August 25, 2021

UNITED STATES OF AMERICA

BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Brookfield White Pine Hydro, LLC	Project No. 2325-100
Merimil Limited Partnership	Project No. 2574-092
Hydro-Kennebec, LLC	Project No. 2611-091

KENNEBEC COALITION'S AND CONSERVATION LAW FOUNDATION'S JOINT MOTION TO INTERVENE, WITH PROTESTS AND COMMENTS IN OPPOSITION TO THE AMENDMENT APPLICATION TO INCORPORATE SPECIES PROTECTION PLAN INTO THE PROJECT LICENSES

This Motion to Intervene, Protests, Comments, including demand for Commission compliance with the National Environmental Policy Act, 42 U.S.C. § 4321 et seq., and Request for Orders of Plans for Decommissioning, are filed by the Kennebec Coalition and Conservation Law Foundation pursuant to the Notice of Amendment Application to Incorporate Species Protection Plan into the Project Licenses and Soliciting Comments, Motions to Intervene, and Protests, issued by the Federal Energy Regulatory Commission ("Commission" or "FERC"), on July 26, 2021. The amendment application was filed by Brookfield Power US Asset Management, LLC ("Brookfield") on behalf of the affiliated licensees of three hydroelectric projects on the Kennebec River in Maine – the Lockwood Project FERC No. P-2574, the Hydro-Kennebec Project FERC No. P-2611, and the Weston Project FERC No. P-2325.

In accordance with the Notice and the Commission's Rules of Practice and Procedure, 18 C.F.R. §385.210, .211 and .214, the Atlantic Salmon Federation U.S.

("ASF"), the Kennebec Valley Chapter of Trout Unlimited ("KVTU"), the Natural Resources Council of Maine ("NRCM"), Maine Rivers (hereinafter collectively referred to as the "Kennebec Coalition"), and the Conservation Law Foundation ("CLF"), hereby move to intervene in the above-captioned proceeding and to protest and comment on the amendment application that has been filed with the Commission for these Projects.

1. MOTION TO INTERVENE

The Kennebec Coalition is a longstanding coalition of non-profit organizations consisting of the Atlantic Salmon Federation U.S.; the Kennebec Valley Chapter of Trout Unlimited; the Natural Resources Council of Maine; and Maine Rivers. Each member, except Maine Rivers, is a signatory to the *Agreement Between Members of the Hydro Developers Group, the Kennebec Coalition, the National Marine Fisheries Service, the State of Maine, and the U.S. Fish and Wildlife Service ("Agreement")* dated May 27, 1998 ("The KHDG Agreement").[1] Kennebec Coalition members have long been involved with all aspects of the protection and restoration of the Kennebec River, including filings with the Commission on matters involving the implementation of the KHDG Agreement.[2]

[1] A Commission order issued on September 16, 1998, approved the KHDG Agreement and incorporated its fish restoration goals and fish passage provisions into the licenses of the four projects – Lockwood, Hydro-Kennebec, Shawmut, and Weston. *Edwards Manufacturing Co., Inc., and City of Augusta, Maine*, 84 FERC ¶ 61,227 (1998) (incorporating May 27, 1998 Lower Kennebec River Comprehensive Settlement Record (KHDG Agreement)).

[2] The KHDG Agreement, Part I(B), coins the term "Kennebec Coalition" to name the respective associations herein, to wit: "the Atlantic Salmon Federation; Kennebec Valley Chapter of Trout Unlimited; the Natural Resources Council of Maine; and Trout Unlimited." 84 FERC ¶ 61,227 & n.1. Maine Rivers has since joined the Kennebec Coalition in filings before this Commission, as Maine Rivers was formed in 2002 after the KHDG Agreement was signed and approved by the

Members of ASF, KVTU, Maine Rivers and NRCM use the Kennebec River for recreational, educational, and aesthetic pursuits. Their members fish, boat and otherwise enjoy the watershed in the vicinity of the Lockwood, Hydro-Kennebec, Shawmut, and Weston projects along the Kennebec. Further, Kennebec Coalition members have broad and deep organizational interests in the Commission's equal consideration of power and non-power values in hydropower licensing pursuant to Sections 4(e) and 10(a) of the Federal Power Act ("FPA"). Finally, as signatories to the KHDG Agreement, ASF, NRCM, and KVTU and their members have an interest in upholding and enforcing the terms of the KHDG Agreement and the fish restoration goals incorporated into the Project licenses and present in this proceeding.

Specific descriptions of the moving-party Intervenors joining herein, is as follows:

(a) The Atlantic Salmon Federation U.S. ("ASF"), is a 73-year-old international non-profit organization dedicated to conserving and restoring wild Atlantic salmon and the ecosystems on which their well-being and survival depends. ASF and its Maine Council represent a dozen angling, conservation, and watershed education organizations in the State of Maine and more than 5,000 members and volunteers in the United States. ASF has been engaged on Kennebec River fisheries and dam issues for more than a quarter of a century and has devoted substantial time and money in efforts to restore Atlantic salmon and other native sea-run fish in the Kennebec River Watershed. This includes supporting the removal of the Edwards, Fort Halifax and Madison Electric Works Dams and contributing to the efforts of the

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Commission. *See, e.g.*, FERC Order, FERC Accession No. 20200713-3034 (July 13, 2020) at ¶ 14.

State of Maine in the Sandy River (a major tributary of the Kennebec River that enters the main stem of the river near Madison) to restore the endangered Atlantic salmon population utilizing innovative in-stream egg rearing techniques. ASF is currently implementing a $2.5 million restoration initiative on Temple Stream, a major tributary of the Sandy River, involving the removal of the only dam on the stream and the replacement of two road-stream crossings. Once completed in 2022, ASF's work will fully restore access to more than 50 miles of high-quality, designated critical habitat for endangered Atlantic salmon. In addition, ASF has substantial scientific expertise in Atlantic salmon biology and management and the ecological interactions between salmon and other sea-run fish species. Finally, as a signatory to the KHDG Agreement, ASF has a fundamental interest in ensuring that the outcome of the current proceeding is consistent with the terms of the Agreement.

(b) Kennebec Valley Chapter of Trout Unlimited ("KVTU") is one of six Maine chapters of Trout Unlimited, a national conservation organization whose mission is to conserve, protect and restore North America's cold water fisheries and their habitat. KVTU members fish and recreate on the Kennebec River and its tributaries, have deep knowledge of the river and its fisheries, and have long been involved in fisheries conservation and restoration in the Kennebec watershed. KVTU worked with the Maine Department of Marine Resources ("MDMR") to initiate the current egg-planting project in the Sandy River that is the basis for salmon restoration in the Kennebec watershed; played a leading role in the removal of the Madison Electric dam, which opened the entire mainstem Sandy River to passage for endangered Atlantic salmon and other sea-run fish species; and advocated for the

removal of the Fort Halifax dam to open the Sebasticook River to fish passage. KVTU demonstrated its interest in the Kennebec River watershed and its restoration, as a separate signatory to the KHDG Agreement with Trout Unlimited, and by KVTU's participation in Commission proceedings relating to the KHDG Agreement.

(c) Maine Rivers is a nonprofit corporation with a mission to protect, restore and enhance the ecological health of Maine's river systems. For close to two decades, Maine Rivers has worked to achieve its mission and has shown a strong interest in the recovery of the Kennebec River, including through the successful organization of the Maine Rivers conference on the Kennebec in 2014, entitled Restoring Fish for People and Wildlife, an event bringing together more than 100 people to focus on the restoration of sea-run species.

(d) NRCM is a 62-year-old environmental advocacy organization with over 25,000 members and supporters. NRCM's mission is "to protect, conserve and restore Maine's environment, now and for future generations." NRCM members, staff, and the board of directors all have significant interests in the Kennebec River watershed through their use, enjoyment, and research of this area. NRCM was previously an intervenor and participant in the settlement of the Edwards Project proceedings, which had resulted in the Commission's order denying a new license of the Edwards Project (81 FERC ¶ 61,255), removal of the Edwards dam, and incorporation of the KHDG Agreement fish passage terms into the subject licenses of the next four hydroelectric projects in the lower Kennebec watershed, in *Edwards Manufacturing Co., Inc., and City of Augusta, Maine*, 84 FERC ¶ 61,227. NRCM has demonstrated long-standing interest in the recovery of Kennebec fisheries in general, including through its

comments and efforts to fully implement the KHDG Agreement and to otherwise ensure the restoration of the Kennebec River and its fisheries. NRCM has both individually and as a member of the Kennebec Coalition, demonstrated an active interest in the fisheries restoration activities on the Kennebec River and watershed. NRCM has demonstrated this interest through activities including but not limited to participation in the development and review of the Kennebec Hydro Developers Group Annual Reports, continuing outreach and policy efforts regarding restoration of the Kennebec River and its fisheries, advocacy to improve water quality in the Kennebec, and activities related to the licenses for hydropower projects that are governed by the KHDG Agreement.

(e) Founded in 1966, CLF is a non-profit advocacy organization with 5000 members across New England, including approximately 500 in Maine. CLF works to solve the environmental problems threatening the people, natural resources, and communities of New England. CLF's advocates use law, economics and science to design and implement strategies that conserve natural resources, protect public health, and promote vital communities in our region. CLF has members in many of the communities that border the Kennebec River, including Waterville, Augusta, Skowhegan and Fairfield, the sites of these Projects. For more than three decades, CLF has worked to restore habitat in New England's coastal rivers for important species such as herring, alewives, shad and salmon. CLF's work to restore key forage fish has stretched from the Connecticut River to the St. Croix River and is an integral part of our work to restore New England's coastal and ocean fisheries. Members of CLF use the Kennebec River for recreational, educational, and aesthetic pursuits. CLF members

fish, boat and otherwise enjoy the watershed in the vicinity of the Lockwood, Hydro-Kennebec, Shawmut, and Weston projects along the Kennebec. Further, CLF members have broad and deep organizational interests in the Commission's equal consideration of power and non-power values in hydropower licensing pursuant to Sections 4(e) and 10(k) of the Federal Power Act ("FPA"). CLF is engaged on Kennebec River fisheries and dam issues in collaboration with the Kennebec Coalition, a group of organizations who themselves have been working for more than a quarter of a century to restore Atlantic salmon and other native sea-run fish in the Kennebec River Watershed. This collaboration resulted in the joint filing by the Kennebec Coalition and the CLF of Protests and Comments in opposition to the Draft Environmental Assessment for the Shawmut Project Hydropower License.[3] This collaboration also results in the present joint filing.

2. KENNEBEC COALITION and CLF PROTESTS, COMMENTS, AND DEMAND FOR COMPLIANCE WITH NATIONAL ENVIRONMENTAL POLICY ACT ("NEPA"); and REQUEST FOR ORDERS OF PLANS FOR DECOMMISSIONINGS

I. Introduction

Brookfield Power US Asset Management, LLC ("Brookfield"), on behalf of the affiliated licensees for the Lockwood (P-2574), Hydro-Kennebec (P-2611), and Weston (P-2325) Projects, has requested Commission approval to amend each project license – for the remaining duration of each license – to incorporate the provisions of a Species Protection Plan for Atlantic salmon, Atlantic Sturgeon, and shortnose sturgeon ("SPP").

[3] FERC Accession No. 20210816-5050.

The SPP was filed concurrently with a Draft Biological Assessment ("BA"), which the Commission has adopted without modification as the final BA for initiation of a request for formal consultation under Section 7 of the Endangered Species Act ("ESA").[4] The proposed actions of the SPP and BA include, *inter alia*, construction and operation of permanent upstream and downstream fish passage facilities, and related operational measures, at each of the three Projects. The license amendments would incorporate these proposed actions and govern "continued operation of the projects on GOM DPS Atlantic salmon and is designated critical habitat."[5] The expirations of the FERC licenses for the subject Projects are year 2036.[6]

The Kennebec Coalition and CLF have reviewed the SPP, and conclude that these plans will result in the likely extirpation of Atlantic salmon from the Kennebec River, and will result in the continued failure of restoration efforts for other sea-run species above Waterville (where the Lockwood Project is located). The plans will jeopardize the survival and recovery of Atlantic salmon, and will defeat, for decades and potentially into perpetuity, all meaningful efforts to reach the restoration goals of the Maine Department of Marine Resources ("MDMR") for both salmon and the suite of sea-run species within the critical habitat of the Kennebec River, and within the Merrymeeting Bay species habitat recovery unit, including the Sandy River critical habitat units (Merrymeeting Bay

[4] FERC Accession No. 20210726-3031.

[5] *Id*. at p. 2, under "Proposed Action."

[6] SPP at 1.1, p. 1-1 [FERC Accession No. 20210601-5152]. As the Commission is aware, the Shawmut Project (P-2322), is the third project upriver, located between the Hydro-Kennebec Project (P-2611) and the Weston Project (P-2325). The Shawmut licensee is also Brookfield White Pine Hydro LLC, part of the Brookfield licensee affiliates. Shawmut is under review for relicensing (P-2322-069), and its current license expires on January 31, 2022.

SHRU).[7] Further, Brookfield's plan contains significant amounts of inaccurate information, as detailed in each of the sections below.

Brookfield's plans – the SPP and the measures set forth in the adopted BA – are not based on any current best available data; indeed the current best available data yield the unassailable consensus that engineered fish passage facilities will not work. They will not work even at the unsupported percentage passage efficiencies proffered by Brookfield for both up- and downstream measures; and for either Atlantic salmon or American shad, those passage efficiencies have never worked at such levels on any multi-dam system, anywhere on our planet. Based on this plan, the National Marine Fisheries Service (NMFS) and this Commission should find that these planned continued operations of Brookfield's four projects will result in jeopardy to the survival and recovery of GOM DPS of Atlantic salmon. 16 U.S.C. §§ 1531, et seq. The plan would also leave each of the three projects at issue in non-compliance with the fish passage standards of each current license, and the water quality standards applicable to each project under the Clean Water Act, 33 U.S.C. § 1341, with respect to mandates for passage of other sea-run species en masse, which are critical both to the survival and recovery of Atlantic salmon, and to the ecosystem as a whole.

[7] 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.

A. The Notice of License Amendment Application sets forth proposed actions requiring review under NEPA.

The Notice of License Amendment Application in issue here is the type of federal agency action that triggers compliance with the National Environmental Policy Act of 1969 ("NEPA"), 42 U.S.C. § 4321 et seq. "At its core, NEPA simply requires that federal agencies consider the environmental consequences of their actions."[8] "Under NEPA, agency decisionmakers must identify and understand the environmental effects of proposed actions, *and they must inform the public of those effects so that it may 'play a role in both the decisionmaking process and the implementation of [the agency's] decision.*'"[9] "In other words, 'NEPA was designed 'to insure a fully informed and well-considered decision.'"[10]

Under the regulations promulgated by the Council on Environmental Quality, guiding federal agencies' compliance with NEPA, in assessing "whether NEPA applies or is otherwise fulfilled," a Federal agency should determine "whether the proposed activity or decision is a major Federal action."[11] The regulations provide that "in

[8] *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 52 (D.D.C. 2019) (citing NEPA, 42 U.S.C. §§ 4321-4370h; 40 C.F.R. § 1501.1).

[9] *Id*. (italics emphasis added) (quoting in part *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989)); *see also* 42 U.S.C. § 4321; 40 C.F.R. § 1501.1.

[10] *Id*. (quoting in part *Park Cty. Res. Council, Inc. v. U.S. Dep't of Agric.*, 817 F.2d 609, 621 (10th Cir. 1987) (quoting *Vt. Yankee Nuclear Power Corp. v. Nat. Res. Def. Council, Inc.*, 435 U.S. 519, 558 (1978)).

[11] 40 C.F.R. § 1501.1(a)(4). We cite the current regulations, effective as of September 14, 2020; however, the authorities on the position set forth herein are consistent whether under the new regulations or CEQ's 1978 regulations. Under the new regulations, "Section 101 of NEPA establishes the national environmental policy of the Federal Government to use all practicable means and measures to foster and promote the general welfare, create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." 40 C.F.R. § 1500.1(a).

particular, [NEPA] requires Federal agencies to provide a detailed statement on proposals for major Federal action significantly affecting the quality of the human environment."[12]

There should be no question that the proposed actions and FERC decision-making at issue here constitute a major action significantly affecting the quality of the human environment. Indeed, even for only *one* of the dams in issue in this four-dam system (Shawmut P-2322), the Commission has in fact engaged NEPA procedures, albeit by issuance of a deficient Draft EA recently issued by Commission staff. In that context other Federal natural resource agencies had requested that an Environmental Impact Statement issue under NEPA, in relation to the Shawmut relicensing alone.[13] Certainly a three-dam plan to cover continuing operations in the same river, with projects on either side of Shawmut, is a major federal action that triggers NEPA procedure.

We also must not ignore the context of the proposed actions that involves considering continued operations of these three projects within the 4-project system *for the duration of their licenses to 2036.* When even a Draft EA has issued for the Shawmut Project proposed to operate (if relicensed over our objections and over the recommendations of NMFS and MDMR under the Federal Power Act) until 2052, certainly a comprehensive NEPA analysis of the other three projects within the system –

[12] 40 C.F.R. § 1500.1(a).

[13] USFWS, NMFS and MDMR all called for preparing an EIS rather than an EA with respect to Shawmut relicensing: 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.").

all operating under a set of affiliated licensees (Brookfield) – is compelled here. To perform a NEPA analysis for Shawmut, even in faulty Draft EA form, and yet to ignore NEPA altogether for Lockwood, Hydro-Kennebec, and Weston, is inconsistent with the NEPA mandate.

Nor is it enough to say that the ESA section 7 consultation will inevitably cover whatever NEPA requires. That was not the case with Shawmut, which is simultaneously undergoing both NEPA procedure and the required section 7 consultation under the ESA with NMFS with respect to Atlantic salmon. The SPP and BA here do not perform a comprehensive basin-wide analysis that would include Shawmut, as NEPA would require.[14] Further, one of the fundamental failings of this SPP and Biological Assessment is that they completely ignore the requirements of fish passage for the other sea-run species which are part of the environment, and which are part of Brookfield's responsibility for passage and restoration. In other words, this SPP and BA proposes (unrealistically) to pass Atlantic salmon, notably at the expense of all of the other species. While that failing may be a significant factor in a finding of jeopardy under the ESA, it is also a significant and notable environmental consequence that the Commission is otherwise compelled to "take a hard and honest look at" under NEPA's primary "information-forcing" function.[15]

[14] *Delaware Riverkeeper Network v. FERC*, 753 F.3d 1304, 1313-15 (D.C. Cir. 2014) (FERC impermissibly segmented NEPA review of a third project when it failed to consider the cumulative impacts of all four upgrade projects); *see also American Rivers v. Federal Energy Regulatory Commission*, 895 F.3d 32, 49 (D.C. Cir. 2018).

[15] *American Rivers v. Federal Energy Regulatory Commission*, 895 F.3d 32, 49 (D.C. Cir. 2018) (citing *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519, 518 (1978); *Sierra Club v. FERC*, 867 F.3d 1357, 1367 (D.C. Cir. 2017); *Mayo v. Reynolds*, 875 F.3d 11, 16 (D.C. Cir. 2017).

It is also important for the Commission to be reminded that it had always been the intention that the environmental consequences of this SPP be analyzed comprehensively with the environmental consequences of Shawmut relicensing. That intention was contained in the very proceedings leading up to this Notice of Amendment of License, as early as the Commission's designation of non-federal representative status to Brookfield under the ESA.[16] The non-federal designation was premised upon Brookfield's promise to "file a basin-wide SPP in January 2019, concurrent with the Final License Application submission for the Shawmut Project." The Commission even stated that "[t]his should allow sufficient time to complete the FERC Section 7 consultation process and the BO [Biological Opinion] issuance **prior to the December 2019 expiration**."[17] This promise of a comprehensive review echoes throughout this record, including 1) when the Commission extended the Shawmut Project license term, stating that "Brookfield is currently in the process of developing a final BA and [SPP] for Atlantic salmon *for the four lower Kennebec River projects*" and extending the Shawmut license term would "allow Brookfield to complete the BA and SPP for the protection of Atlantic salmon;"[18] and 2) when the Commission extended the expiration of the Hydro-Kennebec Interim SPP by three years, so that it would expire on December 31, 2019 "to align it with the expiration date of the Interim SPP approved for the Lockwood, Shawmut, and Weston Projects," which in turn would "permit the development of a single Final SPP for all four projects, which would enable the licensees and resource agencies to follow a more

[16] FERC Accession No. 20180212-5110.

[17] *Id*. at p.2.

[18] FERC Accession No. 20181211-3042 at ¶¶ 4 & 8 (italics emphasis added).

effective and efficient 'basin-wide' approach for Atlantic salmon species protection on the Kennebec River . . . ."[19]

NEPA procedure and analysis compel this *comprehensive* review – one that involves all projects on the river, and involving *all* sea-run fish species effected by each projects' adverse impact to the environment.[20] "The agency must also consider the unique characteristics of the geographic area, the cumulative effects of each individual part of the action, and any impact on endangered or threatened species or their habitats."[21]

The Commission's decision-making in this instance – the determination on whether to amend each project license, in the context where each license currently has long-expired ESA incidental take authorizations, and where each license runs to 2036 – is an agency action clearly of environmental significance, both in context and in intensity of impact.[22] NEPA review, to ensure a "'well-considered' and 'fully informed' analysis of the relevant issues and opposing viewpoints," is both essential and mandatory.[23]

[19] FERC Accession No. 20180920-3040 at ¶ 8.

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

[21] *Id*.

[22] *Id*. at 49 (citing 40 C.F.R. § 1508.27).

[23] *Id*.

B. Brookfield's upstream performance standards are unrealistic, and Brookfield has provided no data supporting its ability to attain them.

i. Brookfield's proposed 96% upstream salmon passage standard for each of the three dams is unrealistic, and we are unaware of other dams that meet this standard.

In its SPP, Brookfield proposes a 96% upstream passage standard for Atlantic salmon for each of the three dams[24] and an "end-of-pipe" standard of 84.9%.[25] There is no justification for these proposed standards 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 not 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 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

[24] SPP at P.1-11; FERC Accession No. 20210601-5152.

[25] SPP at P. 8-2.

[26] A List of References to literature cited in these Comments is appended.

is required for successful migration, the cumulative effect of even slightly reduced passage at these dams can be substantial (Holbrook et al., 2009).

The passage rate at the Milford Dam is also not as good as it appears. Brookfield's SPP ignores serious, self-reported delays in salmon passage at Milford during tagging studies of adult passage. 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] Again in 2015, 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] 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, which the SPP does not recognize, as discussed below.

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

[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.

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]

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 lesions (D.A. Neitzel et al., 2004).[31] Holbrook et al. (2009) observed frequent fallbacks

[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 C.iv. herein.

[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

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

This information shows that the 96% upstream passage rate that the SPP proposes is not attainable at even one dam, let alone at four dams in sequence.

Department of Marine Resources (Jennifer Noll). June 17, 2021. Field Summary of Atlantic Salmon Stranding Rescue at Lockwood Dam.)

[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, and attached hereto).

iii. The proposed bypass reach fishway at Lockwood is completely inadequate.

MDMR expressed numerous concerns with Brookfield's fishway proposal, including that fishways are very unlikely to meet necessary passage standards for target fish species; that this particular fishway may result in passage failure due to the creation of an eddy at the second turning pool; that Brookfield's computational fluid dynamics (CFD) modeling did not account for flows during the bulk of the fish passage migration season; and that all of Brookfield's CFD modeling may be invalid due to changes the Maine Department of Transportation may make to supports to the Route 201 bridge.[33]

C. Brookfield's downstream smolt passage goals are also unrealistic, and Brookfield's own data show that it will never meet these goals.

i. Brookfield's own data show that downstream passage success is far lower than it claims.

Brookfield claims it will meet a passage goal of 97% of smolts at each of the three dams for an overall "end-of-pipe" passage rate of 88.5% across all four dams.[34] However, Brookfield's own data show that 97% downstream passage is not attainable at any of the four lower Kennebec dams and neither is an overall survival rate of 88.5% over all four of the dams. On behalf of the Kennebec Coalition, Don Pugh, a fish passage expert with decades of experience, including at the S.O. Conte Anadromous Fish Research Center,[35] evaluated Brookfield's downstream smolt passage data from 2012 to 2015 and identified two key factors that inflated Brookfield's smolt survival percentages.

[33] MDMR. 2021. Comments of the Maine Department of Marine Resources (MDMR) for #L-20218- 35-O-N Permit Application for Lockwood Fishway Construction. March 10. P. 3. Accessed at https://www.maine.gov/dep/ftp/HYDRO/MWDCA/Lockwood/fishway/agency-review/2021_03_10_Lock_Fishway_DMR%20comments.pdf.

[34] SPP at P.8-1; FERC Accession No. 20210601-5152.

[35] 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 (Normandeau, 2014-2016); paired release studies should only be used when there are at least 1000 fish.[36] 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.[37] The SPP ignores this significant flaw in Normandeau's analysis.[38]

Second, Brookfield inappropriately calculated overall downstream survival rates as the product of survival rates at each individual dam, which leaves out the highly significant impacts of the impoundments between the dams. Mr. Pugh analyzed the actual survival of individual smolts from 200 meters above the Weston Dam to the lowermost telemetry station below the Lockwood Dam. Only an average of 56% of smolts survived this multi-dam passage over the course of the four years of the Normandeau studies.[39] 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.

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

[37] 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.

[38] *Id*.

[39] 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.

Based on Mr. Pugh's calculations, Brookfield's contention that it can meet an "end-of-pipe" downstream passage goal of 88.5% is both absurd and perilous for the future of the endangered Atlantic salmon.

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 1 (below) compares the baseline (all fish that passed) and adjusted results for the years 2013 to 2015.

Table 1. 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 Brookfield's SPP, 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 released at the Weston project in 2015 (98 released above Weston to face passing four dams; and 60 released below Weston to face passing three dams), 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, or 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).

Brookfield's SPP also fails to give adequate consideration to 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."[40] Building on these empirical results, Stevens et al. modeled salmon smolt survival through multiple 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."[41] 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

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

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

unrestored) in wild smolt survival to the ocean was possible with the removal of some dams in the Penobscot River."[42]

In addition, as Dr. Robert Lusardi noted in his review of the Draft EA for the Shawmut Project:

> Delayed mortality has been found to have a profound effect on juvenile salmon survival when smolts must migrate downstream through dams and has been tied to the hydrosystem experience (Budy et al. 2002). Typically, mortality occurs after passage through, over, or around a dam, but does not become evident until those individuals reach the estuary or ocean (Budy 2002). The draft EA neglects to examine the potential for delayed mortality to play a significant role in survival estimates of juvenile salmon through the Shawmut project. Budy et al. (2002) demonstrated that as a fish passes through a dam, they experience acute or chronic stress. While some individuals may fully recover, others do not and experience physical limitations making them more susceptible to mortality at a later point in time (e.g., more susceptible to predators, disease, or energetic and/or physiological impairment). For instance, Ferguson et al. (2006) found that while initial survival estimates of juvenile Pacific salmon passage through McNary Dam in the Pacific Northwest ranged from approximately 86-95%, delayed mortality ultimately accounted for 46-70% of total estimated mortality. The authors concluded that the primary mechanism of delayed mortality was sensory impairment and subsequent predation in and around the dam tailrace.[43]

These statements from Dr. Lusardi are equally relevant to the three dams in the SPP.

ii. Brookfield's proposed "improvements" to downstream passage will not allow it to meet its proposed smolt passage goals nor will they assure safe passage of other sea-run species.

Brookfield proposes various tweaks to downstream fish passage facilities for the three dams in the SPP, such as relocating a fish boom at Hydro-Kennebec and increasing spill to up to 50% of inflow during low flow years at Lockwood.[44] Given the dismal

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[42] *Ibid*.

[43] Lusardi, R.A. 2021. Memorandum to Secretary Bose, FERC re: draft Shawmut EA. August 12. P. 1. FERC Accession Number 20210816-5123. Dr. Lusardi is an aquatic research ecologist and applied conservation biologist at the Center for Watershed Sciences and is Adjunct Faculty in the Department of Wildlife, Fish, and Conservation Biology at the University of California, Davis. Dr. Lusardi's memorandum is broadly relevant to this draft SPP and BA.

[44] SPP at pp. 9-1 to 9-2; FERC Accession No. 20210601-5152.

levels of smolt passage that are already occurring at these dams, these measures will not allow Brookfield to reach its passage goals. MDMR has clearly stated that it does not support the use of booms to improve smolt passage. In its comments on Brookfield's application for Water Quality Certification at the Shawmut Project, MDMR stated the following that is also relevant to Brookfield's proposals in the SPP:

> 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 [Shawmut Final License Application, 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.[45]

iii. 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., 2013; 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).

[45] 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.

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 that make up the majority (16 of 21) of turbines at the four dams on the Lower Kennebec. Weston has four Francis turbines (SPP, P. 3-5), Shawmut has six Francis Turbines[46], and Lockwood has six Francis turbines (SPP, P. 3-1). Kaplan turbines 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 lower Kennebec dams are not meaningful and, in fact, inflate Brookfield's claims for future passage success at these dams.

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 SPP also 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).

[46] Brookfield. 2021. INTERIM SPECIES PROTECTION PLAN BIOLOGICAL ASSESSMENT FOR ATLANTIC SALMON FOR THE SHAWMUT PROJECT ON THE KENNEBEC RIVER, MAINE . P. 2-3. FERC Accession Number 20210601-5149.

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).

Brookfield's SPP fails to acknowledge any of this.

iv. Brookfield's SPP contains no performance standards for kelts and completely ignores the importance of repeat spawners in salmon restoration.

The SPP contains no passage standards for Atlantic salmon kelts. Best available information and scientific literature emphasizes the unique importance of repeat spawners, and the difficulty in passing kelts. This is a critical issue for salmon recovery that, under the ESA, cannot be ignored.

Standards for kelts need to be considered and prioritized in order to promote recovery; without this consideration the SPP is inadequate 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(1). Survival through multiple dams compared to that in free-flowing rivers is particularly dismal (Coutant and Whitney, 2000; Wertheimer and Evans, 2005; Holbrook et al., 2009; Norrgård et al., 2013; 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 recovery strategy and SPP.

Atlantic salmon are iteroparous and have been documented spawning as much as 6 or 7 times in some populations (Reid and Chaput, 2012; Chaput et al., 2016). Repeat

spawners have been shown to comprise as much as 40 percent of returning adults in a given year in some rivers, though the scientific literature indicates that the range within salmon populations is typically from 0 to 26 percent each year (Reid and Chaput, 2012; Maynard et al., 2018; Fleming and Reynolds, 2004).

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. Improved kelt survival will increase the number of repeat spawners and provide substantial benefits to the population, including increased absolute and relative fecundity, increased egg survival, increased number of year classes present, increased effective population size, and increased probability of population persistence (Fleming, 1996; Halttunen, 2011; Reid and Chaput, 2012; Lawrence et al., 2016; Baktoft et al., 2020).

The number of females, and thus the number of eggs deposited in a spawning year, is a key limiting factor for production in Atlantic salmon populations (Halttunen, 2011). Since repeat spawners tend to be female, their presence or absence can have outsized impacts on a population (Halttunen, 2011; Niemelä et al. 2006). The fecundity of female Atlantic salmon is positively related to body size and age, as well as body condition and experience (Heinimaa and Heinimaa, 2004; Burton et al., 2013; Hanson et al., 2019). Repeat spawning female salmon, which would generally be both larger and older than maiden females, will produce more eggs and have a greater proportional contribution to a given year class. Maynard et al. (2018) reported that a review of salmon egg production on the Connecticut, Merrimack, and Sheepscot Rivers from the 1980s to 2011 found that repeat spawners produced between 2,300 and 3,100 more eggs than

maiden spawners. Halttunen (2011) found that an average of 20 percent of the female salmon returning to the River Alta in Norway were repeat spawners and that they contributed 27 percent (ranging from 2 percent to 59 percent) of egg deposition on average. On the Miramichi River in New Brunswick, Canada, repeat spawners have comprised between 6 percent and 21 percent of the total returns of all age groups (Chaput et al., 2016) and have contributed more than 40 percent of total egg deposition in a year (Halttunen, 2011).

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). The presence of 1-sea winter (vast majority male), 2 sea-winter, and 3+ sea winter adults in a spawning population, along with consecutive and alternating repeat spawners (vast majority female), and precocious parr (all male) create a diverse, complex, and resilient population that will be able to persist over time and be more resilient to negative anthropogenic factors, stochastic events, and a changing climate and marine environment. But, these adults all need to be able to access prime spawning and rearing habitats. And the promotion of more abundant repeat spawners via improved kelt survival will positively influence the probability of population persistence (Lawrence et al., 2016). On the other hand, 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). 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, 2006; 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).

Repeat spawners have almost been entirely eliminated from the GOM DPS. On the Penobscot River, repeat spawners comprised 1.7% of the run in the 1980s, but only 0.6% in the early 2010s (Maynard et al., 2018). It is important to remember that the 1.7% number from the 1980s was likely significantly lower than natural return rates for repeat spawners prior to more than 250 years of anthropogenic impacts that reduced the total run

size from more than 100,000 individuals to a few thousand. On the Kennebec River, the Lockwood fish lift has only passed one repeat spawning salmon in 16 years of operation. The event was so extraordinary that the salmon, called Charlie, was headline news (Holyoke, 2019).

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).[47] In the Penobscot River (see Maynard et al., 2018) repeat

[47] 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.[48]

The SPP'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 and repeat spawning should result in a jeopardy finding.

D. The SPP ignores mortality associated with maintenance activities at the dams.

i. Injury and mortality at the Lockwood Project indicate that this is a serious problem; multiplied at four dams, it would be far worse.

At Lockwood, 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."[49] At least two other adult Atlantic

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[48] 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.

[49] 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.)

salmon, one with "significant scars located dorsally on its body"[50] 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[51]) 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 SPP would include similar inefficiencies at four dams, before endangered salmon even reach spawning habitat in the Sandy River. The SPP does not acknowledge these inefficiencies at all.

E. Brookfield's adaptive management proposals are inadequate.

Brookfield repeatedly says that if it does not meet passage goals it will use "adaptive management" to address them.[52] However, throughout the SPP, Brookfield proposes no concrete measures it would take in the aftermath of fish passage failure. The Kennebec Coalition has watched Brookfield's "adaptive management" since it entered Maine, and we have witnessed its complete failure. Brookfield has "adaptively managed" the failed Lockwood fishway since 2013. MDMR describes Brookfield's adaptive management this way:

> Fish passage failures at the Lockwood Project provide a cautionary tale as unexpectedly poor performance has left hundreds of returning endangered Atlantic salmon to die or spawn in subpar habitats below the project and likely

[50] Ibid.

[51] 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.

[52] See, e.g., SPP at p. 7-30; FERC Accession No. 20210601-5152.

tens or hundreds of thousands of American shad and other species to be blocked from historic habitats annually.[53]

To the extent that federal agencies allow Brookfield to rely on fishways to meet the requirements of an SPP, they must spell out specific and enforceable adaptive management steps. For example, if a single upstream fishway proves ineffective after two years of testing, the agencies should require Brookfield to construct a second fishway. If the first and second fishways prove ineffective, the agencies should require a third fishway, until fish pass at required levels. Another measure – in light of the lack of current best available data to support Brookfield's plans for engineered fishways as a suitable passage solution in the first place – would be for the Commission to hold in abeyance an order for license reopening and order for plans for decommissioning, should passage facilities fail (as they are expected to do, under current available data). The Kennebec Coalition continues to believe that removal of all four of Brookfield's Lower Kennebec dams is necessary, and feasible as the comparatively least expensive approach. But if Brookfield moves forward with plans for fishway construction, agencies cannot allow the company to tweak failing fishways forever, which is clearly Brookfield's preferred mode of operation. Sea-run fish will always lose in this scenario.

[53] 2020. MDMR. MDMR Response to the Ready for Environmental Analysis (REA) Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions for the Shawmut Project (P-2322-069). August 28, 2020. P.3. Accessible at https://1drv.ms/u/s!AkLlihAdyxqVklBuZIG6A5l9pnd8?e=sWgbBm.

F. Brookfield's SPP contains almost nothing on restoration of the other sea-run fish species without which salmon restoration is impossible.

i. The SPP fails to acknowledge the importance of Maine's management goals for sea-run species in the Kennebec.

Brookfield's SPP lacks any evaluation of passage standards for species other than salmon. It dismisses the State's Minimum Species Goals for the Kennebec River, which are:

> 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 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.[54]

The SPP's failure to develop passage standards for species other than Atlantic salmon is not just clearly inconsistent with Maine's management goals but also undercuts them. 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.[55]

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[54] 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.

[55] 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.

ii. The SPP's lack of standards for the full suite of sea-run species in the Kennebec guarantee's the failure of salmon restoration efforts for the river.

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

> 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.[56]

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.[57]

The Final Recovery Plan for the GOM DPS of Atlantic salmon makes clear both that dams were a primary factor in in the decimation and near extirpation of Atlantic

[56] 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).

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

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.[58]

Clearly an SPP that ignores the suite of species that co-evolved with Atlantic salmon offers no hope of recovering this species.

But in addition, the licenses of the Projects also require passage of the full suite of sea-run species – for the duration of their licenses to 2036 – and this obligation cannot be ignored as a license term in and of itself. The State's restoration goals for recovery of the suite of sea-run species were made license terms when the Commission approved the KHDG Agreement and incorporated its fish restoration goals and fish passage provisions into the licenses of the four projects – Lockwood, Hydro-Kennebec, Shawmut, and Weston.[59] In turn, each extant water quality certification from the State, for each Project, under section 401 of the Clean Water Act, 33 U.S.C. § 1341, relies upon meeting fundamental performance standards. Each Project must pass *all* species to meet the sea-run restoration goals generally, to minimize each Project's undue adverse impact to the

[58] 2019 Final Recovery Plan at p. 11.

[59] *Edwards Manufacturing Co., Inc., and City of Augusta, Maine*, 84 FERC ¶ 61,227 (1998) (incorporating May 27, 1998 Lower Kennebec River Comprehensive Settlement Accord (KHDG Agreement)).

environment and critical habitat, and to meet the challenge of recovery of Atlantic salmon.

G. Brookfield misrepresents the water quality attainment status of its impoundments.

Brookfield falsely claims that all four of the Lower Kennebec dams meet state water quality standards. In its BA, Brookfield falsely states: "Water quality at all four Projects is good both upstream and downstream of the dams, and Project waters at all four Projects meet state water quality standards."[60]

However, according to DEP's most recent Integrated Water Quality Monitoring Report Appendices, the Shawmut impoundment is listed under "Category 3: Rivers and Streams with Insufficient Data or Information to Determine if Designated Uses are Attained (One or More Uses may be Impaired)".[61] The Appendices further state, in reference to the segments of the Kennebec above and below the Shawmut Project: "Category 3 for potential aquatic life use impairment; insufficient data to delist: macroinvertebrate community attained Class C in 2004 but did not attain in 2002."[62]

H. Brookfield's BA repeatedly and incorrectly refers to viable salmon spawning and rearing habitat below the Lockwood Dam.

Brookfield attempts to divert attention away from the importance of achieving safe, timely and effective fish passage to the Sandy River by making inaccurate claims regarding the value and significance of salmon habitat in other parts of the watershed,

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[60] BA at p. 5-1; FERC Accession No. 20210601-5152.

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

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

including inaccurate claims about mainstem habitat below the Lockwood Dam, as well as habitat in tributaries like Bond Brook and Togus Stream.

The Inter-Agency Merrymeeting Bay Coordinating Committee lists the Kennebec Watershed, and specifically the Sandy River and upper Kennebec, as:

> [T]he top priority for recovery work because it has the most habitat in the SHRU, including the highest quality habitat and thermally optimal habitat. The four mainstem dams on the lower Kennebec River currently block free-swim access to high-quality habitat in the upper watershed, including the Sandy River. The Kennebec watershed upstream of the lowermost dam, Lockwood, contains a majority of quality salmon habitat within the MMB SHRU and includes some of the most diverse and abundant Atlantic salmon habitat in the United States.[63]

MDMR focuses their salmon egg planting program in the Sandy River, above all four of Brookfield's dams, and MDMR releases returning adult salmon into this habitat *precisely* because the upper Sandy contains large quantities of some of the highest quality spawning and rearing in the Kennebec River, the Merrymeeting Bay SHRU, and, in fact, within the entire geographic area that supports the endangered GOM DPS of Atlantic salmon.

The lower mainstem Kennebec River was ranked by NMFS as having "the highest biological value to the Merrymeeting Bay SHRU because *it provides the central migration conduit for much of the currently occupied habitat found in the Sandy River*."[64] The high valuation is only because the mainstem river is the *corridor* for migrating

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[63] Maine DMR, NMFS, and USFWS. 2020. Merrymeeting Bay Atlantic Salmon Habitat Recovery Unit Five-year Work Plan (2020-2025). Draft, approved by Atlantic Salmon CMS Board, June 2021, final version not yet generated. P. 2.

[64] NOAA Fisheries. 2009. Biological Valuation of Atlantic Salmon Habitat within the Gulf of Maine Distinct Population Segment. P. 79. Available from: https://atlanticsalmonrestoration.org/resources/documents/atlantic-salmon-recovery-plan-2015/appendix-to-recovery-plan/critical-habitat/biological-valuation-of-atlantic-salmon-habitat-2009/index_html.

salmon smolts and adults, providing access to the high elevation critical habitat for spawning and rearing, not because the lower mainstem itself contains adequate amounts of habitat with those values.

The lower mainstem Kennebec does not have high value for spawning and rearing, and Brookfield's BA is highly misleading in this respect. The habitat in the lower Kennebec simply lacks the critical habitat features or environmental or physical features needed to support successful spawning and rearing of Atlantic salmon. Maine DMR salmon biologist Paul Christman describes the 82 miles of the mainstem Kennebec below the Weston Dam in Skowhegan as not having suitable juvenile rearing habitat: "Some portions of it may meet some of the physical characteristics of habitat during portions of the year however given the numerous issues like the predatory fish assemblage, lack of thermal refuge and poor water quality (Biological Valuation 2009 page 78) make this reach unlivable for vulnerable juveniles."[65]

There are small pockets of suitable habitat in tributaries of the lower Kennebec, most notably Bond Brook and Togus Stream. These are small subwatersheds, draining 21.35 and 22.37 square miles, respectively, and certainly not "major tributaries" as described in the BA.[66] Combined, Bond Brook and Togus Stream have only 565 units of habitat and both of these minor tributaries have a number of issues that decrease the quality of their salmon habitat. Togus Stream drains from Togus Pond, a warmwater pond whose fish community today is dominated by smallmouth bass, largemouth bass, and chain pickerel. Togus Stream flows through a suburban area with multiple

[65] Christman, Paul. 2021. Email to John Burrows, Executive Director of U.S. Operations, Atlantic Salmon Federation. "Kennebec Habitat." Received August 28. This document is attached to these Comments.

[66] BA page 1-13; FERC Accession No. 20210601-5152.

anthropogenic impacts to habitat. Bond Brook has its headwaters in suburbs west and north of the City of Augusta, and its lower tributaries and mainstem flow through a heavily developed, urban environment before entering the Kennebec. Portions of the Bond Brook watershed are classified as an Urban Impaired Stream Watershed.[67]

The BA further states that "… modelling and survey efforts have identified suitable spawning habitat in the mainstem river below the Lockwood Project, some of which is within 300 meters of the Project (Table 1-2) (NMFS 2013). The 3,131 habitat units estimated to be downstream of Lockwood are currently accessible to pre-spawn adults and could be used for spawning and rearing of juvenile salmon."[68] Yet Maine DMR salmon biologist Paul Christman describes the physical habitat survey on the mainstem Kennebec River as follows:

> This survey was conducted in anticipation of the construction of the Lockwood Fish Lift and the initiation of salmon restoration. The primary goal of the survey was to characterize the reach of river below Lockwood to head of tide for holding pool and potential sites for angling opportunities. The survey technique measured numerous physical characteristics such as depth, widths and substrate. While some of this information can be used to physically classify sections as juvenile rearing and spawning, these surveys do not take into account any qualitative information and were never intended for this purpose."[69]

The BA clearly gives the false impression that salmon recovery—or even persistence—could be supported by production in mainstem habitat below the Lockwood Dam or in the small and heavily impacted tributaries that enter the Kennebec near and below the

[67] Maine DEP. 2018. 2016 Integrated Water Quality Monitoring Report. Appendices. P. 126. Accessed at https://www.maine.gov/dep/water/monitoring/305b/2016/28-Feb-2018_2016-ME-IntegratedRptLIST.pdf.

[68] BA P. 1-12; FERC Accession No. 20210601-5152.

[69] Christman, Paul. 2021. Email to John Burrows, Executive Director of U.S. Operations, Atlantic Salmon Federation. "Kennebec Habitat." Received August 28. This document is attached to these Comments.

head of tide. The reality is that, like most of the large salmon rivers in the United States and Atlantic Canada, the bulk of Atlantic salmon habitat has always been in its high elevation, high gradient headwater tributaries. NOAA's Biological Valuation of Atlantic Salmon Habitat within the Gulf of Maine Distinct Population Segment (2009) states that: "In the Kennebec basin, historically important tributaries to Atlantic salmon included the Dead River, Carrabassett River and Sandy River (Atkins and Foster, 1867), which are generally characterized as high elevation tributaries that are dominated by rapids, riffles and the occasional falls with a substrate composed of boulders, cobble, and gravel."[70] Of those historically important tributaries, only the Sandy River is within currently designated Critical Habitat for endangered Atlantic salmon.[71]

NOAA's *Atlantic Salmon SHRU Specific Implementation Strategy* describes the importance of the Kennebec River watershed to Atlantic salmon recovery, stating that the Kennebec "contains the most abundant, most suitable habitats for Atlantic salmon in the GOM DPS" and that the Kennebec "may have greater resilience to climate change because of its high gradient systems and cool water influences.[72] Rivers like the Kennebec, with large quantities of high quality habitats, that are able to support large salmon populations are "more resilient to anthropogenic and environmental stressors then smaller rivers."[73] Nearly all of the Kennebec's high quality habitat is located in the upper

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[70] NOAA Fisheries. 2009. Biological Valuation of Atlantic Salmon Habitat within the Gulf of Maine Distinct Population Segment. P. 72. Available from: https://atlanticsalmonrestoration.org/resources/documents/atlantic-salmon-recovery-plan-2015/appendix-to-recovery-plan/critical-habitat/biological-valuation-of-atlantic-salmon-habitat-2009/index_html.

[71] 74 Fed. Reg. 29,300 (NMFS, Designation of Critical Habitat for Atlantic Salmon (Salmo salar) Gulf of Maine Distinct Population Segment) (June 19, 2009).

[72] NOAA Fisheries. 2016. SHRU Specific Recovery Implementation Strategy (Draft). P. 20-21.

[73] *Id*.

half of the watershed, above these four Brookfield Projects. The upper Kennebec not only contains the majority of quality salmon habitat in the Merrymeeting Bay SHRU, but it also "includes some of the most diverse and abundant Atlantic salmon habitat in the United States."[74] The Sandy River, which is the only part of the upper Kennebec currently occupied by Atlantic salmon, typifies this and is one of the most important areas for Atlantic salmon recovery. With more than 43,000 units of habitat, the Sandy River HUC 10 watershed has more Atlantic salmon habitat than any of the other 27 HUC 10 watersheds that were historically accessible to Atlantic salmon within the Merrymeeting Bay SHRU (HUC stands for Hydrologic Unit Code and is the national classification system for watershed by size).[75] The Sandy River has "the greatest biological value for spawning and rearing habitat within the occupied range of the Merrymeeting Bay SHRU."[76]

The Sandy River's salmon habitat is diverse and well-connected – the entire 70-mile mainstem from Small's Falls to the confluence with the Kennebec is free-flowing – and is situated in a largely undeveloped and well-forested area of the western Maine mountains. The Sandy is characterized by extensive boulder, cobble, and gravel substrate; long, medium to high gradient riffles; and an alluvial flood plain. These features make the Sandy different than many of the other rivers within the GOM DPS and create unique rearing opportunities for Atlantic salmon, which will lead to increased

[74] Maine DMR, NMFS, and USFWS. 2020. Merrymeeting Bay Atlantic Salmon Habitat Recovery Unit Five-year Work Plan (2020-2025). Draft, approved by Atlantic Salmon CMS Board, June 2021, final version not yet generated. P. 3.

[75] NOAA Fisheries. 2009. Biological Valuation of Atlantic Salmon Habitat within the Gulf of Maine Distinct Population Segment. P. 82-83.

[76] Ibid, 79.

diversity and lowered risk of extirpation, if the species can actually get to these habitats.[77] The upper Sandy and its tributaries are also located in a high elevation area that remains cool throughout the year, providing optimal water temperatures for juvenile salmon growth and survival. The array of diverse habitats found in the Sandy are critical "for supporting an abundant, diverse and resilient Atlantic salmon population."[78]

II. Conclusion

Even if everything Brookfield proposes in the SPP were to work according to plan, which best available science and information show is not possible, it would still result in unacceptable mortality for Atlantic salmon:

- Brookfield's SPP proposes to kill 11.5% of salmon smolts from the Sandy River—the largest run of smolts within the entire DPS, and the only run that is entirely made up of naturally-reared salmon—on their way to the ocean;
- Brookfield's SPP proposes to prevent 15.1% of the returning adults from passing upstream to spawn;
- Combined, that means that Brookfield's SPP proposes to reduce the Kennebec salmon run by 26.6% *every year*, for the duration of these licenses through 2036.

Even Brookfield's rosy analysis in the SPP should yield a finding of jeopardy to the survival and recovery of Atlantic salmon. The reality, however, is far worse. As the above shows, Brookfield cannot meet any of the standards it proposes for salmon in this SPP. Further, Brookfield's failure to guarantee successful passage for other sea-run species is another nail in the coffin of Kennebec salmon, and in any efforts at fish restoration on the Kennebec.

[77] NOAA Fisheries. 2016. SHRU Specific Recovery Implementation Strategy (Draft). P. 25.

[78] Ibid, 20.

In the final analysis, Brookfield is facing an insoluble problem. Brookfield's undisputed delays in preparing this SPP and BA are self-evident and reflect how insoluble the problem is. The delay now exceeds by almost two years the expiration of take authorizations at each of the Projects under the ESA on December 31, 2019, and exceeds by over three years this Commission's designation of Brookfield as its non-federal representative under the ESA.[79] It is worth noting that the non-federal designation also was premised upon Brookfield's promise to "file a basin-wide SPP in January 2019, concurrent with the Final License Application submission for the Shawmut Project."[80] The Commission even stated that "[t]his should allow sufficient time to complete the FERC Section 7 consultation process and the BO [Biological Opinion] issuance **prior to the December 2019 expiration**."[81] Brookfield did not meet these promises.

But we believe that the delay is indicative of the heart of the issue: Brookfield does not have a suitable solution to the problem of these hydropower projects' permanently impairing sea-run fish restoration on the Kennebec and never will. That is because there is no feasible solution at all. These Projects and their continued operations are incompatible with the survival and recovery of Atlantic salmon and with fundamental fish passage mandates and restoration goals for the other sea-run species. The project licensees – Brookfield and its predecessors – have had since the Atlantic salmon expanded ESA listing in 2009, and even since the KHDG Agreement of 1998

[79] FERC Accession No. 20180212-5110.

[80] *Id*.

[81] *Id*.

(incorporated into the existing licenses in issue), with even a further extension of these timeframes provided by the Interim SPP periods of 2012 through December 31, 2019.[82] In all this the time, they have been unable to solve the restoration problem on the river by fish passage engineering. That they have failed to do so speaks louder than words: it is a result of the current best available information that there is no viable engineered fish passage solution that will work to solve the problem.

With this fish passage plan, Brookfield is making extraordinary claims for passage performance that are unsupported by current available data, and Brookfield omits passage performance standards for the other species, leaving them completely unaddressed. Extraordinary claims require extraordinary proof. Without extraordinary measures – such as the installation of multiple fish passage facilities at each site (as an example, as proposed by MDMR in relation to the Shawmut Project) – Brookfield's extraordinary promises about fish passage working at each project will inevitably become broken promises, and will be relegated to the experiential heap of failed passages at every other multi-dam system that has ever faced this challenge of passing Atlantic salmon and other sea-run species like American shad. This failure will occur at the expense of an endangered species, resulting in the extirpation of the species from the Kennebec River, and resulting in ESA-defined jeopardy to the survival and recovery of the species. This Commission has the independent obligation to "seek to conserve endangered species and threatened species," and "shall utilize [its] authorities in furtherance of the purposes of [the ESA]." 16 U.S.C. § 1531(c). In addition, significant and effective passage of the

[82] See FERC Accession No. 20180920-3040 (Commission Order at ¶ 3) (discussing requirements for fish passage at each Project, primarily contained in Exhibit B of the May 27, 1998 Lower Kennebec River Comprehensive Settlement Accord ("KHDG Agreement"), and incorporated into each license*); Edwards Manufacturing Co. Inc.*, 84 FERC ¶ 61, 227 (1998).

suite of other co-evolved sea-run species is vital to the conservation of Atlantic salmon, and required to minimize adverse impact to the environment. Such passage standards for other species are also a term of each Project license in issue, and a key condition of the State water quality certifications for each Project in issue under Section 401 of the Clean Water Act.

We respectfully request that the Commission deny the amendment application in issue. We request that the Commission prepare an Environmental Impact Statement under NEPA, in relation to its review of the plans in the pending amendment application (and with respect to the Shawmut relicensing, as we and the resource agencies have previously called for). In that context, the Commission may then evaluate whether continued operations of each project jeopardize the survival and recovery of Atlantic salmon. This may therefore call for the exercise of the Commission's reservation authority to reopen the licenses, to include analysis of the reasonable alternative of plans for decommissioning of the Projects.[83] All of the long, delay-engendering present proceedings on SPP and BA preparation and analysis, combined with the required NEPA

[83] Since 1991, the Commission's reservation of authority to reopen a license is incorporated in all hydropower licenses. See Article 15 of standard form L-3 of the licenses. The Commission's reservation of authority in this respect is also inherent in the license and in Commission practice and protocol. *See Phelps-Dodge Morenci, Inc.*, 94 FERC ¶ 61,202 (Feb. 23, 2001):

> Rather, when the Commission becomes aware of information to suggest that ongoing operation of a project may affect a threatened or endangered species, it is our practice to direct our staff to investigate the situation, in consultation with the licensee, the FWS (or NMFS, as appropriate), and any other interested participants, to determine what effects, if any, may be occurring, and what changes, if any, should be considered to avoid or mitigate those effects.

Id. at 6 and n.40. If, as in this case, no changes are available to "avoid or mitigate" those effects, this Commission must then seriously revisit for each Project the Federal Power Act's vision of giving "equal consideration" to the "protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), . . . and the preservation of other aspects of environmental quality." 16 U.S.C. § 797(e).

"hard and honest look" at environmental consequences (a NEPA analysis that cannot be lightly skipped by the Commission) certainly will satisfy the Commission's standards for a premise of investigation to reopen a license.[84] After SPP, BA, and NEPA analysis of this four-dam system, no further investigation is needed to conclude that engineered fish passage will not meet the present demands of fish restoration on the Kennebec River.

Respectfully submitted, this 25th day of August, 2021,

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[84] *See Hoopa Valley Tribe v. FERC*, 629 F.3d 209 (D.C. Cir. 2010) (while the Commission does not undertake reopener proceedings lightly, it may do so after first investigating what effects, if any, may be occurring and whether there is a need to require changes to address those effects).

CERTIFICATE OF SERVICE

I, Russell B. Pierce, Jr., Esq., hereby certify that on August 25, 2021 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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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

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Wendell, MA 01379
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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.

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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

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.

From: Christman, Paul <Paul.Christman@maine.gov>
Sent: Wednesday, July 28, 2021 1:17 PM
To: John Burrows <jburrows@asfmaine.org>
Cc: Wippelhauser, Gail <Gail.Wippelhauser@maine.gov>
Subject: Kennebec Habitat

John

I wanted to follow up with you regarding our conversation about Atlantic salmon habitat below the four mainstem dams on the Kennebec River between Skowhegan and Waterville.

As I mentioned to you, the mainstem of the Kennebec River downstream of Skowhegan isn't considered as having juvenile rearing habitat. Some portions of it may meet some of the physical characteristics of habitat during portions of the year however given the numerus issues like the predatory fish assemblage, lack of thermal refuge and poor water quality (Biological Valuation 2009 page 78) make this reach unlivable for vulnerable juveniles. This is why in the Biological Valuation 2009 on page 79 NOAA scientist stated "The Mainstem Kennebec has the highest biological value to the Merrymeeting Bay SHRU because it provides the central migration conduit for much of the currently occupied habitat found in the Sandy River". The high biological value for both rearing and spawning habitat is in the Sandy River above the mainstem. Essentially, it's the high biological value of the rearing and spawning habitat in the Sandy River that makes the mainstem corridor valuable. MDMR agrees with NOAA scientists regarding this conclusion.

Also, I wanted to comment on the physical habitat surveys that the Atlantic Salmon Commission conducted on the mainstem Kennebec River. This survey was conducted in anticipation of the construction of the Lockwood Fish Lift and the initiation of salmon restoration. The primary goal of the survey was to characterize the reach of river below Lockwood to head of tide for holding pool and potential sites for angling opportunities. The survey technique measured numerus physical characteristics such as depth, widths and substrate. While some of this information can be used to physically classify sections as juvenile rearing and spawning, these surveys do not take into account any qualitative information and were never intended for this purpose.

I also want to add that in the Kennebec River below the four dams there are some tributaries that are capable of rearing Atlantic salmon. Both Bond Brook and Togus Stream have been habitat surveyed and determined to have juvenile rearing habitat as well as spawning habitat. Bond Brook has 174 rearing units and 3.64 spawning units while Togus Stream has 384 rearing units and 3.24 spawning units. Unlike the mainstem Kennebec River adult salmon have spawned in both of these streams and MDMR had documented survival to the parr stage. Both streams do have habitat that can support salmon. Partial or complete surveys have been conducted on the Sebasticook, Cobbossee, Seven Mill and Messalonskee streams but we currently have no indications that they are capable of rearing juveniles. Most of these streams are very small and

have under 200 hundred units except for the Sebasticook Stream which likely has several thousand units.

If you need more information, please let me know.
Paul

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