of balloon-tagged and radio-tagged smolts at various distances downstream dams. They attributed 46-70% of total estimated mortality in radio-tagged fish to delayed mortality.

In addition to threats imposed by powerhouse passage, smolts are vulnerable to delays at dams. Successful migration can be critically dependent on the synchronization of numerous confounding factors (McCormick et al., 1998; National Research Council, 2004). Successful smoltification is physically, behaviorally, and environmentally constrained in time. Delays can occur approaching dams due to the transition from passive to active swimming at the impoundment, thermal stress, and difficulty finding confined passage entrances. They reduce fitness and survival through increased exposure to predation and parasites, reduced feeding opportunities, and desmoltification (Mccormick et al., 1998; Keefer et al., 2012).

Even where direct survival has been improved through technological enhancements, impacted stocks continue to decline. Several reports evaluating salmon population viability in the presence of dams recommend that breaching lower dams was the most likely management option to achieve recovery (National Research Council, 2004; Budy et al., 2002; Lawrence et al., 2016).[73]

The Draft EA's analysis of downstream smolt survival shows clearly that improved passage success at each dam in a river containing four dams has a dramatic impact on smolt survival, such that improving downstream passage success even from 96% to 99% increases smolt survival through the 50.1 km length of the Kennebec River from the mouth of the Sandy River to the base of Lockwood Dam, from 13,187 to 14,941 individuals.[74] As was the case when evaluating the benefits of improved upstream passage for salmon, set forth in Part A herein, the Draft EA's analysis and discussion of Atlantic salmon smolt losses as they pass over and through multiple dams ignores the obvious: the presence of multiple dams substantially decreases smolt survival. This is clear in the following paragraph from the Draft EA:

> Brookfield's downstream survival studies indicate that whole station survival of juvenile salmon through the Shawmut Project has never consistently exceeded 96%; its passage efforts have resulted in an average survival rate of 93.9% under existing conditions. Therefore, Brookfield's proposed, NMFS's prescribed, and Maine DMR's recommended survival standards would represent an increase in

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[73] See also Part D.ii, herein, discussing the 2019 Final Recovery Plan for Atlantic salmon, prioritizing dam removal as the key Recovery Action therein.

[74] Draft EA at p. 59.

> juvenile salmon passage survival through the project of 2.1, 3.1, and 5.1 percentage points, respectively. However, neither NMFS nor Maine DMR demonstrated how the higher survival standards would benefit the downstream migrating Atlantic salmon smolt population. To compare these survival standards, we used an initial population of 18,420 smolts migrating downstream from the mouth of the Sandy River through all four dams. Based on a natural freshwater mortality rate of 0.33% of smolts per kilometer (Stevens et al., 2019), the population potentially surviving below Lockwood Dam using a 96, 97, and 99 percent survival standard would be 13,187 smolts, 13,745 smolts, and 14,914 smolts, respectively. When accounting for estimates of estuarine mortality (1.15% per kilometer) based on Stevens et. al. (2019) and marine survival of smolts (0.4%) based on NMFS (2013), the number of adult salmon returning to Lockwood Dam under a 96, 97, and 99% downstream smolt survival standard would be 24, 25, and 27 adults, respectively. Thus, the incremental gains in survival rates of 1 and 3 percentage points that would accrue through NMFS's prescribed and Maine DMR's recommended performance standards, respectively, would be negligible.[75]

The Draft EA does not show how those estimates of smolt survival were generated, but the conclusion that the benefits of improved survival of smolts at dams are "negligible" hides the clear increases behind a tortured analysis that expresses the benefits only in terms of a modeled increase in the existing very low adult returns. Even accepting the analysis on its face, increasing downstream passage success increases adult returns from 24 to 27—a 12.5% improvement. With salmon on the brink of extinction, 12.5% is a significant gain. This benefit is much clearer if evaluated on the basis of the number of salmon smolts killed as they pass the four dams, and how this number changes with improved passage efficiency. The Draft EA does not show these numbers, but they can be calculated using the smolt survival numbers provided in the Draft EA analysis. The table below (Table C) shows estimates of the total number of smolts leaving the mouth of the Sandy River (18,420), and the number of surviving smolts at the base of the Lockwood Dam, accounting for (1) natural mortality as the smolts migrate the 50.1 km

[75] Draft EA at p. 59.

from the Sandy River to below Lockwood Dam and (2) for smolt mortality due to passage inefficiencies at dams. Commission staff's calculation is that with 96%, 97%, and 99% passage efficiency, smolt survival will be 13,187, 13,745, and 14,914, respectively. Simple subtraction shows that with 96% passage, smolt mortality is 5,233; with 97% passage 4,695; and with 99% passage 3,506. Improving passage efficiency from 96% to 99% reduces smolt mortality by 1,727—a 33% reduction in overall smolt mortality.

The Draft EA does not show natural mortality and mortality at dams separately, but the relatively high rate of natural mortality it assumes obscures the benefits of improving downstream fish passage. The Draft EA used an estimate of 0.33% mortality of smolts per river-km to calculate "natural freshwater mortality." A mortality rate of 18,420 smolts over 50.1 kilometers of river generates a calculated natural mortality for this reach of 3,045, and we assume it to be the same for each passage efficiency scenario. Subtracting this estimate of natural mortality from the Draft EA's estimate of total smolt mortality, we can isolate the smolt mortalities caused by the dams: 2,188 smolts with 96% passage; 1,630 smolts with 97% passage; and 461 smolts with 99% passage. Increasing passage success from 96% to 99% reduces mortality of Kennebec River smolts at dams from 2,188 to 461, and the rate of smolt mortality at dams from 11.9% to 2.5%. The reduction in smolt mortality at dams from improved downstream passage is 79%.

Table C. FERC estimates of cumulative smolt survival at dams and in free flowing reaches at 96%, 97%, and 99% downstream survival at four dams, smolt losses at dams and a combined total percent mortality.

	Smolts from Sandy River	FERC Calculation of Smolts Surviving to Base of Lockwood Dam	Total Smolt Morta lity	FERC Estimate of Natural Freshwater Smolt Mortality (0.33%/km; 50.1 km)	Smolt Losses at Dams	% Smolt Mortality Due to Dams
96% DS Passage Success	18,420	13,187	5,233	3,045	2,188	11.9%
97% DS Passage Success	18420	13,745	4,675	3,045	1,630	8.8%
99% DS Passage Success	18420	14,914	3,506	3,045	461	2.5%

Incredibly, it is this reduction of 79% mortality for Atlantic salmon smolts in their downstream migration that the Draft EA characterizes as "negligible."

In addition, although the Draft EA cites Stevens et al, 2019 for estimates of freshwater and estuarine smolt mortality per river kilometer, it ignores that paper's conclusion that estuarine survival of Atlantic salmon smolts is significantly reduced by passage over hydropower dams. In their model, Stevens et al. estimate estuarine survival is 87.2% for smolts passing no hydropower dams; reduced to 67.7% for smolts passing even a single hydropower dam; and is 56.2% for smolts passing over four hydropower dams. Stevens et al. make a number of very strong statements about this:

> The latent impacts of dam passage and subsequent delayed mortality in estuaries has been investigated in Pacific salmon (Budy et al. 2002; Schaller et al. 2014; Haeseker et al. 2012; Rechisky et al. 2013), with all but Rechisky et al. (2013) concluding significant negative effects. Stich et al. (2015*b*) demonstrated the first evidence of latent estuary mortality in Atlantic salmon. The difference in estuary survival with one dam (68%) to zero dam (89%) exposure in our reference studies (Stich et al. 2015*b*; NOAA, unpublished data) strongly suggests that important delayed mortality may occur even with only one dam. However, with a rate of

> change of approximately 6% increase per dam (Stich et al. 2015*b*), the overall dam-induced latent estuary mortality is especially problematic for production areas or stocking sites above multiple dams.[76]

The Draft EA's failure to analyze or even acknowledge the issue of delayed mortality significantly undercuts the conclusion that Shawmut Project's impacts on endangered Atlantic salmon are not significant. In conducting its NEPA analysis, the Commission "cannot overlook a single environmental consequence even if it is 'arguably significant.'"[77] In doing so with respect to the issue of delayed mortality, the Draft EA commits the same category of reversible error that was present in the *American Rivers* case, where the environmental consequence that the Commission missed was the ineluctable reality that, with respect to fish passage, "[t]he Project would compound the death rate."[78] "Those fish that manage to run the gauntlet of youth and natural mortality factors will now emerge only to face hydropower turbines and *other lethal aspects* of the Project."[79] In sum, "[t]he Commission's NEPA analysis has to grapple with that," and has to do so "honestly" and under a "hard look."[80] It fails by all measures.

v. The Draft EA fails to contain or even analyze passage standards for downstream-migrating adults (kelts), and ignores the significance of repeat spawners.

The Draft EA contains no passage standards for Atlantic salmon kelts. Best available information and scientific literature emphasizes the unique importance of repeat

[76] Stevens et al. 2019 at p. 1804.

[77] *American Rivers*, 895 F.3d at 51 (citing *Myersville Citizens for a Rural Cmty., Inc. v. FERC*, 783 F.3d 1301, 1322 (D.C. Cir. 2015)).

[78] *Id*.

[79] *Id*. (italics emphasis added).

[80] *Id*. at 51 & 49.

spawners, and the difficulty in passing kelts. This is an environmental consequence that, under NEPA, cannot be ignored.

Standards for kelts need to be considered and prioritized in order to promote recovery; without this consideration recovery plans are not adequate and will likely fail. Research indicates that downstream-migrating adult salmon follow bulk flows (Coutant and Whitney, 2000). However, even with fishways and high flow through spillways, many kelts have been observed passing through turbines, resulting in low downstream passage survival (Calles and Greenberg 2009; Nyqvist et al., 2017(8). Survival through multiple dams compared to that in free-flowing rivers is dismal (Coutant and Whitney, 2000; Wertheimer and Evans, 2005; Holbrook et al., 2009; Norrgård et al., 2012; Nyqvist et al., 2016). The positive contributions kelts were found to make towards population persistence diminished with the presence of multiple dams (Lawrence et al., 2016). Consideration of passage effectiveness rates for kelts is therefore an imperative component of a successful restoration plan.

Repeat spawners are a particularly critical factor necessary for the recovery of Atlantic salmon populations because their populations are small and recovering (Nyqvist et al., 2016; Bordeleau et al., 2020), as is especially the case for the GOM DPS. These individuals have been shown to contribute substantial numbers of offspring while providing a stabilizing effect on populations. Repeat spawners often have higher fecundity than first time spawners, given the repeat spawners' greater size and experience (Halttunen, 2011; Maynard et al., 2018; Baktoft et al., 2020). Variation in the timing of spawning among year-classes diffuses the adverse effects of environmental variability on spawning success and promotes genetic diversity within populations (Saunders and

Schom, 1985; Moore et al., 2014). A model developed by Lawrence et al. (2016) revealed that the abundance of kelts was positively related to the probability of population persistence. Thus, the loss of just a few individual repeat spawners through passage-related mortalities each season has a qualitatively greater impact on the ability of the species to avoid extinction.

Declining numbers of repeat spawners have been widely reported (Hubley et al., 2008, Nyqvist et al., 2016; Maynard et al., 2018) and associated with overharvesting and hydropower projects (Wertheimer and Evans, 2005; Keefer et al., 2008). The proportion of repeat spawners in the Penobscot River's Atlantic salmon run over the last decade has averaged 0.04%, compared to an average of 1.7% in the 1980s (Fleming and Reynolds, 2004). Average proportions of repeat spawners in the southern North American range of Atlantic salmon have decreased significantly from 4.1 to 2.7% (Bordeleau et al., 2020). Though many northern and mid-latitude populations have exhibited a relative increase in repeat spawners with reductions in fishing pressure, declines seen in the southern range have been attributed to anthropogenic threats such as hydropower projects and reliance on hatchery reared fish (Maynard et al., 2018). Hydropower projects elevate mortality of post-spawners during downstream migration through injuries and delays (Holbrook, 2009; Östergren and Rivinoja, 2008; Ferguson, 2005; Scruton et al, 2007; Kraabøl et al., 2009). Chaput and Jones (2006) highlighted the effects of hydropower projects on repeat spawners by revealing a 4.1% reduction in their prevalence between two proximate populations in the Saint John River above and below the Mactaquac Dam. Size-dependent selection against larger fish reported at passage facilities on the Penobscot and Saint John rivers may limit the persistence of repeat spawners and must be closely examined before building new passage facilities to minimize post-spawning mortality (Maynard et al., 2017; Bordeleau et al., 2020). Furthermore, delays at dams can lead to starvation, accumulated stress, increased predation and loss of marine adaptations, lowering the chances of surviving to feeding grounds (Nyqvist et al., 2016).

Recent data from researchers at the University of Maine support all of the above concerns about negative dam impacts on critically important repeat spawners and specifically show that a four-dam system would result in a loss of more than 50% of pre-spawn and post-spawn fish. In an email to the Kennebec Coalition describing work with graduate student Sarah Rubenstein, University of Maine Professor Joseph Zydlewski stated:

> 1) ATS [Atlantic salmon] face poor passage at some dams (e.g. Lockwood)
>
> 2) If passing, ATS often face long delays, usually weeks in length - sometimes months
>
> 3) Because of the high and rising downstream temperatures in lower rivers in the summer during river entry and migration, there is increased metabolic cost and this is directly related to depletion of limited and fixed energy stores.
>
> 4) Our bioenergetic model suggests that these delays significantly lower the probability of spawning success (depletion of energy stores prior to spawning likely leading to mortalities) and biologically significant declines in the probability of repeat spawning (due to energy depletion and likely mortality). For a four dam system, this loss is estimated to be greater than 50% loss for pre-spawn and post-spawn fish. These are likely conservative estimates as delays at dams are associated with increases in searching behavior, and activity means more energy demand.
>
> 5) Extensive literature suggests that older, larger, repeat spawning fish are critical for population resilience, and hence recovery (see attached).[81] In the Penobscot River (see Maynard et al., 2018) repeat

[81] Dr. Zydlewski is referring to the following paper attached to his email cited below: Hixon, M.A., Johnson, D.W. and Sogard, S.M., 2014. BOFFFFs: on the importance of conserving old-growth age structure in fishery populations. *ICES Journal of Marine Science, 71*(8), pp.2171-2185.

> spawning is less than 1%, far less than occurs in un-dammed ATS rivers. This fact provided direct evidence that dams are associated with and likely causal to low survival (increased mortality) of post spawn salmon and underscored the demographic fragility resulting from this persistent fixed source of mortality.[82]

For all these reasons, the Draft EA's failure to even analyze the environmental consequences of downstream passage for kelts, and its failure to set passage performance standards to address the unique importance of kelt passage, fails to adhere to NEPA's "exacting procedural requirements" and to analyze the environmental consequences the Shawmut Project "to the fullest extent possible."[83]

C. The Draft EA Fails to include Alosines in Fish Passage Analysis and to take a "Hard Look" at the Environmental Consequences of Ineffective Passage of Other Species

The Federal Power Act requires the Commission to give equal consideration to fish and wildlife resources in addition to power generation.[84] NEPA requires the Commission to "integrate" its environmental impact analyses with all "related surveys and studies required by all other Federal environmental review laws."[85] This should clearly include requirements for restoration of all of the sea-run species that are so

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[82] Zydlewski, Joseph. 2021. Email to Landis Hudson, Maine Rivers Executive Director. Re: "Rubenstein Defense This Friday August 6." Received August 7. This document is attached to these Comments.

[83] *American Rivers*, 895 F.3d at 51 (citing *Delaware Riverkeeper Network v. FERC*, 753 F.3d 1304, 1310 (D.C. Cir. 2014).

[84] 16 U.S.C. 797(f).

[85] 40 C.F.R. § 1502.24(a). And of course the ESA contains the policy overlay requiring that the Commission "shall cooperate with State and local agencies to resolve water resource issues in concert with conservation of endangered species." 16 U.S.C. § 1531(c)(1).

important to Maine's environment and economy. But the Draft EA is devoid of any such analysis, as set forth below.

i. Failure to analyze the environmental consequences of not passing the full suite of sea-run species.

Another glaring omission in the Draft EA is the complete lack of any evaluation of passage standards for species other than salmon, leading to – in what can be only characterized under the *American Rivers* standard as a "breezy dismissal"[86] – its recommendation that there be no passage standards for the full suite of sea-run species. The Draft EA thus ignores Maine's multi-species restoration goals for the Kennebec, as set forth by the MDMR for Atlantic Salmon, American shad, alewives, blueback herring and American eels/sea lampreys:

> Minimum Species Goals for the Kennebec River
>
> The minimum goal for **Atlantic Salmon** is to provide safe, timely, and effective upstream and downstream passage in order to achieve a minimum annual return of 500 naturally-reared adults to historic spawning/rearing habitat in the Kennebec River for Endangered Species Act (ESA) down-listing and a minimum annual return of 2,000 naturally-reared adults to historic spawning/rearing habitat in the Kennebec River for reclassification based on the NOAA and USFWS Recovery Plan (2019). To reach spawning/rearing habitat in the Sandy River, Carrabassett River, and mainstem Kennebec River, all returning adults must annually pass upstream at the Lockwood, Hydro Kennebec, Shawmut, and Weston project dams.
>
> The minimum goal for **American Shad** is to provide safe, timely, and effective upstream and downstream passage in order to achieve a minimum annual return of 1,018,000[1] wild adults to the mouth of the Kennebec River; a minimum annual return of 509,000 adults above Augusta; a minimum of 303,500 adults annually passing upstream at the Lockwood and Hydro Kennebec Project dams; a minimum of 260,500 adults annually passing upstream at the Shawmut Project

[86] *American Rivers*, 895 F.3d at 50.

dam; and a minimum of 156,600 adults annually passing upstream at the Weston Project dam.

The minimum goal for **Blueback Herring** is to provide safe, timely, and effective upstream and downstream passage in order to achieve a minimum annual return of 6,000,000 wild adults to the mouth of the Kennebec River; a minimum annual return of 3,000,000 adults above Augusta; a minimum of 1,788,000 adults annually passing upstream at the Lockwood and Hydro Kennebec Project dams; a minimum of 1,535,000 adults annually passing upstream at the Shawmut Project dam; and a minimum of 922,400 adults passing upstream at the Weston Project dam.

The minimum goal for **Alewife** is to provide safe, timely, and effective upstream and downstream passage in order to achieve a minimum annual return of 5,785,000 adults above Augusta; a minimum of 608,200 adults annually passing at the Lockwood, Hydro Kennebec, and Shawmut project dams; and a minimum of 473,500 adults annually passing upstream at the Weston Project dam.

The minimum goal for **Sea Lamprey and American Eel** is to provide safe, timely, and effective upstream and downstream passage throughout the historically accessible habitat of these two species.[87]

The Draft EA's recommendation to ignore passage standards for species other than Atlantic salmon is not just clearly inconsistent with Maine's management goals but also undercuts them. Moreover, MDMR explicitly states that the proposed fish passage measures at Shawmut would be unlikely to meet these minimum goals for any of the species.[88] These goals are important to the ecology of the Gulf of Maine and Maine's

[87] MDMR. 2021. Comments on Brookfield White Pine Hydro, LLC's Shawmut (FERC No. 2322). Hydroelectric Project, State Water Quality Certification. July 17. p. 2. Accessible at https://www.maine.gov/dep/ftp/HYDRO/WaterQualityCertifications/Shawmut/agency-comments/DMR%20Comments%20to%20DEP%20WQC%20Shawmut_July.pdf. Also attached to these Comments.

[88] MDMR. 2021. Comments on Brookfield White Pine Hydro, LLC's Shawmut (FERC No. 2322). Hydroelectric Project, State Water Quality Certification. July 17. p.2. https://www.maine.gov/dep/ftp/HYDRO/WaterQualityCertifications/Shawmut/agency-comments/DMR%20Comments%20to%20DEP%20WQC%20Shawmut_July.pdf

iconic and economically critical marine industries. NMFS shares the MDMR's goals, stating in its comments on the Shawmut license application that:

> [t]he Kennebec River watershed once produced large runs of Atlantic salmon, American shad, blueback herring and alewife, as well as other sea-run fish including shortnose and Atlantic sturgeon (MSPO, 1993). Diadromous fish once contributed to substantial commercial, recreational, and subsistence harvests (MSPO, 1993) that were economically important to coastal communities. Anadromous fish production within the Kennebec River experienced dramatic declines throughout the past 150 years. Multiple plans since the 1980s, including the Kennebec River Resource Management Plan (1993), KHDG Settlement Accord (1998) and Atlantic salmon recovery plan (2019), highlight the importance of fish passage and habitat restoration as critical to supporting a restored anadromous fishery. Significant spawning, rearing, and migratory habitat exists above the Shawmut Project. Existing dams prevent access to those historical habitats.[89]

The Draft EA's failure to consider the positions and recommendations of the state and federal natural resource agencies is a far cry from an objective hard look at the impacts of the relicensing of the project.

ii. The Draft EA errs in concluding that other species need not be passed.

The Draft EA creates a false choice by suggesting it cannot require Brookfield to restore both salmon and the sea-run species with which they coevolved. First, there is no evidence that improvements in fish passage for other species would harm salmon, as the Draft EA so boldly declares.[90]

In the June 19, 2009 NMFS and USFWS determination of endangered status for the GOM DPS of Atlantic salmon, the agencies found:

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[89] 2020. NMFS. Comments, Recommendations, Preliminary terms and Conditions, and Preliminary Fishway Prescriptions for the Shawmut Hydroelectric Project (FERC No. 2322). Pp. 43-44. August 28. FERC Accession Number 20200828-5176.

[90] Draft EA at p.120.

> Of particular concern for Atlantic salmon recovery efforts within the range of the GOM DPS is the dramatic decline observed in the diadromous fish community. At historic abundance levels, Fay et al. (2006) and Saunders et al. (2006) hypothesized that several of the co-evolved diadromous fishes may have provided substantial benefits to Atlantic salmon through at least four mechanisms: serving as an alternative prey source for salmon predators; serving as prey for salmon directly; depositing marine-derived nutrients in freshwater; and increasing substrate diversity of rivers.[91]

As an additional example undermining the unsupported Draft EA conclusion, running the upstream fish lift 24 hours a day to allow nocturnal sea lamprey migration would not interfere with Atlantic salmon upstream migration. Sea lamprey (discussed further below, in subsection v) are also particularly important for salmon recovery because Atlantic salmon show a preference for laying their eggs in old sea lamprey redds.[92] Additionally, restoration of the suite of sea-run species with which Atlantic salmon co-evolved is necessary to restore Atlantic salmon. These species provide a prey buffer for salmon, particularly for salmon smolts migrating downstream at the same time that alewife and blueback herring are at the peak of their upstream migration. Without this buffer, avian and fish predators will focus their attention on salmon smolts. With large numbers of alewife and blueback herring migrating upstream during the smolt migration, predation on less numerous and smaller salmon smolts will be much reduced. Hence, without this prey buffer, salmon restoration is likely impossible.[93]

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[91] 74 Fed. Reg. 29,344-01 at 29,374-75 (Determination of Endangered Status for the Gulf of Maine Distinct Population Segment of Atlantic Salmon) (June 19, 2009).

[92] Saunders, R., *et a*l. 2006. Maine's Diadromous Fish Community: Past, Present, and Implications for Atlantic Salmon Recovery. Fisheries 31: 537-547. Accessible at http://www.gulfofmaine.org/kb/uploads/1717/saunders%20et%20al.pdf.; *see also* 74 Fed. Reg. 29,344-01 at 29,375 ("Sea lampreys likely provide an additional benefit to Atlantic salmon spawning activity in sympatric reaches.") (citing, *inter alia,* Kircheis, 2004).

[93] U.S. Fish and Wildlife Service and National Marine Fisheries Service. 2018. Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic salmon (*Salmo salar*). Hadley, Massachusetts. January 2019. 74 pp. at P11 (hereafter "2019 Final Recovery Plan"). *See also* 74 Fed. Reg. 29,344-01 at 29,374-75

The Final Recovery Plan for the Gulf of Maine DPS of Atlantic salmon makes clear both that dams were a primary factor in in the decimation and near extirpation of Atlantic salmon runs and that the continued low abundance of co-evolved diadromous fish is a "secondary stressor" that contributes to reduced survival of Atlantic salmon:

> Damming rivers, thus preventing migration to spawning grounds, was a major factor in the decline of Atlantic salmon and much of the co-evolved suite of diadromous fish (e.g., alewife and blueback herring). Many co-evolved diadromous species have experienced dramatic declines throughout their ranges and current abundance indices are fractions of historical levels. The dramatic decline in diadromous species has negative impacts on Atlantic salmon populations, including through depletion of an alternative food source for predators of salmon, reductions in food available for juvenile and adult salmon, nutrient cycling, and habitat conditioning. These impacts may be contributing to decreased survival in lower river and estuarine areas.[94]

And analytically, the "exacting" requirement under NEPA is to consider the environmental consequences of the action on the whole environment, the entire ecosystem – not just one component of it. If the Shawmut Dam will block passage of other sea-run species, to any degree, that alone is a significant environmental consequence that the Commission must "grapple with."[95] When it is considered further that that environmental consequence of blocking passage of other sea-run species likely heralds the death knell to efforts for the recovery of an endangered species, to not even consider the issue in the Draft EA clearly fails to comport with the requirements of NEPA.

(NMFS Determination of Endangered Status for the Gulf of Maine Distinct Population Segment of Atlantic Salmon) (June 19, 2009).

[94] 2019 Final Recovery Plan at p. 11.

[95] *American Rivers*, 895 F.3d at 51.

iii. The Draft EA fails to provide adequate information to assess use of the USFWS Turbine Blade Strike Analysis model.

One particular failure in conducting an Environmental Assessment instead of an Environmental Impact Statement under NEPA, is that conclusions such as use of the USFWS Turbine Blade Strike Analysis model[96] are left without the means of validation. Moreover, the information was not provided to the public by Commission staff when requested. Commission staff must provide all necessary information (all inputs for the blade strike model) for the NGOs and the public to validate conclusions based on this model. Part of taking a "hard look" under NEPA is providing the public with the information necessary to engage in that hard look. This aspect of the Draft EA analysis is deficient in this respect.

iv. The Draft EA's statement that shad may be unmotivated to pass upstream makes no sense.[97]

Shad migratory motivation can be assessed by the distance fish move upriver and by their behavior at artificial barriers, and specifically for the number of times fish attempt to enter a fish ladder and the time spent attempting to pass a dam. Repeated entries in the face of failure and extended residence in proximity to a dam represent a strong upstream drive. Telemetry studies of upstream shad movement at fishways often assess the number of entries into a ladder or fish lift and the time spent attempting to ascend a fishway. An unmotivated fish that failed to pass the fishway would be expected to fall back and not attempt entry again within a short period of time.

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[96] Draft EA at p. 53.

[97] Draft EA at p.44.

In a review of American shad for the Atlantic States Marine Fisheries Commission, historic shad runs are reported as long as 451 miles (726 km) in the Great Pee Dee and Yankin Rivers in North Carolina and over 500 miles (805 km) in the Susquehanna River (Green et al., 2009). These fish bypass significant reaches of suitable spawning habitat. Fish that migrate upstream in the Connecticut River pass multiple suitable spawning habitats areas of the river while migrating to Turners Falls (Layzer 1974; Kleinschmidt, 2016). The extent of historic shad migration in the Kennebec and Sandy Rivers is well documented in Maine's 1993 Kennebec River Resource Management Plan:

> Shad historically ascended the Kennebec River as far as Norridgewock Falls (89 miles from the sea), the Sandy River a few miles from its mouth, and the Sebasticook River in small numbers to Newport. Atkins indicated that shad ascended the Sandy River as far as Farmington.[98]

Radio telemetry studies of American shad on the Connecticut (Kleinschmidt 2016a & Kleinschmidt, 2019) and Susquehanna Rivers (Normandeau, 2011 & Normandeau, 2012) show a strong motivation for upstream passage when encountering a dam. For both rivers, Table D (below) lists the number of American shad, the number of entries, and the maximum number of entries made by a single fish. In 2018 the area around the Cabot Station tailrace and ladder entrance was ensonified with an ultrasound array in an effort to prevent shad from entering the ladder (FERC No. 1889). Even with a sound field designed to repel them, shad moved into the area searching for an upstream route of passage – a clear showing of a strong motivation to migrate upstream.

[98] Maine State Planning Office. 1993. Kennebec River Resource Management Plan. Augusta, Maine. February 1993. P. 79.

Table D. River, fishway, year of study, number of shad entering fishway, number of entries, and the maximum number of entries by a fish.

River	Location	Year	Shad	Entries	Maximum # Entries
Connecticut	Cabot ladder	2015	102	408	8
Connecticut	Cabot ladder	2018*	53	117	7
Connecticut	Cabot ladder	2019	51	260	28
Susquehanna	East Fish Lift	2010	65	102	9
Susquehanna	East Fish Lift	2012	29	49	6

* Area around ladder entrance ensonified

In 2015, 54 radio tagged shad spent an average of 10.7 days (range 0.3 to 40.1 days) within 1.2 kilometers of the Cabot Station at the Turners Falls Project without passing. 24% of those fish spent over 15 days at the project (D. Pugh unpublished data). These fish had passed multiple known shad spawning areas in the river before reaching the Turners Falls Project, demonstrating that they were motivated to move upstream but had trouble passing the dam (Layzer, 1974; Kleinschmidt, 2016b).

Similarly, experience with dam removals in Maine indicates that American shad will colonize habitat above a removed dam as soon as the barrier is removed. On the Kennebec River, following removal of Edwards Dam in 1999, anglers caught shad in the tailrace of the Lockwood Dam, 17 river miles upstream, by mid-May of 2000. Twenty years later there is a thriving recreational fishery for shad each spring. Similarly, on the Penobscot River, following removal of the Great Works Dam in 2012 and Veazie Dam in 2013, the fish lift at the Milford Dam, 9 river miles upstream, captured 1,806 shad in 2014.[99] By 2021, shad captures at Milford Dam have increased to 11,572.[100] Given this

[99] Maine DMR Fish Trap data, accessed here: https://www.maine.gov/dmr/science-research/searun/programs/documents/trapcounts2020.pdf.

[100] *Id.* (https://www.maine.gov/dmr/science-research/searun/programs/trapcounts.html)

hard and readily available data, Commission staff's conclusion in the Draft EA that American shad are "unmotivated" to pass upstream is unusual, at best.

v. The Draft EA errs in analysis on issues of sea lamprey passage.

The Draft EA states that the importance of upstream habitat to historical habitat for sea lamprey is not known and that sea lamprey may not be motivated to pass upstream.[101] However, sea lamprey are known to migrate several hundred kilometers upstream from the ocean. Bigelow and Schroeder note migration of 320 kilometers in the Susquehanna River and 240 kilometers in the Savannah River (Beamish, 1980). Tens of thousands of sea lamprey pass the Holyoke dam every year at river kilometer 139, a similar distance as the Weston Project which is at river kilometer 132. Prior to dam construction on the Kennebec, sea lamprey certainly migrated beyond where the lower four mainstem dams are now located. Sea lamprey recolonization of Sedgeunkedunk Stream in 2010 and 2011 above a previously impassable barrier demonstrates that they will utilize previously unavailable habitats. Sedgeunkedunk Stream experienced a fourfold increase in population in the two years after dam removal (Hogg et al., 2013).

Sea lamprey are similarly highly motivated as American shad. For example, on the Connecticut river, they move rapidly from Holyoke to the Turners Falls project (54.5 km, median time of 33.8 hours) for a median migration speed of 0.45 m s^{-1} (Castro-Santos et al., 2017). This included time for the fish to find and enter the Cabot ladder and does not consider any tortuosity of upstream movement, so this migration speed is almost certainly an underestimate. Indeed, in a controlled flume, sea lamprey were able to ascend channels with velocities as high as 3.5 m/s (T. Castro-Santos pers. Comm.).

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[101] Draft EA at pp. 43-44.

During studies in an experimental fishway at the USGS Conte Anadromous Fish Research Center, sea lamprey were highly motivated swimming against the retaining barrier at the lower end of the fishway prior to the start of tests (D. Pugh pers. Comm).

The importance of sea lamprey to Atlantic salmon recovery cannot be overemphasized. Sea lamprey provide important ecological functions including reducing sediment in pool tail and riffle spawning habitat and transport of nutrients to freshwater habitats. Sea lamprey also build large oval redds which restructure the substrate, shifting small rocks, and reducing embeddedness as flows sweep away fines and silt increasing interstitial spaces (Souse et al., 2012). Hogg et al. 2014 describe changes in stream-bed complexity including a reduction in embeddedness and an increase in macroinvertebrate abundance in mounds compared to pits and reference locations. The physical/substrate changes persisted through September. Intragravel permeability declined in the uppermost reach compared to the lowest reach, where sea lamprey had access prior to dam removal, at a statistically significant level. The authors postulate that this may reflect the lack of anadromous spawning for more than 150 years. A decrease in embeddedness between mounds, pits and reference sites between the summer of 2010 and autumn of 2011 suggest that sea lamprey spawning may condition the substrate.

Atlantic salmon – as well as brook trout – use the same habitat as sea lamprey for spawning, at times superimposing their redds over those of sea lamprey (Kircheis, 2004). In addition, by clearing fines and debris, sea lamprey provide favorable habitat for macroinvertebrates and provide a food source for macroinvertebrates after they die (Nislow and Kynard 2009, Weaver et al. 2016, Weaver et al. 2018). Macroinvertebrates are a primary food source for salmon fry and parr (Grader and Letcher, 2006).

Thus, the Draft EA errs when it cites the lack of motivation of sea lamprey and American shad as a reason not to set performance standards for passage for those species. Both species migrate long distances, passing spawning habitat while moving to upriver habitat that is preferred. Movement in open river and at fishways for sea lamprey and shad has been documented at numerous sites and the Draft EA's failure to set performance standards for their passage at Shawmut Dam is inexcusable. The impressive performance of sea lamprey moving upriver after tagging in the Connecticut River, the determination of shad to enter the Cabot ladder, and the rapid recolonization by shad of previously-inaccessible river reaches following removal of the Edwards, Veazie, and Great Works Dams, belies any concerns about their motivation. The Draft EA's reliance upon the unreliable assertions that these species would not be motivated to pass the Shawmut Dam amount to an improper "breezy dismissal" of both the environmental consequences of failure to pass, and the affirmative requirements to pass sea lamprey and shad to avoid adverse impact to the environment, particularly given their importance to a species on the verge of extinction.[102]

D. The Failure to Consider Dam Removal

i. The Draft EA ignores MDMR and NOAA recommendations for dam removal.

As summarized above, under the Federal Power Act "[n]o license may be issued unless the Commission first determines that the proposed project 'will be best adapted to a comprehensive plan for improving or developing' the relevant waterways." *American Rivers and Alabama Rivers Alliance v. Federal Energy Regulatory Commission*, 895 F.3d

[102] *American Rivers*, 895 F.3d at 50-51.

32, 36 (D.C. Cir. 2018) (quoting 16 U.S.C. § 803(a)(1)). "In making that judgment, the Commission must give '**equal consideration to** the purposes of energy conservation, **the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat)**, the protection of recreational opportunities, and the preservation of other aspects of environmental quality.'" *Id.* (quoting 16 U.S.C. § 797(e)) (bold emphasis added). In furtherance of the standard, compliance with the mandates of NEPA as implemented by the regulations of the Council on Environmental Quality ("CEQ"), 40 C.F.R. parts 1500 through 1508, compels federal agencies "to take a hard and *honest* look at the environmental consequences of their decisions." *American Rivers*, 895 F.3d at 49 (italics emphasis added). In light of this standard, for the Draft EA to simply brush off the state and federal wildlife agencies' recommendations for decommissioning and removal of the Shawmut Dam without "hard and honest" analysis, violates NEPA.

Brookfield's own analysis states that dam removal is the cheapest and most effective mode of fish passage at the Shawmut Dam. Brookfield received a one-year extension on its license in order to carry out a fish passage study at three of its four dams between Waterville and Skowhegan, including the Shawmut Dam.[103] For the Shawmut Dam, this study concluded that dam removal was the cheapest and most effective fish passage option.[104] Despite this, and the recommendations from NMFS and MDMR to remove the dam, Commission staff unacceptably dismissed removal as an option with almost no analysis.

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[103] Kleinschmidt. 2018. Brookfield White Pine Hydro, LLC, Energy Enhancements and Lower Kennebec Fish Passage Improvements Study. October. P. 18; FERC Accession No. 20191106-5142.

[104] *Id*.

This lack of hard analysis of the dam removal option fails to meet the Commission's obligation to "ensure the professional integrity, including scientific integrity, of the discussions and analyses and environmental documents" and to "make use of reliable existing data and resources." 40 C.F.R. § 1502.23. This failure is compounded by the Draft EA's failure to consider both the experience of and outcomes associated with several past dam removals in Maine of dams comparable to Shawmut including the Edwards, Fort Halifax, Great Works, and Veazie Dams, for example, as well as the experience and expertise of the state and federal natural resources agencies. These failures are even more reason for a finding that the Draft EA is woefully deficient.

ii. The Draft EA ignores the NMFS/USFWS 2019 Final Recovery Plan and the 2009 ESA listing for Atlantic salmon.

The Draft EA falls short of the Commission's obligations under NEPA to consider "best available scientific data" by ignoring the terms of the 2019 Final Recovery Plan for Atlantic salmon and the 2009 Endangered Species Act listing for Atlantic salmon.[105] Under NEPA, even under the less stringent requirements with respect to the preparation of an environmental assessment, the Commission is required to "integrate" environmental analyses with "related surveys and studies required by all other Federal environmental review laws . . ., including the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), . . . and the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)." 40 C.F.R. §§ 1501.5(g)(3), 1502.24(a). The Commission is also required to

[105] U.S. Fish and Wildlife Service and NMFS. 2018. Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (*Salmo salar*) ("2019 Final Recovery Plan"); 74 Fed. Reg. 29,344-01 (June 19, 2009) (Determination of Endangered Status for the Gulf of Maine Distinct Population Segment of Atlantic Salmon).

"ensure the professional integrity, including scientific integrity, of the discussions and analyses and environmental documents" and "shall make use of reliable existing data and resources." 40 C.F.R. § 1502.23.

The purpose of the Fish and Wildlife Coordination Act is "to provide that wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development programs through the effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation and rehabilitation . . . ." 16 U.S.C. § 661. Under the Endangered Species Act, the Commission also has a coextensive responsibility "to conserve endangered species and threatened species and shall utilize [the Commission's] authorities in furtherance of the purposes of this chapter [i.e., the ESA]," and to "cooperate with State and local agencies to resolve water resource issues in concert with conservation of endangered species." 16 U.S.C. § 1531(c)(1) & (2); *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 185 (1978) ("In addition, the legislative history undergirding § 7 [of the ESA] reveals an explicit congressional decision to require agencies to afford first priority to the declared national policy of saving endangered species."). "The plain intent of Congress in enacting this statute [the ESA] was to halt and reverse the trend toward species extinction, *whatever the cost*." *Id*. at 184 (italics emphasis added).

Thus, for the Draft EA to ignore the inconsistencies of its results with the recovery actions set forth in the 2019 Final Recovery Plan for endangered Atlantic salmon is unacceptable and shirks the Commission's responsibilities under NEPA. The Draft EA ignores the required "best available science" on Atlantic salmon restoration, and by doing so it yields arbitrary and capricious conclusions regarding the number of fish that must be passed at the lower four Kennebec Dams in order to meet the 2019 Final Recovery Plan for Atlantic salmon.

Doing so is particularly galling in light of the long history of the State of Maine, USFWS, and NMFS working together for the conservation and recovery of Atlantic salmon. In the early 1990s, these state and federal agencies worked together on a pre-listing recovery plan for Atlantic salmon and initiated the river-specific stocking program. The GOM DPS of Atlantic salmon was listed under the Endangered Species Act (ESA) in 2000, and this listing was expanded in 2009 to include a broader geographic range within the State of Maine, and to designate the species' critical habitat under the ESA, *see* 74 Fed. Reg. 29,344-01; 74 Fed. Reg. 29,300, an area that totally encompasses the Shawmut Project.

The Draft EA's reference to the 2019 Final Recovery Plan on page 141 in section 5.4, and Commission staff's unexplained conclusory statement that "[n]o inconsistencies were found" with it, is by definition fundamentally arbitrary and capricious. The 2019 Final Recovery Plan concludes that dams are "one of the most significant threats to Atlantic salmon" and concludes that the most significant top "Recovery Action" is to: "**Remove Dams to Ensure Access to Habitats Necessary for Atlantic Salmon Recovery**."[106]

> One of the most significant threats to Atlantic salmon are dams. Dams block or significantly impede a salmon's ability to access freshwater habitats essential for spawning and juvenile rearing. Dams, especially dams with turbines, can delay, injure or kill a significant number of downstream migrating smolts as they are heading to the ocean. Dams can kill (directly or indirectly) post-spawn adults (kelts) as they attempt to return to the ocean, preventing their ability to spawn

[106] 2109 Final Recovery Plan at C2.0 at 33 (bold emphasis added).

again. **Dam removal offers the highest likelihood of addressing these threats.** . . .[107]

And lest the specific point is missed on even the most casual reader, recovery action C2.4 is to, **"[w]hen feasible, remove hydro-electric dams that afford significant conservation benefit to Atlantic salmon and the ecosystems that they depend on."**[108] These Recovery Actions are higher in order of priority than "improving fish passage at dams." Compare C2.0 with C3.0.[109] So, to be clear, for the lower Kennebec dams in the Merrymeeting Bay Salmon Habitat Recovery Unit (SHRU),[110] NMFS and USFWS have prioritized *removal* of hydro-electric dams over installation of fishways, in the official final plan for recovery of Atlantic salmon – a priority further reflected in NMFS's recommendation for removal in its comment on the Shawmut final license application.[111] In direct contrast, in this Draft EA, Commission staff prioritize new fishways (ignoring best available science on their inefficacy) over dam removal, ignoring not only the best available science on their inefficacy but also the very clear position and priority of a fellow federal agency.

That is a glaring inconsistency for the Draft EA, and one that NEPA requires the Commission to "grapple with." *See American Rivers v. Federal Energy Regulatory Commission*, 895 F.3d 32, 51 (D.C. Cir. 2018) (in requiring "compounded" analysis of

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[107] *Id*. (bold emphasis added).

[108] 2019 Final Recovery Plan, C2.4 at p. 34 (bold emphasis added).

[109] 2019 Final Recovery Plan at pp. 33-34.

[110] 2019 Final Recovery Plan at ix.

[111] FERC Accession No. 20200828-5176 (NMFS Comments, Recommendations, etc. for the Shawmut Project) at pp. 43-44.

mortality factors, noting that "fish that manage to run the gauntlet of youth and natural mortality factors will now emerge only to face a high rate of death in hydropower turbines and other lethal aspects of the Project. The Commission's NEPA analysis has to grapple with that."). Brookfield's own feasibility study of record admits that removal of the Shawmut dam is not only feasible but also the most economic and efficient feasible solution, more so than installation of fish passage facilities.[112] Federal and state wildlife agencies have unequivocally conveyed a consensus position to the Commission staff that by removal there will be a significant, and uniquely pivotal, conservation benefit to the recovery of Atlantic salmon, reflected most significantly by the NMFS and MDMR recommendations for decommissioning and removal of the Shawmut Project. In reviewing the Draft EA, the Commission therefore must weigh the circumstances that fit the Final Recovery Plan's top Recovery Action, i.e., ***"[w]hen feasible*, [we must] remove hydro-electric dams that afford significant conservation benefit to Atlantic salmon and the ecosystems that they depend on."**[113]

In the Draft EA for the Shawmut Dam, Commission staff focused exclusively on an average of the number of fish captured at the Lockwood fish lift to determine their estimated efficiency of fish passage required for the term of a new license at the Shawmut dam. In doing this Commission staff ignored the ongoing work and progress that has been made protecting and restoring access, and created hatchery capacity for Atlantic salmon restoration in the Kennebec River. These ongoing efforts include:

[112] Kleinschmidt. 2018. Brookfield White Pine Hydro, LLC, Energy Enhancements and Lower Kennebec Fish Passage Improvements Study. October. P. 18; FERC Accession No. 20191106-5142.

[113] 2019 Final Recovery Plan at C2.4 at 34 (bold emphasis added).

- Removal of the only main stem dam in Sandy River, the 313' long Madison Electric Works dam in the summer of 2006. This dam was removed to provide access to spawning habitat for Atlantic salmon and other sea-run fish.

- The replacement of two road-stream crossings and the pending removal of the Walton Mills Dam on Temple Stream in Farmington with approximately $3,000,000 of federal, state, and private funding. Once fully completed in 2022, these projects will fully restore access to more than 2,200 units of spawning and rearing habitat for Atlantic salmon.

- The protection of 5,774 acres of forest land with $1,300,000 of federal Forest Legacy funding plus $300,000 from the State of Maine Land for Maine's Future program. This parcel in Madrid and Phillips, Maine, contains some of the Kennebec River's primary spawning and rearing habitat for Atlantic salmon. Because this parcel is at high elevation, it will provide significant cold water protection for spawning Atlantic salmon, especially important as our waterbodies continue to warm because of the climate crisis.

- Significant funding and effort that has been committed by USFWS to enable hatchery production and stocking of over 100,000 Atlantic salmon smolts into the Kennebec River in 2020 and 2021.

Perhaps most significant is the Draft EA's failure to consider the Final Recovery Plan for Atlantic salmon ("2019 Final Recovery Plan").[114]

The 2019 Final Recovery Plan was adopted to identify and guide species recovery needs under section 4(f) of the Endangered Species Act which directs the development and implementation of recovery plans for all listed species.[115] This 2019 Final Recovery Plan addresses the recovery requirements under the ESA for the GOM DPS of Atlantic salmon. It presents a recovery strategy based on the biological and ecological needs of the species as well as current threats and conservation accomplishments that affect its long-term viability.

The 2019 Final Recovery Plan includes:

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[114] U.S. Fish and Wildlife Service and NMFS. 2018. Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (*Salmo salar*) 74 pp.

[115] 16 U.S.C. § 1533(f).

- A description of site-specific management actions necessary to conserve the species;

- Objective, measurable criteria that, when met, will allow the species to be removed from the endangered and threatened species list;

- Estimates of the time and funding required to achieve the plan's goals. The plan adopts a planning approach recently endorsed by the USFWS;

- Site-specific recovery actions;

- Objective, measurable criteria for delisting; and,

- Time and cost estimates to achieve recovery and intermediate steps.

The 2019 Final Recovery Plan also provides relevant background information for understanding the proposed recovery program, including a summary of the governance structure, threats, conservation measures, and recovery strategy for the GOM DPS. The simultaneously adopted critical habitat rule[116] delineates recovery units for the expanded DPS. These units, designated as Salmon Habitat Recovery Units (SHRUs), respond to the life history needs and the environmental variations associated with freshwater habitats. The SHRUs encompass the full range of the DPS, by dividing it into three segments:

- The Merrymeeting Bay SHRU, which covers the Androscoggin and Kennebec, and extends east to include the Sheepscot, Pemaquid, Medomak, and St. George watersheds;

- The Penobscot Bay SHRU, which covers the entire Penobscot basin and extends west to and includes the Ducktrap watershed; and,

- The Downeast SHRU, including all coastal watersheds from the Union River east to the "Dennys River."

[116] 74 Fed. Reg. 29,300 (June 19, 2009).

The 2019 Final Recovery Plan goes on to say "The 2009 listing rule called particular attention to three **major threats to Atlantic salmon: dams, inadequacy of regulatory mechanisms related to dams** and low marine survival."[117] The Delisting Objectives include:

- Maintaining self-sustaining, wild populations with access to sufficient suitable habitat in each SHRU;
- Ensure that necessary management options for marine survival are in place; and,
- Reducing or eliminating all threats that, either individually or in combination, pose a risk of endangerment to the DPS…[118]

The 2019 Final Recovery Plan also creates Biological Criteria for Delisting. The Plan states that GOM DPS will be considered recovered when all of the following criteria are met:

- **Abundance**: When the DPS has a self-sustaining annual escapement of at least <u>**2,000 wild origin adults in each SHRU**</u> [emphasis added], for a DPS-wide total of at least 6,000 wild adults;
- **Productivity:** When each SHRU has a positive mean population growth rate of greater than 1.0 in the 10-year (two-generation) period preceding delisting. In addition, at the time of delisting, the DPS demonstrates self-sustaining persistence, whereby the total wild population in each SHRU has less than a 50% probability of falling below 500 adult wild spawners in the next 15 years based on population viability analysis projections; and
- **Habitat:** When sufficient suitable spawning and rearing habitat for the offspring of the 6,000 wild adults is accessible and distributed throughout the designated Atlantic salmon critical habitat, with at least 30,000 accessible and suitable Habitat Units in each SHRU, located according to the known migratory patterns of returning wild adult salmon. This will require both habitat protection and restoration at significant levels.[119]

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[117] 2019 Final Recovery Plan at p. ix (bold emphasis added).

[118] 2019 Final Recovery Plan at p. x.

[119] 2019 Final Recovery Plan at pp. x-xi.

It is vital that the Commission understand that the 43,000+ Atlantic salmon habitat units in the Sandy River watershed (including Orbeton Stream) are pivotal and critical to the recovery of Atlantic salmon in the entire GOM DPS. The recovery of Atlantic salmon in the Kennebec River and its Sandy River tributary, as called for in the 2019 Final Recovery Plan, is critical to the recovery effort of the species as a whole, and must be considered in the Commission's NEPA review. The Draft EA's failure to consider this key significance is fatal to compliance with NEPA.

By ignoring the ongoing restoration of access to spawning and rearing habitat as well as the goals and objectives of the 2019 Final Recovery Plan for Atlantic Salmon in the GOM DPS, Commission staff ignore the required escapement requirement of 2,000 wild adults in the Merrymeeting Bay SHRU. This is only possible if salmon have unfettered access to the more than 43,000 units of habitat in the Sandy River, most of which is in largely undeveloped, well-forested, and higher elevation areas, which makes the habitat highly resilient to climate change.

The Draft EA's fish passage provisions for the lower Kennebec River would limit the number of Atlantic salmon that are able to pass the Shawmut Dam and other lower Kennebec dams, and likely lead to the extinction of the Atlantic salmon population in the Gulf of Maine. The Draft EA's analysis is neither "fully informed" nor "well-considered" and as such fails to take a "hard look" at the "significant" and "intense" environmental impact of relicensing the Shawmut Project. What is required is a full evaluation under NEPA by means of an environmental impact statement *before* any action is taken.[120]

iii. The Draft EA's analysis of dam removal is inadequate and lacks detail.

The Draft EA makes the following demonstrably incorrect assertions in connection with its stunted analysis of dam removal as a viable option to relicensing:

a. Sediment Release. "Removing the dam would release stored sentiment to the Kennebec River." Draft EA pp. 188-89. But at the same time, the Draft EA states that "[t]here is no information on sediment accumulation or containment levels in the project's impoundment." *Id.* Commission staff fail to recognize, however, that experience in Maine has shown that sediment effects are transitory. There have been multiple removals of dams comparable to Shawmut (Edwards, Fort Halifax, Great Works, and Veazie, for example) with no indication of lasting consequences due to sedimentation. FERC's Environmental Assessment that assessed removal of the Great Works and Veazie Dams on the Penobscot River in a lower mainstem river of similar size and character concluded that:

> Under the Proposed Action or Action Alternative 1 (removal of all three dams) there would be minor, short-term, adverse impacts to geologic and soil resources. Dam removal activities would disturb soils and sediments and result in increased turbidity within the projects' areas. However, these impacts would persist only during dam removal activities, and the licensee's implementation of best-management-practices such as silt screens and coffer dams would help to minimize these effects. While some erosion may occur as a result of lower

[120] *American Rivers*, 895 F.3d at 49 (quoting *Sierra Club v. Peterson*, 717 F.2d 1409, 1415 (D.C. Cir. 1983)).

> impoundment levels and increased water velocities, it is expected to be minimal as a result of natural channel substrates armoring the shoreline.[121]

b. Diversity and Wildlife Abundance. The Draft EA's "finding" that the diversity and abundance of wildlife species in the area would not be expected to significantly change if the dam was removed,[122] is simply not true. The diversity of sea-run species would increase, as would the diversity of benthic macroinvertebrates, based on experiences at other dams. This was the case on the Kennebec and Sebasticook Rivers where Yoder et al calculated both Diadromous and Riverine Indices of Biological Integrity (R-IBI, D-IBI) before and after dam removal at Edwards and Fort Halifax Dams. After Edwards Dam removal on the Kennebec River, "the DIBI showed an improvement almost immediately with the 2002 DIBI in the Lockwood to Augusta segment clearly higher than the upstream impoundments."[123] After the Fort Halifax Dam removal on the Sebasticook River both riverine and diadromous IBIs improved immediately, and "[t]he D-IBI showed a comparatively larger increase due to improved access by diadromous species and river herring."[124] In the Penobscot River, total mean abundance and generic richness of benthic macroinvertebrates increased after dam

[121] FERC Accession No. 20100518-3016. FERC, May 2010. Final Environmental Assessment, Application for Surrender of License, Veazie, Great Works, and Howland Projects, FERC Project Nos. 2403-056, 2312-019 and 2721-020. Section 4.4.1, page 172.

[122] Draft EA at p. 190.

[123] Yoder. C.O., R.F. Thoma, L.E. Hersha, E.T. Rankin, B.H. Kulik, and B.R. Apell. 2008. Maine Rivers Fish Assemblage Assessment: Development of an Index of Biotic Integrity for Non-wadeable Rivers. (Addendum March 31, 2016). MBI Technical Report MBI/2008-11-2. Submitted to U.S. EPA, Region I, Boston, MA. 55 pp. + appendices.

[124] Ibid.

removal at both the Veazie and Great Works sites.[125] Similarly, a fish assemblage study after removal at these sites found that dam removal improves diversity and abundance:

> Dams and their impoundments disrupt river habitat connectivity to the detriment of migratory fishes. Removal of dams improves riverine connectivity and lotic habitat, which benefits not only these fishes but also resident fluvial specialist species. Restoration efforts on the Penobscot River, Maine, are among the largest recently completed in the United States and include the removal of the two lowermost dams and improvements to fish passage at several remaining barriers. We assessed fish assemblages in the main-stem river and several major tributaries before (2010–2012) and after (2014–2016) dam removal using boat electrofishing surveys and a stratified random sampling design. In total, we sampled 303 km of shoreline and captured 107,335 individual fish representing 39 species. Similarity indices and rarefaction curves indicated that significant changes in fish assemblage composition occurred in reaches that underwent both habitat and connectivity changes (i.e., directly above removed dams). The newly connected reaches became more similar in fish assemblage composition, as demonstrated by an average increase of 31% in similarity scores. The changes in similarity score in these reaches were driven by increasing access for anadromous fishes and decreasing abundances of slow-water specialist species. For example, we observed a marked reduction in lacustrine species in former impoundments. These assemblage shifts were further illustrated by nonmetric multidimensional scaling in which sites directly above former dams exhibited the largest ordinal shifts immediately following dam removal. We also found all anadromous species in greatest abundance below the lowermost dam during each respective sampling period, though we did find some anadromous species above the lowermost dam during postremoval sampling. Our results demonstrate the potential for large dam removal projects to restore both fluvial and anadromous fish assemblages.[126]

c. Industrial Infrastructure. The Draft EA concludes that removal of the dam would cause problems with industrial and municipal in-river infrastructure.[127] This is

[125] Kusnierz, D., et al. 2021. A Comparative Analysis of Benthic Macroinvertebrate Communities and Water Quality Before and After Removal of the Great Works and Veazie Dams, Penobscot River Restoration Project. A report to The Nature Conservancy pursuant to Contract ID: PRRP Water Quality Analysis_2017_PIN_DKusnierz. National Oceanic and Atmospheric Administration Rebuilding Sea-Run Fisheries: A103519. P. 18.

[126] Watson, J.M., et. al. 2018. Dam Removal and Fish Passage Improvement Influence Fish Assemblages in the Penobscot River, Maine. *Transactions of the American Fisheries Society.* Accessed at https://usgs-cru-individual-data.s3.amazonaws.com/jzydlewski/intellcont/2018%20Watson%20et%20al%20Dam%20removal%20and%20fish%20assemblages-1.pdf.

[127] Draft EA at p. 191.

also not true based on past Maine experience. In cases of dam removals on the Penobscot and the Kennebec, municipalities and industries were able to relocate in-river infrastructure. Further, the State of Maine is well aware of these needs and still supports dam removal. As with other dam removals in Maine, industrial in-river infrastructure can be relocated or reconfigured, and there would almost certainly be financial assistance provided to do so. This was the case with the Penobscot River Restoration Project, where appropriate measures to protect infrastructure were proposed by the applicant and this Commission's Final Environmental Assessment concluded that: "With proper mitigation as proposed by the Trust and Commission staff, however, the infrastructure would be adequately protected and no impact would occur upon this environment from these actions."[128]

In addition, a free-flowing river would increase the assimilative capacity of the Shawmut reach and make it easier for dischargers such as Sappi to attain water quality standards. Currently, the Shawmut impoundment is not in attainment with Maine water quality standards due, in part, to potential failure to meet aquatic life standards for benthic macroinvertebrates.[129]

In the final analysis, the Draft EA provides no quantitative analysis of fish passage over remaining dams in the absence of the Shawmut Dam. It also does not examine the water quality benefits of dam removal or accurately portray current water quality problems in the Shawmut impoundment. This does not allow valid conclusions

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[128] FERC Accession No. 20100518-3016. FERC, May 2010. Final Environmental Assessment, Application for Surrender of License, Veazie, Great Works, and Howland Projects, FERC Project Nos. 2403-056, 2312-019 and 2721-020. Section 4.4.11, p. 178.

[129] Maine DEP. 2018. 2016 Integrated Water Quality Monitoring Report. P. 60. Accessed at https://www.maine.gov/dep/water/monitoring/305b/2016/28-Feb-2018_2016-ME-IntegratedRptLIST.pdf.

about the adequacy of engineered fish passage as a mitigation measure. The bottom line is that the failure to analyze dam removal in the context of the compounded effects of hydropower projects and dams both up- and downstream from Shawmut, in turn fails to meet NEPA's requirement that the lead agency evaluate the environmental consequences of this major federal action "to the fullest extent possible" in a "well-considered "and "fully informed" analysis.[130]

iv. The Draft EA fails to analyze run-of-river issues "to the fullest extent possible."[131]

The Kennebec Coalition's August 29, 2020 comments on the license application raised concerns about the magnitude, frequency, and duration of fluctuations in Kennebec River flows below the Shawmut Project.[132] The primary concern was on impacts of flow changes on fish passage and instream habitat—particularly if short duration flow fluctuations occur during critical periods for migration and spawning. USFWS raised similar concerns in its August 27, 2020 "Comments, Recommendations, Preliminary Terms and Conditions, and Preliminary Prescriptions," and recommended instantaneous run-of-river operation.[133] USFWS further noted that "[s]ince precise inflow is currently unavailable at the Project the headpond should be maintained at the 112 foot elevation and at most vary by 0.5 feet not one foot."[134]

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[130] *American Rivers*, 895 F.3d at 49, 51.

[131] *American Rivers*, 895 F.3d at 51(citing *Delaware Riverkeeper Network v. FERC*, 753 F.3d 1304, 1310 (D.C. Cir. 2014)).

[132] FERC Accession No. 20200831-5332 at pp. 27-34.

[133] FERC Accession No. 20200827-5121 at p. 7.

[134] FERC Accession No. 20200827-5121 at p. 7.

The Draft EA rejects this recommendation. In their analysis, Commission staff seem to have missed that USFWS was suggesting the project approximate instantaneous run-of-river by limiting headpond fluctuations to +/- 0.5 feet. Commission staff instead interpreted the request as requiring absolute run-of-river operation, and erroneously concluded that the USFWS's recommendation would "essentially eliminate any of the minor fluctuations that currently occur when adjustments are made to project facilities."[135] Finally, without any analysis, the Draft EA suggests that "there is no indication that the project is technologically capable of operating under conditions where outflow from the project instantaneously equals inflow, rather than approximates it."[136] But the Draft EA itself notes that data submitted by Brookfield indicate that the project currently operates within a deviation +/- 0.5' of elevation 96% of the time.[137] This strongly suggests that compliance with such a condition is feasible and could be accomplished with existing infrastructure at little or no additional cost.

v. The Draft EA fails to take an "honest and hard look" at the poor economics of the Shawmut Project.

The poor economics of the Shawmut Project and its minimal energy contributions do not justify its relicensing or the damage it does to Maine's environment. As MDMR stated in its comments on the Shawmut relicensing:

> The Shawmut project represents less than 0.1% of the production of electricity in the State of Maine yet, if relicensed with underperforming fishways, would hasten the extinction of an iconic Maine species, Atlantic salmon, and could result in

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[135] Draft EA at p. 79.

[136] Draft EA at p. 35.

[137] Draft EA at p. 35 n.29.

> millions of sea-run fish not reaching historic habitats over the term of the license.[138]

As Commission staff also state in the Draft EA, the Shawmut Project is uneconomic with the mandatory conditions from NMFS and USFWS, and it would be significantly more uneconomic if MDMR's recommendations are included. By proposing the relicensing of this project, Brookfield is essentially asking Maine ratepayers to subsidize one of the most destructive dams in the State to the tune of at least $1,424,770 annually.[139] This is senseless.

Moreover, Maine's growing portfolio of non-hydro renewable resources makes the energy generation from Shawmut even less relevant. For example, Maine's solar generation capacity is expected to grow by an additional 1,597 MW over the next 5 years.[140] Even assuming that the capacity factor of the Kennebec dams is 67%[141] and only 15%[142] for solar, expected new solar generation capacity dwarfs the capacity of the Shawmut Dam by about 50 to 1. Shawmut is simply not a necessary part of Maine's energy portfolio.

A recent paper examined the solar acreage necessary to replace hydroelectricity from the Shawmut Dam and other lower mainstem Kennebec dams. It concluded that

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[138] MDMR. 2020. MDMR Response to the Ready for Environmental Analysis (REA) Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions for the Shawmut Project (P-2322-069). P.2. FERC Accession No. 20200828-5199.

[139] Draft EA at p. 103.

[140] Solar Energy Industries Association. Accessed at https://www.seia.org/state-solar-policy/maine-solar.

[141] 2020. Kleinschmidt Associates. Brookfield White Pine Hydro LLC. Application for New License for Major Water Power Project – Existing Dam. Shawmut Hydroelectric Project (FERC No. 2322). January 30. P. B-2. Accessible at https://1drv.ms/u/s!AkLlihAdyxqVklBuZIG6A5l9pnd8?e=sWgbBm.

[142] Energy Information Administration. Accessed at https://www.eia.gov/todayinenergy/detail.php?id=39832.

only 44.4 hectares (110 acres) of solar panels would replace Shawmut generation.[143] In comparison, the size of the Shawmut impoundment, where water quality is potentially not attaining standards and non-native warmwater species dominate, is 530 hectares (1309 acres).[144] Simply put, the Shawmut dam is an antiquated energy project that is too expensive to run, severely damaging to the environment, and unnecessary given the rapid advances in modern renewable energy systems in Maine.

II. Conclusion

In the final analysis, at the culmination of more than two decades of grappling with sea-run fish passage failures and inadequacies with the lower Kennebec hydropower dams, the best available information and scientific data have yielded a number of unassailable points of consensus: 1) no hydropower dam – anywhere on the planet – has consistently maintained 48-hour 95% upstream salmonid passage performance; 2) multi-dam fish passage facilities will not work to restore self-sustaining sea-run populations of Atlantic salmon *and* the other coevolved species – again, it has never been achieved anywhere on the planet, and the scientific data support too great an array of causal impediments – from issues of delayed mortality, to depleted energy reserves leading to unsuccessful spawning, to insufficient per-species seasonal passage percentages both up- and downstream. No current reliable information justifies multi-dam passage systems as

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[143] Sharma, S. and Waldman, J. (2021), Potential Solar Replacement of Hydroelectricity to Reopen Rivers: Maine as a Case Example. Fisheries. https://doi.org/10.1002/fsh.10619. P. 3.

[144] The Shawmut impoundment does not meet State water quality standards. 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 Uses may be Impaired)," in Maine's 303(d) list. *See* DEP. 2018. 2016 Integrated Water Quality Monitoring Report. P. 59. This is likely due to the lack of both diversity and abundance of macroinvertebrates that require high water quality in the impoundment, a common feature in large impoundments where deeper areas have low flow and dissolved oxygen.

"mitigation" of the environmental consequences posed by these dams, of which Shawmut is included. To be blunt: fish passage facilities will not work, and will not work well enough, to avoid the adverse environmental consequences posed by the dams and their impoundments. And in this case those consequences are especially dire, as the fate of an endangered species hangs in the balance.

And there is nothing in the record that tells us the Shawmut Project is any different. Indeed, the record with respect to this particular licensee, Brookfield, is a history of failure and of delay. Brookfield had the entire period from 2013 to 2019 under the interim species protection plan to try to establish that multi-dam fish passage facilities would work to restore sea-run migrations on the lower Kennebec. Brookfield failed to even get fish the ability to swim freely above the first dam in all of that time. In the face of this failed history, and the further delay and failures resulting from it, Brookfield's assertions that we should all close our eyes to the truth and that the public should continue to accept the situation on the Kennebec is beyond the pale. All current and best scientific data tell us that the situation will not be solved by fish passage facilities installed at Shawmut and at the other three dams. Brookfield's invitation to essentially maintain the status quo and sit back as the iconic Atlantic salmon goes extinct must be rejected by the Commission.

What the Commission should accept is what all the current and best scientific and economic data make clear – the Shawmut Project should not be relicensed. That conclusion is ineluctable if, as required under NEPA, the Commission takes a "hard and honest" look at the wager Brookfield puts to us, the gamble that risks the extinction of an iconic endangered species in the United States. It is time for this Commission to transcend the wishful thinking of its Kennebec Licensees that has prevailed for so many decades, and that has been proven wrong by all current and best available information. The Commission must abandon the idea that engineered fish passage facilities over four dams will address the significant and dire adverse environmental consequences of these four dams on the lower Kennebec, with the Shawmut Project as one of them.

At the very least, this Commission must undertake a hard and *honest* look at the state of this best, current, reliable information, as set forth herein – especially with the State of Maine, its lead wildlife resource agency on this issue (MDMR), and NMFS, all recommending decommissioning and removal of the Shawmut dam. The Commission must grapple with these hard facts, and it must do so in an Environmental Impact Statement. "NEPA requires an Environmental Impact Statement for any major federal action that might 'significantly' affect the human environment."[145] "If *any* 'significant' environmental impacts might result from the proposed agency action then an [Environmental Impact Statement] must be prepared *before* the action is taken."[146] The Federal Power Act mandates giving "'**equal consideration to** the purposes of energy conservation, **the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat)**, the protection of recreational opportunities, and the preservation of other aspects of environmental quality.'" *American* Rivers, *supra*, 895 F.3d 32, 36 (D.C. Cir. 2018) (quoting 16 U.S.C. § 797(e)) (bold emphasis added).

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[145] *American Rivers*, 895 F. 3d at 49 (citing 42 U.S.C. § 4332(C)).

[146] *Id*. (quoting *Sierra Club v. Peterson*, 717 F.2d 1409, 1415 (D.C. Cir. 1983)) (italics emphasis in original).

We urge the Commission to reject the Draft EA, and direct the development of an Environmental Impact Statement that meets the exacting procedural requirements of NEPA, which requires development of a decommissioning plan for consideration, and that truly confronts the irreversible and significant adverse environmental consequences of the Shawmut Project.

Respectfully submitted, this 14th day of August, 2021,

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CERTIFICATE OF SERVICE

I, Russell B. Pierce, Jr., Esq., hereby certify that a copy of these comments was transmitted by electronic means to each of the persons on the Service list maintained by the Secretary of the Commission.

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Wertheimer RH, Evans AF. 2005. Downstream passage of Steelhead kelts through hydroelectric dams on the lower snake and Columbia rivers. Trans Am Fish Soc. 134(4):853–865.

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Landis Hudson
Executive Director, Maine Rivers
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Our mission is to protect, restore and enhance the ecological health of Maine's river systems

On 8/7/21, 9:49 AM, "Joseph Zydlewski" <josephz@maine.edu> wrote:

Landis -

Thanks for the kind words. Yes - PLEASE use this information.

We should have a thesis you can point to in short order - but for now you can point to Rubenstein, Sarah and Zydlewski, Joseph, unpublished data.

This will be submitted for publication by the January, so really in pub form ~ June of next year if all goes well.

The major points

1) ATS face poor passage at some dams (e.g. Lockwood)

2) If passing, ATS often face long delays, usually weeks in length - sometimes months

3) Because of the high and rising downstream temperatures in lower rivers in the summer during river entry and migration, there is increased metabolic cost and this is directly related to depletion of limited and fixed energy stores.

4) Our bioenergetic model suggests that these delays significantly lower the probability of spawning success (depletion of energy stores prior to spawning likely leading to mortalities) and biologically significant declines in the probability of repeat spawning (due to energy depletion and likely mortality). For a four dam system, this loss is estimated to be greater than 50% loss for pre-spawn and post-spawn fish. These are likely conservative estimates as delays at dams are associated with increases in searching behavior, and activity means more energy demand.

5) Extensive literature suggests that older, larger, repeat spawning fish are critical for population resilience , and hence recovery (see attached). In the Penobscot River (see Maynard et al., 2018) repeat spawning is less than 1%, far less than occurs in un-dammed ATS rivers. This fact provided direct evidence that dams are associated with and likely causal to low survival (increased mortality) of post spawn salmon and underscored the demographic fragility resulting from this persistent fixed source of mortality.

Joe Z

Donald H. Pugh, Jr.
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Wendell, MA 01379
Telephone 978 544 7438 Office
413 387 9439 Cell

Work History:

Self Employed

Current projects:

Maryland Power Plant Research Project – relicensing of Conowingo Project (FERC # 405) on the Susquehanna River and post-license studies at Holtwood (FERC # 1881) and York Haven (FERC # 1888) upstream of Conowingo. Principle areas of responsibility include: up- and downstream fish passage, telemetry data analysis, fish biology, habitat-flow analysis, and American eel passage.

Connecticut River Conservancy – relicensing of First light hydroelectric projects on the Connecticut River at Turners Falls (FERC # 1889) and the Northfield Mountain Pumped Storage Station (FERC #2485). Scoping began in 2012. First Light has filed its final license application. Reviewed study plans, study reports, IFIM review, shortnose sturgeon spawning flow needs analysis, and shad telemetry analysis. Participated in settlement talks with company, state and federal agencies, and NGOs.

SWCA, Inc. – Shortnose and Atlantic sturgeon habitat and protection plans for sewer line crossing construction on the Connecticut River, Springfield, Massachusetts.

Geosyntec consultants - Shortnose and Atlantic sturgeon habitat and protection plans for river bank stabilization on the Merrimack River, Haverhill, Massachusetts

Maine Rivers – relicensing of three projects on the Mousam River (FERC # 14856).

Kennebec Coalition – review and data analysis of downstream smolt radio telemetry studies (2012 – 2015) and the upstream fish passage plan at the Shawmut project on the Kennebec River (FERC # 2322).

Member of the Holyoke Cooperative Consultation Team for the Holyoke Hydroelectric Project (FERC #2004). Post-licensing downstream fish passage planning including configuration of the downstream passage protection structure, review of CFD analysis, analysis of telemetry data of American shad, shortnose sturgeon, and American eel during post licensing studies.

Santo Antônio , January 2010 to June 2011

TIRIS PIT tag installation, data analysis, and fish passage consultation for an experimental fish passage flume on the Rio Maderia, Brazil.

American Rivers, April 2010 to November 2011

Represented American Rivers for the relicensing of three projects on the Susquehanna River – Conowingo Dam, Muddy Run Pumped Storage Project and York Haven Dam. Participated in study plan development, reviewed study reports and prepared comment letters, attended meetings with the project owners, the FERC, state and federal agencies, and NGO's. Developed and independent analysis of American shad telemetry data at York Haven and Conowingo.

University of Massachusetts, Amherst MA January 1997 to January 2009

Research Assistant in the Department of Natural Resource Conservation working at the

Silvio Conte Anadromous Research Center – areas of research included the behavior and movement of adult Atlantic salmon in the Westfield River in Massachusetts using radio telemetry, upstream passage of sturgeons and riverine fishes in a spiral fishway, spawning behavior of shortnose sturgeon in an artificial ‘stream, and downstream passage of sturgeons at a bar rack and louver system with a low level bypass entrance.

Massachusetts Cooperative Fisheries and Wildlife Research Unit, University of Massachusetts, Amherst MA
March 1991 to January 1997

Project Leader for Anadromous Fish Investigations project. Duties include: hire and supervise technicians staffing the Holyoke, Turners Falls, and Westfield River fish passage facilities; conduct recreational angler creel surveys, Atlantic salmon habitat assessment, and juvenile growth and survival estimates; supervise stocking of Atlantic salmon fry for the Connecticut River basin in Massachusetts; coordinate Unit operations with utility companies and state and federal agencies; and prepare budgets and reports.

Education:

Undergraduate

Trinity College
Hartford, CT 1967-71, B.A.
Major: History
Specialty: American History

Continuing Ed.

Greenfield Community College
- Photography I, II & III, Fall 1980-81
- Engineering Drawing, Fall 1978
- Drafting for Engineers, Spring 1979
- Programming Principles and Concepts, Fall 2002
- Advanced Basic for Programmers, Spring 2002
- Database Programming and Procedures, Spring 2005
- Advanced Database Programming, Spring 2006

University of Massachusetts, Amherst
- Principles of Management, Fall 1981
- Microeconomics, Fall 1980
- Macroeconomics, Spring 1981
- Social Conflicts and Natural Resources, Spring 1991
- Biological Limnology, Fall 1991
- Anadromous Fish, Fall 1991
- Biostatistics, Fall 1991
- Intermediate Biostatistics, Spring 1992
- GIS, Spring 1992
- Population Dynamics, Fall 1992
- Animal Movement and Migration, Fall 1992
- Coastal Zone Management, Spring 1993
- Ichthyology, Fall 1993
- Principles of Fisheries Stock Assessment, Spring 1994
- Aquatic Invertebrates, Fall 1994
- Freshwater Fisheries Management, 1997
- Inland Fisheries Management, Spring 1999
- Imaging in Fisheries Science, Fall 2000
- Natural Resource Modeling, Spring 2001

American Fisheries Society Workshops
- Fish Ageing, 1995
- Stream Habitat Assessment, 1996

USFWS - National Education and Training Center
Principles and Techniques of Electrofishing, 1996

DOI-USGS – Motorboat Operator Certification Course, 2000

Certified S.O. Conte Anadromous Research Center dive team member

S.O. Conte Fish Research Projects:

Atlantic salmon behavior and movements in the Westfield River, Massachusetts 1996 to 1998 – wild adult Atlantic salmon returning to the Westfield River were internally radio tagged and released into the upper Westfield River. Fish were tracked with fixed stations and with manual tracking. Movement, habitat choice, spawning, and post-spawning behavior were evaluated. Domestic broodstock Atlantic salmon were also radio tagged and released to assess their spawning potential to contribute to the salmon restoration effort in the Connecticut River basin.

Spiral fishway 2001 to 2007 – evaluation of a spiral, side baffle fishway designed for upstream sturgeon fish passage. Sturgeon, a benthic fish, need a fishway that allows upstream movement while maintaining close proximity to the bottom of the fishway. The spiral uses side baffles to reduce velocity and provide depth allowing fish to move in a sinusoidal curve along the bottom of the channel. Sturgeon movement was evaluated with a PIT tag system detecting fish at the entrance and exit of the fishway and at four points along each of two loops. Riverine fish were also evaluated in the spiral fishway.

Shortnose sturgeon spawning behavior 2002 to 2008 – the spawning behavior of wild Connecticut River shortnose sturgeon was evaluated in an artificial stream. Mating behavior, mate choice, velocity preference, egg to larvae survival, and embryo and larval dispersal timing were evaluated.

Downstream passage and behavior studies of shortnose sturgeon 2004 and 2005 – yearling, juvenile and adult shortnose sturgeon were evaluated for swimming depth, behavior at and movement along a bar rack, entrainment and impingement, and willingness to enter an opening in the bar rack at three different approach velocities. Pressure sensitive (depth) and radio tags were used to assess swimming depth for both upstream and downstream movement in a 20' by 120' flume with a velocity of 1 ft/sec. PIT tags and video were used to assess individual fish movement and behavior at a bar rack oriented 90º to flow at velocities of 1, 2 and 3 ft/sec.

Downstream movement of yearling shortnose sturgeon 2004 and 2006 – yearling shortnose sturgeon (Connecticut River stock in 2004 and Savannah River stock in 2006) were evaluated in a large outdoor oval channel with a river stone substrate to determine the timing, frequency and duration of upstream and downstream movements. Fish were tested for 48 hours on a monthly basis from June through November. PIT tags and five antennas were used to determine movement.

Low level orifice use of sturgeon at an angled bar rack and louver 2006 to 2008 – green, lake, Savannah and Connecticut River shortnose sturgeon of different year classes were tested in a 10' by 120' flume at two bar rack angles (45º and 30º) and one louver angle (26º) with two velocities at the orifice. Approach velocity (2 ft/sec) and water depth (7.5') remained constant for all trials. Fish were tested both day and night. Video and PIT tags were used to determine individual fish movement, behavior at the bar rack and passage through the orifice and pipe which transported fish downstream to a holding area.

Past Relicensing Projects:

Bear Swamp Hydroelectric Project – FERC # 2669
Relicensing of project through the ILP.
Deerfield River Project – FERC # 2323, License issued 1997
Deerfield River Compact – precursor to relicensing, all stakeholders in relicensing, including New England Power Co., met on a regular basis to discuss issues. Final report issued.
Deerfield River Settlement – followed the conclusion of the Deerfield River Compact with similar discussions as to the issues involved in relicensing with the goal of reaching agreement on environmental mitigation prior to issuing or license. Represented Trout Unlimited in

meetings with state and federal agencies, New England Power Co. and other NGO's which reached an agreement that was incorporated into and was the basis of relicensing by the FERC.

Holyoke – FERC # 2004, Connecticut River

Relicensing of project – bypass minimum flows, downstream fish passage (salmon smolts, adult Atlantic salmon, American eels, clupeids, and riverine fish), upstream passage (adult Atlantic salmon, clupeids, American eels, and riverine fish) freshwater mussel protection, flow priorities (bypass reach, canal, up- and downstream fish passage, hydrogenation, run of river protection of federally threatened tiger beetle), and disabled angler fishing access.

Comments to both company and the FERC concerning above listed issues.

Participant in CCT meetings representing Trout Unlimited concerning above listed issues. CCT consists of Holyoke Gas & Electric (project owners), state and federal agencies, and NGO's (Trout Unlimited and Connecticut River Watershed Council).

Indian River – FERC # 12462, Westfield River

Licensing of project – bypass minimum flows, freshwater mussel protection, downstream fish passage (salmon smolts, adult Atlantic salmon, American eels, riverine fish), upstream passage for American eels.

Participation in ongoing fish passage discussions regarding both up- and downstream passage issues.

L.S. Starrett Co. – FERC # UL09-01, Millers River

Installation of new turbine initiated local Conservation Commission and Massachusetts Department of Environmental Protection actions presently on hold due to a FERC order of jurisdiction dated October 21, 2009.

Intervened in Massachusetts Department of Environmental Protection appeal by Starrett of a Superseding Order of Conditions.

Commented to the FERC concerning Starrett Motion for Stay of Order of Jurisdiction regarding downstream fish passage.

Muddy Run Pumped Storage Project – FERC # 2355, Susquehanna River. Contracted by Maryland Power Plant Project to provide biological and fish passage assistance during relicensing and post licensing. Principle issues are entrainment and the impact of the project on river flows.

New Home Dam Project – FERC # 6096, Millers River

Post licensing flow issues - run of river requirement.

Northfield Mountain Pumped Storage Project – FERC # 2485, Connecticut River

License amendment allowing more storage in upper pond. River bank erosion concerns. Amendment application withdrawn.

Woronoco – FERC # 2631, Westfield River

Relicensing of project and 401 certification – bypass minimum flows, freshwater mussel protection, downstream fish passage (salmon smolts, adult Atlantic salmon, American eels, riverine fish), upstream passage for American eels, and recreation issues.

Analyzed telemetry data from downstream smolt test to provide independent review of results.

York Haven – FERC # 1888, Susquehanna River

Contracted by Maryland Power Plant Project to provide biological and fish passage assistance during relicensing. Relicensing is currently involved in settlement discussions with project owner, Olympus Power. Principle issues are up- and downstream fish passage for American shad and American eel and bypass flows.

Publications:

Kynard, B., D. Pugh, and T. Parker. 2003. Development of a fish ladder to pass lake sturgeon. Great Lakes Foundation, Final Report, Lansing Michigan.

Kynard, B., M. Horgan, D. Pugh, E. Henyey and T. Parker. 2008. Using juvenile sturgeon as a substitute for adults: a new way to develop fish passage for large fish. American Fisheries Society Symposium 61: 1-21.

Kynard, B., M. Kieffer, E. Parker, D. Pugh and T. Parker. 2012. Lifetime movements by Connecticut River sturgeon. In Life history and behavior of Connecticut Rver shortnose sturgeon and other sturgeons. B. Kynard, P. Bronzi, and H. Rosenthal Editors. World Sturgeon Conservation Society: Special Publication #4. Norderstedt, Germany.

Kynard, B., D. Pugh, and T. Parker, M. Kieffer. 2012. Spawning of shortnose sturgeon in an artificial stream: adult behavior and early life history. In Life history and behavior of Connecticut Rver shortnose sturgeon and other sturgeons. B. Kynard, P. Bronzi, and H. Rosenthal Editors. World Sturgeon Conservation Society: Special Publication #4. Norderstedt, Germany.

Kynard, B., D. Pugh, and T. Parker. 2012. Passage and behavior of Connecticut River shortnose sturgeon in a prototype spiral fish ladder with a note on passage of other fish species. In Life history and behavior of Connecticut Rver shortnose sturgeon and other sturgeons. B. Kynard, P. Bronzi, and H. Rosenthal Editors. World Sturgeon Conservation Society: Special Publication #4. Norderstedt, Germany.

Kynard, B., E. Parker, D. Pugh, and T. Parker. 2012. Downstream and Diel Movements of Cultured Yearling Pallid, Green, Lake, and Shortnose Sturgeons: An Artificial Stream Study. In Life history and behavior of Connecticut Rver shortnose sturgeon and other sturgeons. B. Kynard, P. Bronzi, and H. Rosenthal Editors. World Sturgeon Conservation Society: Special Publication #4. Norderstedt, Germany.

Kynard, B., D. Pugh, and T. Parker. 2004. Experimental Studies to Develop Guidance and a Bypass for Shortnose Sturgeon at Holyoke Dam. Final Report to City of Holyoke, Holyoke Gas & Electric Company, Holyoke, Massachusetts.

Kynard, B., D. Pugh, and T. Parker. 2005. Experimental Studies to Develop Guidance and a Bypass for Shortnose Sturgeon at Holyoke Dam. Final Report to City of Holyoke, Holyoke Gas & Electric Company, Holyoke, Massachusetts.

Kynard, B., E. Parker, D. Pugh, and T. Parker. 2007. Use of laboratory studies to develop a dispersal model for Missouri River pallid sturgeon early life intervals. J. Appl. Ichthyol. 23: 365–374.

Kynard, B., D. Pugh, and T. Parker. 2011. Passage and behavior of cultured lake sturgeon in a prototype side-baffle ladder: I. ladder hydraulics and fish ascent. J. Appl. Ichthyol. 47 (Suppl. 1): 1-12.

Pugh, D., B. Kynard. 2001. Westfield River adult salmon report Westfield River, Massachusetts, 1966 – 1968. Final report to United States Forest Service and United States Fish and Wildlife Service.

Pugh, D. 1997. Millers and Chicopee River Basins Mussel Survey. Report to Massachusetts Natural Heritage and Endangered Species Program.

Pugh, D. 1998. French and Westfield River Basins Mussel Survey. Report to Massachusetts Natural Heritage and Endangered Species Program.

Pugh, D. 1999. Blackstone, Quinebaug, and Quabog River Basins Mussel Survey. Report to Massachusetts Natural Heritage and Endangered Species Program.

Pugh, D and A. Haro. 2000. Passage of Atlantic salmon at Turners Falls fishways: PIT tag evaluation 1999. Conte Anadromous Fish Research Center Internal Report No 00-02.

Pugh, D. 2000. Merrimack, Ipswich, Charles, and Neponsett/Weymouth/Weir Basins Mussel Survey. Report to Massachusetts Natural Heritage and Endangered Species Program.

Pugh, D. 2001. 2001 Fort River dwarf wedge mussel (*Alasmidonta heterodon*) survey. Massachusetts Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program.

Pugh, D. 2002. 2002 Fort River dwarf wedge mussel (*Alasmidonta heterodon*) survey. Massachusetts Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program.

Presentations:

Movement and Habitat of Atlantic Salmon in the Westfield River. D. Pugh. Connecticut River Atlantic Salmon Commission Conference, 1999.

Zebra Mussels: Can We Stop The Eastward Invasion? M. Babione and D. Pugh. Northeast Fish and Wildlife Conference, 2003.

Passage of Sturgeons and Riverine Fishes in a Prototype Spiral Fish Ladder. B. Kynard, D. Pugh, T. Parker. American Fisheries Society Meeting, 2006

Behavior of Lake, Pallid, and Shovelnose Sturgeons at Passage Structures: Toward a New Paradigm in Developing Fish Passage. B. Kynard, M. Horgan, D. Pugh, E. Henyey, and T. Parker. American Fisheries Society Meeting, 2006.

Performance of Lake Sturgeons and Riverine Fishes in a Spiral Side-Baffle Fish Ladder. B. Kynard, D. Pugh, T. Parker. Connecticut River Atlantic Salmon Commission Conference, 2009.

Review of Using a Semi-natural Stream to Produce Young Sturgeons for Conservation Stocking. B. Kynard, D. Pugh, T. Parker, M. Kieffer. International Sturgeon Society Conference, 2009.

Up- and Downstream Passage and Behavior of Lake and other Sturgeons. D. Pugh B. Kynard and T. Parker. Keeyask Fish Passage Workshop, 2011.

Eel Passage Westfield & Millers Rivers, Massachusetts. D. Pugh. ASMFC Eel Passage Workshop, 2011.

Passage and Behavior of Cultured Lake Sturgeon in a Side-Baffled Fish Ladder: II. Fish Ascent and Descent Behavior. NAC. 2011.

Behavior, impingement, and entrainment of shortnose sturgeon at a vertical bar rack: with and without a bypass orifice. B. Kynard and D. Pugh. Fish Passage Conference, Amherst, MA. 2012.

Research on Up-and Downstream Passage of Lake Sturgeons at S. O. Conte Anadromous Fish Research Center. B. Kynard, D. Pugh, E Henyey, T. Parker and M. Horgan. *Scaphirhynchus* Conference: Alabama, Pallid, and Shovelnose Sturgeon Symposium, St. Louis, Missouri, January 2005

Shortnose Sturgeon Life History Requirements and the Holyoke Dam. B. Kynard, M. Kieffer, D. Pugh. Connecticut River Atlantic Salmon Commission Conference, March 2013

STATE OF MAINE
DEPARTMENT OF MARINE RESOURCES
21 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0021

JANET T. MILLS
GOVERNOR

PATRICK C. KELIHER
COMMISSIONER

July 17, 2021

Kathy Davis Howatt
Hydropower Coordinator, Bureau of Land Resources
Maine Department of Environmental Protection
17 State House Station
Augusta, ME 04333

RE: Comments on Brookfield White Pine Hydro, LLC's Shawmut (FERC No. 2322) Hydroelectric Project

Dear Ms. Howatt:

The Maine Department of Marine Resources (MDMR) has reviewed the Brookfield White Pine Hydro, LLC's (BWPH; Licensee) Application for Water Quality Certification (U.S. P.L. 92-500, Section 401) for the relicensing of the Shawmut Project by the Federal Energy Regulatory Commission (FERC). MDMR has also reviewed the Draft Environmental Assessment (DEA), Interim Species Protection Plan (ISPP) for Shawmut, the Final License Application (FLA), Species Protection Plan (SPP) for Lockwood, Hydro-Kennebec, and Weston, as well as other relevant documents in our administrative record. MDMR provides the attached comments and Kennebec River factual background paper focused primarily on the proposal's impacts to diadromous indigenous aquatic fish species and their habitat.

Please contact Gail Wippelhauser at gail.wippelhauser@maine.gov or at 207-904-7962 if you have any questions.

Sincerely,

Patrick C. Keliher, Commissioner

OFFICES AT 32 BLOSSOM LANE, MARQUARDT BUILDING, AUGUSTA, MAINE
http://www.Maine.gov/dmr

PHONE: (207) 624-6550 FAX: (207) 624-6024

Summary

Restoration of Atlantic Salmon, American Shad, Blueback Herring, Alewife, and Sea Lamprey has lagged on the mainstem Kennebec River, primarily because of the lack of upstream fish passage. This situation is particular critical for the endangered Gulf of Maine (GOM) Distinct Population Segment (DPS) of Atlantic Salmon, one of the most iconic and imperiled species in the United States. Diadromous fish species require safe, timely, and effective access to high quality habitats at different life stages in order to successfully survive and reproduce. The Shawmut Project waters currently are used as spawning and rearing habitat and/or a migratory corridor for five indigenous fish species (Atlantic Salmon, American Shad, Blueback Herring, Alewife, and American Eel). Upstream fish passage has been provided for juvenile American Eel at the lower four mainstem dams, but adult Atlantic Salmon, American Shad, Blueback Herring, and Alewife have been captured at the Lockwood Project fish lift and transported upstream for 15 years (2006-2021). A sixth indigenous species, Sea Lamprey, also will use the Shawmut Project waters as spawning/rearing habitat and as a migration corridor when new upstream passage is implemented at the Lockwood, Hydro-Kennebec, Shawmut, and Weston projects. These aquatic habitats are extremely important for diadromous fish and have been designated as Critical Habitat for Atlantic salmon under the Endangered Species Act (ESA) and Essential Fish Habitat (EFH) under the Magnuson Stevens Act (MSA) for a number of species based on the location and characteristics of habitats required to support healthy fish populations. Almost 100% of high quality Atlantic Salmon spawning and rearing habitat, over 50% of spawning and rearing habitat for American Shad and Blueback Herring, and significant areas for the other native anadromous species in the Kennebec river watershed is upstream of the Shawmut project.

The proposal as described in the Brookfield White Pine Hydro, LLC's (BWPH; Licensee) Application for Water Quality Certification (U.S. P.L. 92-500, Section 401), if implemented, will continue to have significant adverse impacts on these indigenous fish species and their habitat. These adverse impacts include, but are not limited to, anticipated low passage efficiency rates at upstream and downstream fishways, mortality and injury to upstream and downstream migrating diadromous fish, impaired in-stream habitat, significant delays in passage, and cumulative effects of multiple proposed fish passages at other projects in the watershed. Population modeling of the cumulative impacts of upstream and downstream passage of Atlantic Salmon, American Shad, Blueback Herring, and Alewife has shown that efficient downstream and upstream fish passage with minimal delays are critical to support these fish species' life history needs. Unless fish passage facilities meet MDMR's proposed performance standards based on this modeling and also provide effective passage for eels, the project waters will likely be of insufficient quality to support self-sustaining runs of these important indigenous species. Of particular concern, MDMR's analysis strongly indicates that the Licensee's proposal would preclude the ability to recover Endangered Species Act (ESA) listed Atlantic salmon in the entire Distinct Population Segment (DPS). In addition, studies have shown that similar fishways at wide, complex sites such as Shawmut could entirely preclude fish such as American Shad from passing upstream. The Department's goal is to restore diadromous fish populations in Maine to their historic habitat. To achieve this goal, MDMR has developed "minimum goals" that are achievable if suitable habitat of sufficient quality is available to support fish and other aquatic life. In other words, building fish runs to meet these minimum demographic goals is a

benchmark for having resilient self-sustaining populations, which require safe, timely, and effective passage and supportive aquatic habitats. The minimum goals and concerns about how the proposed project will not likely achieve those goals and discussion of additional impacts to fish and aquatic habitat are outlined below. More detail on the modeling and background can be found in the Kennebec River factual background provided as a separate document.

Minimum Species Goals for the Kennebec River

The minimum goal for **Atlantic Salmon** is to provide safe, timely, and effective upstream and downstream passage in order to achieve a minimum annual return of 500 naturally-reared adults to historic spawning/rearing habitat in the Kennebec River for Endangered Species Act (ESA) down-listing and a minimum annual return of 2,000 naturally-reared adults to historic spawning/rearing habitat in the Kennebec River for reclassification based on the NOAA and USFWS Recovery Plan (2019). To reach spawning/rearing habitat in the Sandy River, Carrabassett River, and mainstem Kennebec River, all returning adults must annually pass upstream at the Lockwood, Hydro Kennebec, Shawmut, and Weston project dams.

The minimum goal for **American Shad** is to provide safe, timely, and effective upstream and downstream passage in order to achieve a minimum annual return of 1,018,000[1] wild adults to the mouth of the Kennebec River; a minimum annual return of 509,000 adults above Augusta; a minimum of 303,500 adults annually passing upstream at the Lockwood and Hydro Kennebec Project dams; a minimum of 260,500 adults annually passing upstream at the Shawmut Project dam; and a minimum of 156,600 adults annually passing upstream at the Weston Project dam.

The minimum goal for **Blueback Herring** is to provide safe, timely, and effective upstream and downstream passage in order to achieve a minimum annual return of 6,000,000[2] wild adults to the mouth of the Kennebec River; a minimum annual return of 3,000,000 adults above Augusta; a minimum of 1,788,000 adults annually passing upstream at the Lockwood and Hydro Kennebec Project dams; a minimum of 1,535,000 adults annually passing upstream at the Shawmut Project dam; and a minimum of 922,400 adults passing upstream at the Weston Project dam.

The minimum goal for **Alewife** is to provide safe, timely, and effective upstream and downstream passage in order to achieve a minimum annual return of 5,785,000[3] adults above Augusta; a minimum of 608,200 adults annually passing at the Lockwood, Hydro Kennebec, and Shawmut project dams; and a minimum of 473,500 adults annually passing upstream at the Weston Project dam.

The minimum goal for **Sea Lamprey and American Eel** is to provide safe, timely, and effective upstream and downstream passage throughout the historically accessible habitat of these two species.

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[1] Based on 5,015 hectares of spawning/rearing habitat and a minimum return of 203 adults per hectare.
[2] Based on 5,015 hectares of spawning/rearing habitat and a minimum return of 1,196 adults/hectare.
[3] Based on 9,946 hectares of spawning/rearing habitat and a minimum of 581.5 adults/hectare; the Maine State average is 988.4/hectare.

Performance standards necessary to meet minimum goals

Upstream fish passage
Based on the minimum goals, a project's facilities would be considered to be performing in a safe, timely, and effective manner if:

1. At least 99% of the adult Atlantic Salmon that pass upstream at the next downstream dam (or approach within 200 m of the project powerhouse) pass upstream at the project within 48 hours.
2. At least 70% of the adult American Shad that pass upstream at the next downstream dam (or approach within 200 m of the project powerhouse) pass upstream at the project within 72 hours.
3. At least 90% of the adult Blueback Herring that pass upstream at the next downstream dam (or approach within 200 m of the project powerhouse) pass upstream at the project within 72 hours.
4. At least 90% of the adult Alewife that that pass upstream at the next downstream dam (or approach within 200 m of the project powerhouse) pass upstream at the project within 72 hours; and
5. At least 80% of the adult Sea Lamprey that pass upstream at the next downstream dam (or approach within 200 m of the project powerhouse) pass upstream at the project within 48 hours.

Downstream fish passage
Based on the minimum goals, a project's facilities would be considered to be performing in a safe, timely, and effective manner if:

1. At least 99% of the Atlantic Salmon smolts and kelts that pass downstream at the next upstream hydropower dam (or approach within 200 m of the project spillway) pass the project within 24 hours.
2. At least 95% of the adult and juvenile American Shad that pass downstream at the next upstream hydropower dam (or within 200 m of the project spillway) pass the project within 24 hours.
3. At least 95% of the adult and juvenile Blueback Herring that pass downstream at the next upstream hydropower dam (or within 200 m of the project spillway) pass the project within 24 hours.
4. At least 95% of the adult and juvenile Alewife that pass downstream at the next upstream hydropower dam (or within 200 m of the project spillway) pass the project within 24 hours.

The Licensees Proposals for fish passage performance

It is unclear what the Licensee is proposing regarding salmon effectiveness standards for the Shawmut project as the proposed Interim Species Protection Plan (ISPP) does not include updated performance standards. In the SPP for the Lockwood, Hydro-Kennebec, and Weston project, the Licensee indicates they will need to achieve a whole station survival of 88.5% for downstream passage and 84.5% for upstream passage at the four projects for Atlantic salmon. This would indicate an average of 97% for downstream passage per project, and 96% for upstream passage. A cumulative performance standard is not supported by MDMR or consistent with the precedent set by the National Marine Fisheries Service (NMFS) and the Federal Energy Regulatory Commission (FERC) for the Milford (FERC No. 2534), West Enfield (FERC No. 2600), Mattaceunk (FERC No. 2520), Orono (FERC No. 2710) and Stillwater (FERC No. 2712) projects on the Penobscot River. Cumulative performance standards can allow one or more projects to perform poorly, increasing the possibility that the cumulative effects will be even greater and reducing project by project accountability. The Licensee does not utilize DMR's recommended performance standards or provide any of their own performance standards for American Shad, Blueback Herring, Alewife, or Sea Lamprey. MDMR has completed model scenarios that represent the best available science and finds that only with a 99% upstream and downstream passage efficiency at each project (Lockwood, Hydro-Kennebec, Shawmut, and Weston) can interim minimum goals be achieved for Atlantic salmon (Factual Background, 3.1.6). Based on MDMR modeling, the 99% upstream and 99% downstream effectiveness scenario resulted in 28-29% more adult salmon returns than the 96% upstream and 97% downstream scenario suggested in the SPP. Further, based the site conditions, initial testing, and experience with similar passage approaches implemented in other river systems, we find it highly unlikely that the Licensee will meet even their own proposed standards. The Licensee had previously indicated it could achieve lower standards yet has revised those standards upward without proposing any significant commensurate measures that would likely result in those improvements. With salmon runs below replacement levels currently, MDMR concludes that the adverse impacts of the current proposal will not provide conditions where a minimum sustainable population of Atlantic salmon can be supported in the receiving water. It is also possible that species such as American Shad, which have chronic poor performance at fishways, or Sea Lamprey, which are not considered by the Licensee and migrate primarily at night, could be entirely precluded from receiving waters based on cumulative impacts from downstream projects and likely ineffective passage at the Shawmut Project. The high numbers of dams in the lower Kennebec, unknown outcomes of fish passage at those projects, and poor demonstrated performance at similar fishways (Factual Background, Table 9) significantly increases the probabilities of failure to meet basic biological requirements for some or all of the indigenous species at the Shawmut project.

Issues with Proposed upstream fish passage facilities

The Licensee has proposed to construct permanent upstream fish passage (a single fish lift) at the Shawmut project. Successful fishways must create hydraulic signals strong enough to attract fish to one or multiple entrances in the presence of competing flows (i.e., false attraction). The Shawmut dam is extremely long and has multiple discharge locations that will provide significant false attraction flows during the passage season. MDMR has serious concerns about the design, operation, and location of the fishway and believes the current proposal will result in significant delays and likely poor upstream passage efficiency for multiple species. MDMR also has serious concerns about the cumulative adverse impacts of the Lockwood, Hydro-Kennebec, and Weston projects, which has similar issues.

MDMR is very concerned about the effectiveness of the proposed fishway in May, June, and July when the majority of anadromous species are migrating upstream (Table 1). The maximum station hydraulic capacity of the Shawmut Project is 6,690 cfs, which is exceeded approximately 65% of the time in May, 35% of the time in June, and 20% of the time in July. Water in excess of station capacity is spilled at the sluice gate in the middle of the 1,435-foot long dam, the hinged flashboards on the west side of the dam, or the rubber crest(s) on the eastern half of the dam, providing multiple false attractions. As a result, there will be false attraction at the project during the majority of the upstream migration season to multiple areas without a fishway to the headpond. A proposed cross channel egress from an identified false attraction zone would not provide passage to the headpond or directly to the lift.

Table 1. Upstream Run timing by month of Atlantic Salmon, river herring (Alewife and Blueback Herring) and American Shad captured at the Lockwood Project (2006-2020) and Sea Lamprey captured at the Milford Project (2009-2020).

Month	Atlantic Salmon	River herring	American Shad	Sea Lamprey
May	9%	72%	2%	56%
June	49%	28%	78%	44%
July	32%		19%	
August	2%			
September	3%			
October	4%			

The location of the fishway was based on very speculative assumptions using limited information. The CFD modeling that was conducted looked at a very limited range of flows that are not representative of the majority of the migration period. Furthermore, the siting study, conducted from May 19-June 14, 2016 with radio-tagged alewife, occurred during a low flow period, which is not representative of flows during the passage season. Alewives are not necessarily a good proxy for fish attraction of other species, as the Lockwood and Brunswick projects demonstrate. The existing American Eel fishway locations were selected based on flow conditions that will be changing based on the proposal.

While it is hard to predict the exact passage efficiency and delays rates at each project, the results of studies conducted on Atlantic Salmon and shad migrating upstream at the Lockwood Project are illustrative. The Lockwood and Shawmut projects are similar in that they are complex, wide sites, that have multiple sources of spill that create false attraction for migrating fish.

> Two years of telemetry studies by Brookfield were conducted at the Lockwood Project. In 2016, 16 of the 18 test fish (88.9%) which returned to the Project area were recaptured in the fish lift, and the time from return to the project area to recapture was 0.7-111.2 days (mean=17 days). In 2017, 14 of the 20 test fish (70%) were recaptured in the fish lift, and the time from return to the project area to recapture was 3.3-123 days (mean=43.5). As part of a study of energy consumption, adult Atlantic salmon were captured at the Lockwood fish lift, tagged with thermal radio tags and released downstream of the Project. In 2018, 66.7% of the tagged adults (4 of 6) were recaptured at the fish lift, and the time to recapture was 16-33 days (mean=21.8). The following year, 45.0% of tagged adults (9 of 20) were

recaptured, and the time to recapture was 9-30 days (mean=18.7). A 2015 study found that 0% of American shad captured in the fishway and returned downstream were recaptured at the fishway.

The Lockwood fishway (fish lift) was designed consistent with current standards for upstream passage of anadromous fish and yet the complicated setup at the dam has undermined the ability of the fishway to effectively pass fish. It would not be unexpected to have similar results at the Shawmut project. Results at projects such as Lockwood show significantly less than minimum goals necessary to support salmon populations and could fully preclude American shad or other species from accessing necessary habitats above the Shawmut project. MDMR believes having only one fishway at this site to the headpond that is non-volitional will likely result in large percentages of fish not finding the fishway and/or experiencing substantial delays.

Operational period

The Licensee proposed to operate the upstream fishway (fish lift) May 1 to October 31 during daylight hours. This proposed upstream operational period is inadequate to effectively pass all species upstream. Atlantic salmon have been documented in the Kennebec River migrating upstream for a longer season and sea lamprey predominately migrate during the night. Fish passage should be provided from May 1 through November 10 with operations occurring 24 hours per day from May 1 through June 30 to accommodate diurnal and nocturnal migrants. In addition, the proposed fish lift is not a volitional facility and its operation is vulnerable to regular mechanical failures and power outages. Fish lifts generally also have a minimum cycle time of about 15 minutes, during which time the fishway is closed. The Licensee considered at a conceptual level both a nature-like fishway (which is volitional) and a fish lift during a feasibility study, but only pursued the fish lift design. MDMR has further explored concepts developed in the Licensees feasibility study and has conceptual designs for a nature like fishway at this site, which can be made available to DEP upon request. There is potential with a nature like volitional and the similarly designed fish lift working together in separate locations, improved upstream fish passage efficiency and timeliness could be achieved.

Issues with Proposed downstream fish passage facilities

The Licensee proposes to utilize three gates in the forebay area (Sluice Gate, Tainter Gate, and Deep Gate) and up to four sections of hinged flashboards to pass fish downstream. The licensee also proposes a guidance boom (discussed below) and no screening protection of fish through the Francis Turbines. Unlike the Licensee proposal in the SPP for the Lockwood, Hydro-Kennebec, and Weston projects, the Licensee does not propose any specific low flow thresholds that would require curtailment of generation to provide for additional spill for protection of downstream passage of Atlantic salmon smolts. The proposal also fails to provide adequate protection for other species during their period of downstream passage. The proposed downstream operational facilities are inadequate to safely and effectively pass Atlantic salmon and all species downstream.

Radio telemetry studies conducted at the Weston, Shawmut, Hydro-Kennebec, and Lockwood projects resulted in baseline survival of downstream migrating Atlantic salmon smolts ranging from 89.5–100%, but only 66-94.5% of smolts successfully passed the projects within 24 hours. The Shawmut project averaged 93% survival. This analysis only measured survival from just above to just below the projects and fails to take into account the impact of the latent mortality and other mortality associated with the cumulative effects of passing multiple projects. For example, smolts that were released at Weston and detected at Lockwood had much lower survival, with a four-year average of 56%, and that does not include the impacts of the Weston impoundment as fish were released just upstream of the dam.

To assess the true impacts of the projects, it is important to account for survival with dam dependency. The NOAA Science Center modeled smolt survival with dam dependency (Stevens et al. 2019) using 40 years of data on the Penobscot River, with estimates of estuarine mortality for fish that passed 4 dams at 1.15% per kilometer versus 0.34% with no downstream dams (natural mortality baseline). MDMR developed a deterministic salmon model utilizing this data and other data in the watershed and modeled smolt survival with four dams under a number of scenarios. Using the passage scenario of 96% upstream and downstream passage per project, these projects would result in a 45% reduction in smolt survival to sea compared to smolt survival without the projects. Using the updated 97% survival per project proposed in the SPP (12% direct mortality across four projects) and NOAAs estimate from a dam impact model (Neiland and Sheehan 2020) of 6% mortality per dam baseline (24% indirect mortality across four projects), would result in 36% mortality of smolts from project effects alone. In NOAAs August 28, 2020 preliminary Section 18 prescription, their analysis estimated about 40% loss of smolts due to project impacts. The loss of between 36-45% of smolts from dam impacts in addition to baseline mortality on a salmon run that is currently below replacement is not supportive of recovery, even under the most favorable marine survival and freshwater production scenarios. It is unlikely that the Licensee could even achieve the 97% downstream standard based on their proposal as many fish would still be entrained in turbines without shutdowns or full screening. Thus, representations of "Whole Station Survival" vastly understate the current take of these projects as they measure only a small window of impacts that do not account for large impacts of impoundments and latent impacts to fish that pass dams (e.g. delayed mortality in estuary rather than directly after passing project). In addition, in their Augusta 28, 2020 preliminary prescription for the Shawmut project, NOAA predicted that the overall survival of kelts through the four projects cumulatively would be 42% to 51%, an incredibly low number of fish that would preclude the important life history trait of repeat spawning.

The proposed guidance structures (discussed below) at the project are unlikely to prevent or reduce entrainment of smaller alosines. In addition, smaller alosines are more likely to migrate past the Lower Kennebec Projects during the summer months (July-September) when water levels are not likely to result in spill at the project. Due to the reduced swimming ability of smaller alosines and the timing of their migrations, MDMR believes that smaller alosines are likely passing through the turbines of the projects at a high rate. Juvenile alosines migrate downstream from freshwater nursery habitat in Maine between July and November each year. While some juveniles stay in nursery habitat and reach lengths of 100-150mm before their downstream migration, a significant portion of the downstream migrants are much smaller (total length 40-100mm) and typically migrate earlier in the year. Smaller alosines do not have the same swimming ability as larger fish and are more likely to utilize routes of passage in a manner proportionate to the ratio of flow to a given a route. For this reason, smaller juvenile alosines are likely to be entrained as they migrate past the project and turbine passage has been documented as the route of highest mortality (acute and latent) when compared to other passage routes. This will result in adverse impacts to these species and not be conducive to meeting demographic or other goals to maintain self sustaining runs above these projects.

Surface Guidance Boom

The Licensee proposed to construct a fish guidance boom system that is intended to preclude downstream migrating fish from entrainment in Units 7 and 8. MDMR does not support the Licensee's proposal to use surface guidance booms at the Shawmut Project and finds them to be inadequate to protect the GOM DPS population of Atlantic Salmon and the other diadromous species in the Kennebec River. Data provided by the Licensee in the (SPP, Table 5-1) demonstrates that the guidance booms used at the Lockwood, Hydro-Kennebec, and Weston Projects do not guide 14.3-30.6% of the migrating smolts away from the turbines. Data provided by the Licensee (FLA, Table 4-22) shows that 32.7% of the downstream migrating smolts were entrained into the turbines at the Shawmut Project. The instantaneous survival was 7% lower when fish went through the turbines compared to spill routes at Shawmut and that grossly underestimates the sublethal effects, including injury and disorientation, that would result in higher mortality in the estuary. Studies at the Ellsworth dam on the Union river assessing injury to salmon showed that 22-30% of fish that went through the turbines had injuries compared to 3.8% that went through spill routes, demonstrating that impact quantitatively. The 2015 *Evaluation of Downstream Passage for Adult and Juvenile River Herring* demonstrated that 53 percent of the study fish went through the Lockwood turbines, rather than being guided by the boom to the downstream bypass, and survival was lowest for those fish passing Lockwood via the units (i.e., 77-4-81.7% survival).[4] This would indicate that performance standards would not likely be met for these species with the proposed plan.

In addition, MDMR has consulted with the USFWS regarding floating guidance booms and concurs with their comments that are provided below.

> "The Service does not know of any studies that have assessed how effective floating guidance booms are at protecting eels as they attempt to migrate downstream past a hydroelectric project. However, we do know that eels are a bottom-oriented species (Brown et al. 2009) and therefore a floating guidance boom with partial depth panels would not be fully protective. As stated in our 2019 Fish Passage Engineering Design Criteria manual, "A floating guidance system for downstream fish passage is constructed as a series of partial depth panels or screens anchored across a river channel, reservoir, or power canal. These structures 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)." Booms have not been implemented as a protective measure for eels or alosines anywhere else in our region, which spans fourteen states, unless they are installed with other protective measures that are suitable to ensure the safe, timely, and effective downstream passage of our trust species (e.g., inclined bar screens, angled bar racks, etc.). Therefore, the Service recommends that any protective measure implemented at the mainstem Kennebec River hydroelectric projects, as part of the current SPP process, are

[4] Accession No. 20160331-5144

protective of all migratory species and that the proposed mitigation measures comport with the Service's fish passage guidelines."

Operational period

The Licensee proposed to operate the downstream fishway as follows:

- Continue to operate the existing forebay surface sluice gate at maximum capacity to pass up to 35 cfs from April 1 to December 31 to provide a continuous surface bypass route for downstream migrating fish.
- Continue to spill 600 cfs through the existing forebay Tainter gate from April 1 to June 15 to provide a passage route for Atlantic salmon smolts.
- Continue to provide a total of 6% of Station Unit Flow (about 400 cfs at maximum generation) through the combined discharge of the forebay Tainter and surface sluice gates from November 1 to December 31 to provide a safe passage route for Atlantic salmon kelts.
- During the interim period between license issuance and the installation of the new fish guidance boom, continue to lower four sections of hinged flashboards to pass 560 cfs via spill from April 1 to June 15 to provide a safe passage route for Atlantic salmon smolts.
- Continue to pass approximately 425 cfs through the forebay deep gate and shut down Units 7 and 8 for 8 hours during the night for 6 weeks between September 15 and November 15 for downstream adult eel passage.

This proposed downstream operational period is inadequate to safely and effectively pass all species downstream. Alewives and blueback herring leave the spawning grounds immediately after spawning and begin their downstream migration. American shad exhibit similar behavior. This downstream migration typically occurs between May and September each year. In addition, juvenile lifestages of these three species of alosines begin migrating downstream as early as July when they are only approximately 40mm long. Larger juveniles will migrate downstream as late as November depending on environmental variables freshwater nursery habitats. The Licensee has proposed to cease operation of the forebay Tainter gate after June 15th, which would leave only the forebay sluice gate in operation. The maximum capacity of the sluice gate is approximately 35cfs, which is 0.52% of station capacity and is 0.43-0.81% of average flow at the Shawmut dam between June and September.

The Licensee also mentions that they will prioritize units for protection of Atlantic salmon. Based on the average daily inflow reported in table 2 of the EA, station capacity will be exceeding in all months except July, August, and September. Therefore, station capacity will be exceeded at the project for the majority of the downstream migration of Atlantic salmon smolts and adult alosines in the spring and the majority of the juvenile alosines and adult eels in the summer and fall. While unit prioritization is proposed for these times as a protective measure, the prioritization will not be in effect as all units will be "on".

Turbine screening

The licensee did not propose any additional screening, however FERC has suggested screening may be required as this was suggested in NMFS Section 18 preliminary prescription. The preliminary screening suggestion is to equip each powerhouse with full-depth trash rack bars clear spaced at 1.5-inches and 3.5-inches for Units 1-6 and 7-8 respectively. This screening approach is inadequate for Atlantic salmon and does not take into account juvenile river herring, shad, sea-lamprey, or eels so will not result in safe downstream passage of indigenous species. In order to protect downstream migrating Atlantic Salmon smolts and kelts, adult and juvenile Alewife, adult and juvenile American Shad, adult and juvenile Blueback Herring, and adult American Eel, and adult and juvenile sea-lamprey, the Licensee would need to install full-depth inclined or angled screening with much smaller spacing and sized so that the normal velocities should not exceed 2 feet per second measured at an upstream location where velocities are not influenced by the local acceleration around the guidance structures.

Non-Attainment

MDMR notes that aquatic life monitoring in the Shawmut impoundment indicates a finding of non-attainment ME0103000306_339R_01.
https://www.maine.gov/dep/water/monitoring/305b/2016/28-Feb-2018_2016-ME-IntegratedRptLIST.pdf.

Conclusion

The proposal by the Licensee will have significant adverse impacts to fisheries habitat and aquatic life and does not provide sufficient protections for indigenous species. Many additional items, such as full depth appropriate screening, a second volitional fishway near a major area of attraction flow on river right, and reliance on other best protective practices and available science should be considered further.