Brookfield
Renewable

February 1, 2021

Lockwood Project (FERC No. 2574)
Hydro-Kennebec Project (FERC No. 2611)
Shawmut Project (FERC No. 2322)
Weston Project (FERC No. 2325)

Via E-Filing

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

RE: Lockwood Project (FERC No. 2574) ("Lockwood"); Hydro-Kennebec Project (FERC No. 2611) ("Hydro-Kennebec"); Shawmut Project (FERC No. 2322) ("Shawmut"); Weston Project (FERC No. 2325) ("Weston") (collectively the "Projects") Biological Assessment for Extension of Interim Species Protection Plans

Dear Secretary Bose:

Brookfield Renewable – US ("Brookfield"), on behalf of: (i) The Merimil Limited Partnership ("Merimil"), in connection with Lockwood, (ii) Hydro-Kennebec LLC ("HKLLC"), in connection with Hydro-Kennebec; and (iii) Brookfield White Pine Hydro LLC ("BWPH"), in connection with Shawmut and Weston (Weston, Merimil, HKLLC and BWPH referenced herein individually, as "Licensee" and collectively, as "Licensees"), herein provides the Biological Assessment ("BA") requested by the Federal Energy Regulatory Commission ("FERC" or the "Commission") to extend the expirations of the Projects' Interim Species Protection Plans ("ISPPs"). By letter dated December 2, 2020, FERC requested a draft BA to be filed by January 31, 2021 to enable the FERC to consult with the National Marine Fisheries Service ("NMFS") under Section 7 of the Endangered Species Act ("ESA").

In 2012 and 2013, the Licensees proactively initiated Section 7 consultation ahead of any pending federal action by filing ISPPs for Lockwood, Hydro-Kennebec, Shawmut and Weston. NMFS issued Biological Opinions (BOs) for the four Projects in 2012, 2013 and 2017, which included Incidental Take Statements (ITSs) and Reasonable and Prudent Measures (RPMs) necessary to "minimize and/or monitor incidental take and set(s) forth terms and conditions with which the action agency must comply." Specifically:

- The ISPP for Hydro-Kennebec was filed with FERC April 6, 2012. The BO for the Hydro-Kennebec Project was issued by NMFS on September 17, 2012 and subsequently extended for three additional years by NMFS on May 25, 2017. FERC issued an Order Approving the Atlantic Salmon ISPP for the Hydro-Kennebec Project on February 28, 2013 and approved a further extension of the ISPP on March 14, 2018. Among the measures included in the Hydro-Kennebec ISPP/BO was the construction of an upstream fishlift. This lift was completed in October 2017 and has been periodically operating since 2018 in consultation and coordination with the Maine Department of Marine Resources (MDMR) to capture Atlantic salmon. Hydro-Kennebec's license expires in 2036.

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- The ISPP for the Lockwood, Shawmut and Weston Projects was filed with FERC February 21, 2013. The related BO for was issued by NMFS on July 19, 2013. FERC issued an Order Amending License to require the ISPP and the Handling and Protection Plan for Shortnose and Atlantic Sturgeon for the Lockwood, Shawmut and Weston Projects on May 19, 2016. Among the measures included in the Lockwood, Shawmut and Weston ISPP/BO were:

    - A volitional flume connecting the existing Lockwood fish lift to the headpond. The 2016 and 2017 study results indicated upstream migrating adult salmon were strongly attracted to the bypass reach of the Lockwood Dam during times of spill. Discussion with the fishery resource agencies regarding these studies resulted in a change of focus to designing and constructing a fish passage facility in the Lockwood bypass reach as a means to provide volitional passage at the Project. In consultation with the agencies, the Licensee completed conceptual design, CFD modelling (in response to a request from MDMR) and circulated the 30% design drawings on July 10, 2020 and the 30% design drawing meeting was held on July 23, 2020; 60% design drawings were circulated on November 5, 2020 and the 60% design meeting held on July 23, 2020; 90% design drawings were circulated on February 3, 2021 and the 90% design meeting scheduled for February 9, 2021. Lockwood's license expires in 2036.

    - An upstream fish lift at the Shawmut Project. In consultation with the agencies, the Licensee completed CFD modelling in 2016, an upstream alosine siting study in 2016 and the conceptual, 30%, 60%, 90% and final design phases throughout 2016 to 2019. Shawmut's license expires in 2022.

    - An upstream fish lift at the Weston Project. In consultation with the agencies, the Licensee completed conceptual design, CFD modelling and circulated the 30% design drawings on June 23, 2020 and the 30% design drawing meeting was held on July 23, 2020; 60% design drawings were distributed to the agencies on October 23, 2020 and a 60% design review meeting held November 10, 2020; 90% design drawings were circulated on February 3, 2021 and the 90% design meeting scheduled for February 9, 2020. Weston's license expires in 2036.

Because the ISPP for the Projects expired on December 31, 2019, the Licensee filed a final SPP and draft Biological Assessment (BA) for Atlantic salmon with the Commission. The SPP described the measures the respective Licensee would take at each Project to avoid and minimize impacts to Atlantic salmon for the duration of the licenses (including the anticipated issuance of a new license for the Shawmut Project following its 2022 expiration), such as, operation of the previously-authorized and required upstream fish passage facilities, the implementation of downstream passage improvements at the four Projects, performance standards, monitoring studies and a Sturgeon Handling Plan.

On July 13, 2020, in response to agency comments[1], the Commission issued a letter rejecting the Licensees' request to amend the Project licenses to include the provisions of the SPP, stating that, in relevant part, "[t]he extension of time granted for the Lockwood and Weston Projects, issued concurrently with this letter, should provide you with the additional time necessary to work with NMFS, FWS, Maine DMR, and other relevant state and federal agencies

[1] Comment letters dated February 7, 2020 from NMFS; February 28, 2020 from the US Fish and Wildlife Service; and March 20, 2020 from the MDMR.

to address any outstanding issues for the Final Plan and draft BA for the Lockwood, Weston, and Hydro-Kennebec Projects. We encourage you to re-file the Final Plan once those concerns have been resolved."

To accommodate sufficient time to consult with the agencies on comments on the SPP/BA, Brookfield requested, on behalf of the Licensees, by letter dated July 29, 2020, that the 2013 ISPP for the Lockwood, Shawmut and Weston Projects and the 2017 ISPP for the Hydro-Kennebec Project be amended so that their expirations could coincide with issuance of the new license for the Shawmut Project. Subsequently, the Licensees would continue the protection measures contained in the ISPPs, including continued design and construction efforts for the Lockwood and Weston upstream fish passage facilities, until they are supplanted by the lower Kennebec final SPP, along with complying with the terms and conditions contained in the current ITSs and BOs issued by NMFS on May 25, 2017 and July 19, 2013.

FERC issued a public "Notice of Amendment Application to Extend Expiration Date of Interim Species Protection Plans and Soliciting Comments, Motions to Intervene and Protests" on August 5, 2020. NMFS filed its comments on September 4, 2020, noting that with the expiration of the ISPPs on December 31, 2019, there is currently no valid ESA consultation in place and that, should the Commission approve the requested extension of the ISPPs without engaging in consultation pursuant to section 7 of the ESA, the projects would continue to operate without having the effects considered in a BO and there would, therefore, be no incidental take coverage in place. The Kennebec Coalition (consisting of the Atlantic Salmon Federation (including the Maine Council of the Atlantic Salmon Federation), Maine Rivers, the Natural Resources Council of Maine, and Trout Unlimited by its Kennebec Valley Chapter), also filed comments on September 4, 2020, opposing the extension request. Brookfield's response to the Kennebec Coalition's comments were filed with the FERC on September 21, 2020.

By letter dated December 2, 2020, FERC requested a BA to "*include, but not be limited to, the following: (1) changes to the status of the species and the environmental baseline, including information obtained from your survival and passage effectiveness studies; (2) a detailed description of the proposed action that includes updates to the components of the Interim Plans that have not been completed as of December 31, 2019 (e.g., plans for construction of upstream fishways, measures being implemented to increase downstream smolt survival, survival studies of salmon kelts at the four projects, etc.); and (3) an assessment of the effects of the full scope of the proposed action (i.e. consider all effects to listed species and critical habitat of the continued operation of the projects including required construction, monitoring, etc. over the complete time period contemplated)*" (the "December 2020 Letter"). The December 2020 Letter also clarified that any final SPP for the Lockwood, Weston and Hydro-Kennebec Projects is required to be filed no later than May 31, 2022.

In letters dated December 18, 2020 and January 15, 2021, NMFS and the Kennebec Coalition respectively, suggest that Brookfield and FERC should prepare a BA that considers effects of the action that may occur through 2036, when the Lockwood, Hydro-Kennebec and Weston licenses expire. Both NMFS and the Kennebec Coalition misconstrue the scope of the currently proposed action that is subject to ESA Section 7 consultation. As NMFS has recognized, the ISPPs for the four projects expired on December 31, 2019, and NMFS has stated that the corresponding ESA biological opinion and incidental take statement also expired on that date. However, as emphasized in FERC's recent January 25, 2021 letter to NMFS, "Brookfield remains obligated to complete the actions required under those plans" (i.e. the ISPPs which, together with various FERC authorizations regarding schedule, require Brookfield to install and operate upstream fish passage facilities at the Lockwood and Weston Projects by no later than

May 31, 2022. Accordingly, Brookfield has requested an extension of the ISPPs and ESA consultation to cover the limited extension of the duration of this existing action.

Furthermore, as NMFS and Kennebec Coalition are aware, the existing licenses for the Lockwood, Hydro-Kennebec, and Weston Projects authorize operations through 2036. The issuance of these licenses constituted a final federal agency action, and FERC has not retained discretionary involvement or control for purposes of conducting ESA Section 7 consultation on ongoing license activities. As Brookfield has made clear, it will prepare a Final SPP for these Projects by May 31, 2022, as directed by FERC, and will address the requisite measures for the Shawmut Project during the pending relicensing proceeding. Approval of the Final SPP and the Shawmut relicensing involve separate federal agency action that will appropriately be subject to a subsequent ESA Section 7 consultation that will consider the effects of Project operations for the remainder of the license terms. This approach is consistent with NMFS's prior practice in evaluating and consulting on the effects of the ISPP actions.

Brookfield objects to the Kennebec Coalition's erroneous assertion that "Brookfield has dodged and weaved by way of various procedural maneuvers in an effort to avoid this 'comprehensive approach' to a basinwide assessment of the effect of the operation of the four dams." Contrary to the Kennebec Coalition's accusations, Brookfield has not disregarded information regarding dam removal and has not ignored agency comments regarding dam removal during previous consultations. To the contrary, Brookfield has complied with the obligations in its FERC licenses for the four projects and developed the Final SPP in a good faith effort to provide fish passage for the duration of the license terms. Further, fish passage measures are wholly consistent with the 1998 Kennebec Hydro Developers Group Agreement, of which members of the Kennebec Coalition are signatories. Brookfield is not attempting to shirk or avoid its statutory obligations, but is properly proceeding through the appropriate consultation processes necessary to address the sequence of requisite federal actions for these Projects.

While Brookfield understands NMFS's concerns about efficient use of federal resources, the ESA does not exempt federal agency actions from Section 7 consultation to promote administrative efficiency or to reduce administrative burdens. The extension of the ISPPs is a federal action for purposes of initiating consultation, and the extension is necessary in order to authorize and maintain the activities contemplated in the ISPPs and corresponding license provisions. Brookfield is committed to preparing a Final SPP by May 31, 2022, and will engage in a robust and comprehensive consultation of the effects associated with that action at the appropriate time.

Please find the requested BA for the extension of the ISPPs for the Lockwood, Weston and Hydro-Kennebec Projects. Please contact me at 207-233-1995 or by email at Kelly.Maloney@brookfieldrenewable.com if you have any questions or comments.

Sincerely,

Kelly Maloney

Kelly Maloney
Manager, Compliance - Northeast

cc: M. Buyoff, J. Crocker; NMFS
K. Maloney, J. Seyfried, N. Stevens, S. Michaud, J. Rancourt, R. Dorman; Brookfield

INTERIM SPECIES PROTECTION PLAN EXTENSIONS

BIOLOGICAL ASSESSMENT FOR ATLANTIC SALMON, ATLANTIC STURGEON AND SHORTNOSE STURGEON

FOR THE
LOCKWOOD, HYDRO-KENNEBEC, SHAWMUT, AND WESTON PROJECTS ON THE KENNEBEC RIVER, MAINE

Prepared for:

Brookfield White Pine Hydro LLC

Merimil Limited Partnership

and

Hydro-Kennebec LLC

Prepared by:

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February 2021

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INTERIM SPECIEDRAFT BIOLOGICAL ASSESSMENT
FOR ATLANTIC SALMON, ATLANTIC STURGEON AND SHORTNOSE STURGEON
LOCKWOOD, HYDRO-KENNEBEC, SHAWMUT, AND WESTON PROJECTS

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1.0 BACKGROUND

1.1 OVERVIEW

Brookfield Renewable Partners LLC (Brookfield) indirectly owns and operates four hydroelectric projects (collectively, the "Projects") located on the Kennebec River in Maine. All four of the hydroelectric Projects are licensed by the Federal Energy Regulatory Commission (FERC): the Lockwood Project is licensed to the Merimil Limited Partnership; the Hydro-Kennebec Project is licensed to Hydro-Kennebec LLC; and the Shawmut and Weston projects are licensed to Brookfield White Pine Hydro LLC (BWPH), herein individually, or collectively, the "Licensee". The expiration years for the current FERC licenses for the Projects are Shawmut (2022)[1], Weston (2036), Hydro-Kennebec (2036), and Lockwood (2036).

Each of the Projects occur within the range of the endangered Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon (*Salmo salar*), and all four are located entirely within designated critical habitat for salmon. The continued operation of these Projects may have effects on the GOM DPS of Atlantic salmon and its designated critical habitat. In addition, the Lockwood Project tailwater area is within the designated critical habitat for the listed Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and within the known range of shortnose sturgeon (*Acipenser brevirostrum*).

Because the Projects are located within designated critical habitat of these species and these species do or could occur within the respective Project areas, FERC is required to engage in endangered species consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS, collectively the "Services") pursuant to Section 7 of the Endangered Species Act (ESA) when a FERC federal action is pending. Section 7 of the ESA mandates that federal agencies consult with the Secretaries of Interior (through USFWS) and Commerce (through NMFS) to determine whether a proposed action is likely to jeopardize listed species and/or adversely affect designated critical habitat for such species.

In 2012 and 2013, the Licensees proactively initiated Section 7 consultation ahead of any pending federal action (such as an amendment of license(s) or relicensing), by filing Interim Species Protection Plans (ISPP) for the Lockwood, Hydro-Kennebec, Shawmut and Weston

[1] By Order dated December 11, 2018, FERC extended the term of the existing license for the Shawmut Project by one year to January 31, 2022 (165 FERC ¶ 62,152).

Projects and requesting that FERC incorporate the terms of the ISPPs into the existing FERC licenses for each Project.[2] Subsequently, the National Marine Fisheries Service (NMFS) issued Biological Opinions (BOs) for the four Projects in 2012, 2013 and 2017, which included Incidental Take Statements (ITSs) and Reasonable and Prudent Measures (RPMs) necessary to "minimize and/or monitor incidental take and set(s) forth terms and conditions with which the action agency must comply".

The ISPP for the Hydro-Kennebec Project was filed with FERC April 6, 2012 and the Hydro-Kennebec Project Biological Opinion (BO) was issued by NMFS on September 17, 2012. A three-year extension for the Hydro-Kennebec Project BO was issued by NMFS on May 25, 2017. FERC issued an Order approving the Atlantic Salmon ISPP for the Hydro-Kennebec Project on February 28, 2013 and approving an extension of the ISPP on March 14, 2018.

The ISPP for the Lockwood, Shawmut and Weston Projects was filed with FERC February 21, 2013. The BO for the Lockwood, Shawmut and Weston Projects was issued by NMFS on July 19, 2013. FERC issued an Order Amending License to require the ISPP and the Handling and Protection Plan for Shortnose and Atlantic Sturgeon for the Lockwood, Shawmut, and Weston Projects on May 19, 2016.

The ISPPs and BOs included significant provisions and measures for the protection of habitat and provision of passage for Atlantic salmon as well as other diadromous fish species. Among the measures included in the Hydro-Kennebec ISPP/BO was the construction of an upstream fish lift. This lift was completed in 2017 and has since been operated in consultation and coordination with the Maine Department of Marine Resources (MDMR), and the other fisheries agencies.[3] Among the measures included in the Lockwood, Shawmut and Weston ISPP/BO were the addition of volitional passage at Lockwood,[4] an upstream fish lift at Shawmut, and an upstream fish lift at Weston. The ISPPs also included fishway monitoring, and various studies to evaluate the effectiveness of upstream and downstream fish passage facilities. In addition, an adaptive management plan ensured that take limits prescribed in the respective BOs would not be exceeded.

Because the ISPPs for the Projects were set to expire on December 31, 2019, two years in advance of the expiration date, the Licensees initiated consultation with the fisheries agencies on a final Species Protection Plan (SPP). The Licensees filed a final SPP and draft Biological

[2] The development of a Species Protection Plan (SPP) to protect, mitigate, or enhance species listed under the ESA, and to provide take coverage for such species, or the development of an ISPP to provide take coverage while consulting with the NMFS or USFWS, have no basis in ESA statute or regulation. Rather, these documents are negotiated to create PME measures that would otherwise be developed through consultation between the federal action agency the federal resource agency(ies). Filing the document voluntarily with the action agency triggers ESA consultation in the absence of a federal nexus such as a FERC license proceeding.

[3] The fisheries agencies referred to herein include the NMFS, USFWS, the MDMR, and the Maine Department of Inland Fisheries and Wildlife (MDIFW).

[4] Presumed in the ISPP to be a flume volitionally connecting the existing Lockwood fish lift to the headpond.

Assessment (BA) for Atlantic salmon with FERC on December 31, 2019. The SPP described the measures the Licensees would undertake at the four Projects to avoid and minimize impacts to Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon for the duration of the FERC licenses, including the new license for the Shawmut Project anticipated to be issued in 2022. The measures contained in the SPP included operation of the previously-authorized upstream fish passage facilities (required under the ISPPs), the implementation of downstream passage improvements at the four Projects, fishway effectiveness performance standards, monitoring studies, and a Sturgeon Handling Plan (for Lockwood).

Also on December 31, 2019, BWPH filed its design plans for the construction of an upstream fish lift facility at the Shawmut Project, in conformance with the provisions of the ISPP and existing FERC license, as amended by Order issued May 19, 2016.[5] In accordance with the ISPP and current FERC license, the Shawmut upstream fishway was scheduled to be constructed in 2020 and operational in 2021.[6]

On January 31, 2020, BWPH, filed with FERC a Final License Application (FLA) for the Shawmut Project.[7] On March 2, 2020 FERC issued an Additional Information Request (AIR) to BWPH. On June 1, 2020 BWPH filed the requested information. On July 1, 2020, FERC issued its Notice of Application Accepted for Filing, Soliciting Motions to Intervene and Protests, Ready for Environmental Analysis, and Soliciting Comments, Recommendations, Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions (REA Notice).

By letter dated February 7, 2020, NMFS expressed concern that the Final SPP lacked sufficient analysis to adequately proceed with formal consultation and failed to address concerns NMFS raised during the informal consultation process. On February 28, 2020 and March 20, 2020, USFWS and MDMR, respectively, notified FERC of their support for the comments provided in the NMFS February 7, 2020 letter.

On July 13, 2020, FERC issued an Order denying the extension of time to construct upstream fish passage at the Shawmut Project and keeping in place certain provisions of the ISPP, including annual reporting with updates on the status of the preparation of any Final Species Protection Plan.[8] Also on July 13, 2020, FERC issued a letter to BWPH informing the Licensees that construction of a new upstream fishway at the Shawmut Project would be considered as part

[5] Order Amending Licenses to Require Interim Species Protection Plan For Atlantic Salmon, and Handling and Protection Plan for Shortnose and Atlantic Sturgeon May 19, 2016 , 155 FERC ¶ 61,185 (2016).

[6] Id.

[7] Application for License of Brookfield White Pine Hydro LLC under P-2322 (January 21, 2020).

[8] FERC Order on Request for Extensions of Time to Install Fish Passage (Issued July 13, 2020). FERC order denying the extension of time to construct upstream fish passage at the Shawmut Project, though approving the extensions of time to construct upstream fish passage at the Lockwood and Weston Projects.

of the ongoing relicensing proceeding.[9] FERC also stated that it did not intend to act on the Licensees' request to amend the current Shawmut license to incorporate the final SPP, review the final upstream fish passage design drawings[10] that were submitted, or act on any request to commence fishway construction at Shawmut under the ISPP, pursuant to FERC's Order dated May 19, 2016.

In a separate letter, on July 13, 2020, in response to agency comments,[11] FERC issued a letter rejecting the Licensees' request to amend the Project licenses to include the provisions of the SPP. Therein FERC stated "In light of these agencies' comments, Commission staff is unable to accept the Final Plan [SPP] and draft BA. The extension of time granted for the Lockwood and Weston Projects, issued concurrently with this letter, should provide you with the additional time necessary to work with NMFS, FWS, Maine DMR, and other relevant state and federal agencies to address any outstanding issues for the Final Plan and draft BA for the Lockwood, Weston, and Hydro-Kennebec Projects. We encourage you to re-file the Final Plan once those concerns have been resolved." By letter dated December 2, 2020, FERC clarified that "although no deadline was set in the July 13, 2020 letter rejecting the Final Plan, Commission staff has set a deadline of May 31, 2022, for the filing of a Final Plan for the Lockwood, Weston, and Hydro-Kennebec Projects."

On July 29, 2020, the Licensees filed comments with FERC regarding their determinations for both the Shawmut fish lift construction plans, and its rejection of the final SPP. In that letter, the Licensees requested that FERC extend the terms of the ISPPs until such time that the ISPPs were supplanted by a final SPP to allow time to develop a revised Final SPP in consultation with the agencies as well as comply with the requirements for the construction of the Lockwood and Weston upstream fish passage facilities; measures from the ISPP that had been incorporated into the respective Project licenses but which had not yet been completed upon expiration of the ISPP/BO on December 31, 2019.

In a letter to FERC filed in September 2020, NMFS noted that coincident with the expiration of the ISPPs on December 31, 2019, the underlying consultation for the proposed action lapsed, along with the associated authorization for the incidental take of listed species under Section 10(a)(1)(b) of the ESA. NMFS further indicated that FERC's extension of the ISPPs would

[9] FERC Letter to Brookfield White Pine Hydro, LLC discussing the proposed Lower Kennebec Species Protection Plan for Atlantic Salmon, etc. and the related draft Biological Assessment for four hydroelectric projects including the Shawmut Project under P-2322, July 13, 2020.

[10] Brookfield White Pine Hydro LLC Brookfield White Pine Hydro, LLC submits the final design drawings operation and maintenance plan and consultation records for the Shawmut Upstream Fish Passage Facility re the Shawmut Hydro Project under P-2322, December 31, 2019. The final upstream fish passage design drawings were completed with full agency consultation at all phases of design.

[11] Comment letters dated February 7, 2020 from NMFS; February 28, 2020 from the US Fish and Wildlife Service; and March 20, 2020 from the MDMR.

require consultation under Section 7 of the ESA, and to proceed without having the effects of extending the ISPPs considered in a BO, would leave no incidental take coverage in place.

In a letter dated December 2, 2020, FERC indicated that they would consider the request for an extension of the ISPPs to provide the Licensees with incidental take coverage but ordered the Licensees to file a BA within 60 days (on or before February 2, 2021) in support of the request to extend the ISPPs. In response to this letter request, the Licensees prepared the following BA that evaluates the effects of extending the terms of the ISPPs for the Weston, Shawmut, Hydro-Kennebec, and Lockwood Project until May 31, 2022, including the construction of the previously approved new fishways at Lockwood and Weston.

Consistent with its designation as FERC's non-federal representative for ESA consultation for the development of the SPP, the Licensee has developed this BA for the federally endangered GOM DPS of Atlantic salmon and shortnose sturgeon, along with the federally threatened GOM DPS of Atlantic sturgeon. Because the effects of the ISPPs that are being proposed for extension until May 2022 were fully assessed in the 2012, 2013, and 2017 BOs issued by NMFS, this BA focuses on any changes to ISPP provisions or related fish passage facilities, operations and monitoring data that have been modified or updated since that time, and examines the effects of those carried forward through the extension period on the listed species.

1.2 PURPOSE AND DESCRIPTION OF DRAFT BIOLOGICAL ASSESSMENT

Section 9 of the ESA prohibits the take of endangered species unless the take is authorized under specific provisions of the ESA. "Take" is defined by the ESA as "to harass, harm, pursue, ban, shoot, wound, kill, trap, capture, or collect," these species, or to attempt to engage in any such conduct. Exemptions to the prohibitions of take under Section 9 of the ESA can be provided by the Services through Section 10 or Section 7 of the ESA. Under ESA Section 10(a)(1)(B), permits may be issued for taking that is incidental to the purposes of an otherwise lawful activity (incidental take permits). Under ESA Section 7(a)(2), ITS may be issued to exempt the Licensee or Project owner from the prohibitions of any take anticipated as an incidental result of an activity conducted, permitted, or funded by a federal agency, provided this take would not be likely to result in jeopardy to the species or destruction of its critical habitat.

Section 7 of the ESA mandates that all federal agencies consult with the Secretaries of Commerce and Interior to determine whether a proposed action is likely to be categorized with respect to listed species and designated critical habitat, as follows:

- No Effect: No effects to the species and its critical habitat from the proposed action, either positive or negative, are expected.
- May Affect, Not Likely to Adversely Affect: All effects of the proposed action to the species and its critical habitat are beneficial, insignificant, or discountable. Beneficial effects have positive effects to the species or its critical habitat. Insignificant effects relate to the size of the impact and should not reach the scale where incidental or unintentional

take (harming or killing) occurs. Discountable effects are those that are extremely unlikely to occur. Determinations of "not likely to adversely affect" due to beneficial, insignificant, or discountable effects require written concurrence from the USFWS or NMFS.

- May Affect, Likely to Adversely Affect: The action would have an adverse effect on the species or its critical habitat. Any action that would result in take of an endangered species is considered an adverse effect. A combination of beneficial and adverse effects is still considered "likely to adversely affect" even if the net effect is neutral or positive. Adverse effects are not considered discountable because they are expected to occur. This determination requires formal consultation with the USFWS or NMFS.

The purpose of this draft BA is to evaluate the potential effects of the action of extending the terms of the ISPPs for each of the four Projects until May 31, 2022 on the listed species and designated critical habitat, including the effects of the measures to be completed or undertaken before May 31, 2022 (i.e. the construction of upstream fish passage facilities and the operation of the existing downstream passage facilities) and to determine whether the listed species or critical habitats are likely to be adversely affected by the action.

1.3 EXISTING AUTHORIZED ACTIVITIES UNDER PREVIOUSLY APPROVED INTERIM SPECIES PROTECTION PLANS (ISPP)

In 2012 and 2013, the Project licensees proactively initiated Section 7 consultation ahead of any federal action, such as an amendment of license(s) or relicensing a project(s), by filing Interim Species Protection Plans (ISPP) for the Lockwood, Hydro-Kennebec, Shawmut and Weston Projects.[12] NMFS issued Biological Opinions (BO's) for the four Projects in 2012, 2013 and 2017, which included ITSs and Reasonable and Prudent Measures necessary to "minimize and/or monitor incidental take and set(s) forth terms and conditions with which the action agency must comply".[13] The term of the ITSs for the Projects ran concurrently with the terms of the ISPPs which expired in December 2019. The Licensees have requested, and FERC is now considering, extending the terms of the ISPPs through May 31, 2022; which is also the deadline FERC has established for the Licensees to file a final SPP. Under Section 7 of the ESA, to complete this action, requires that NMFS issue a BO and new ITSs for the Projects.

Several fish passage measures that are currently in the process of final implementation were previously authorized under the ISPPs, BOs, and FERC license amendments for the Lockwood,

[12]The ISPP for the Hydro-Kennebec Project was filed with FERC April 6, 2012. FERC issued an Order Approving the Atlantic Salmon ISPP for the Hydro-Kennebec Project on February 28, 2013, and approved an extension of the ISPP on March 14, 2018. The ISPP for the Lockwood, Shawmut and Weston Projects was filed with FERC February 21, 2013. FERC issued an Order Amending License[s] to approve the ISPP and the Handling and Protection Plan for Shortnose and Atlantic Sturgeon for the Lockwood, Shawmut and Weston Projects on May 19, 2016.

[13] The Biological Opinion for the Hydro-Kennebec Project was issued by NMFS on September 17, 2012; a three-year extension of the Biological Opinion for the Hydro-Kennebec Project was issued by NMFS on May 25, 2017. The Biological Opinion for the Lockwood, Shawmut and Weston Projects was issued by NMFS on July 19, 2013.

Hydro-Kennebec, Shawmut, and Weston Projects. Specifically, upstream passage measures for the four Projects were authorized and the Hydro-Kennebec facility has been constructed. Similarly, several downstream measures were implemented under the adaptive management provisions of the ISPP and are now operational. Table 1-1 provides a summary of the measures that were previously approved under the ISPPs and that are ongoing and/or in the process of final implementation. Measures previously approved under the ISPPs for each of the four Projects are outlined in more detail in the Project Descriptions in Section 2.0. As noted previously, the Shawmut upstream fish lift design was rejected by FERC, and is now being considered separately under the ongoing relicensing proceeding.[14]

TABLE 1-1 OVERVIEW OF PREVIOUSLY APPROVED ISPP MEASURES AND STATUS UPDATE

PROJECT	UPSTREAM PASSAGE MEASURES	DOWNSTREAM PASSAGE MEASURES	MONITORING MEASURES AND MANAGEMENT
Lockwood	Structural – Design, install, and operate permanent volitional passage in the Lockwood bypass reach by May 2022[15]. *(Specific type and design of facility to be determined with the fishery agencies)* – 90% design complete Operational – Operate the main channel fish lift in cooperation with MDMR, and in coordination with the other fishery agencies - Ongoing Investigate upstream passage improvement opportunities - Complete	Operational – Operate the existing downstream fish passage facility and maintain the forebay fish guidance boom - Ongoing Implement adaptive management measures as necessary to comply with take limits	Implement Sturgeon Handling Plan - Ongoing Prepare annual fishway monitoring reports and hold annual meeting with fishery agencies - Ongoing Conduct up to three years of upstream adult Atlantic salmon passage effectiveness monitoring - Complete Conduct up to three years of downstream Atlantic salmon smolt passage effectiveness monitoring - Complete

[14] July 13, 2020 letter from Commission rejecting fishway plans.

[15] 2012 ISPP and 2013 BO previously anticipated "new upstream volitional fish passage component for the existing Lockwood fishway". However, Brookfield, in consultation with the agencies shifted from the final design of a volitional flume connected to the existing lift in favor of an entirely new and separate fish passage facility in the bypass reach predicated on the results of the upstream Atlantic salmon and shad passage studies and requisite agency consultation efforts. NMFS's January 27, 2017 letter commenting on the 2016 upstream Atlantic salmon passage study at the Lockwood Project states, "Unless Brookfield can demonstrate a practical way to preclude anadromous fish from the bypass reach of river, significant structural enhancements may be required in the bypass

PROJECT	UPSTREAM PASSAGE MEASURES	DOWNSTREAM PASSAGE MEASURES	MONITORING MEASURES AND MANAGEMENT
Hydro-Kennebec	Structural – Design, install, and operate upstream fish lift by May 2016 - Complete	Operational – Operate the existing downstream fish passage facility and maintain the forebay fish guidance boom - Ongoing Implement adaptive management measures as necessary to comply with take limits	Prepare annual fishway monitoring reports and hold annual meeting with fishery agencies - Ongoing. Conduct up to three years of downstream Atlantic salmon smolt passage effectiveness monitoring - Complete
Shawmut	Structural – Design, install, and operate upstream fish lift by May 2021[16] - Final design complete	Operational – Operate the existing downstream fish passage facility - Ongoing Implement adaptive management measures as necessary to comply with take limits	Continue to prepare annual fishway monitoring reports and hold annual meeting with fishery agencies - Ongoing Conduct up to three years of downstream Atlantic salmon smolt passage effectiveness monitoring - Complete
Weston	Structural – Design, install, and operate upstream fish lift by May 2022 – 90% design complete	Operational – Operate the existing downstream fish passage facility and maintain the forebay fish guidance boom - Ongoing Implement adaptive management measures as necessary to comply with take limits	Prepare annual fishway monitoring reports and hold annual meeting with fishery agencies - Ongoing Conduct up to three years of downstream Atlantic salmon smolt passage effectiveness monitoring - Complete

reach to ensure safe, timely, and effective passage of anadromous fish, including endangered Atlantic salmon." Brookfield filed a notification to the FERC on August 9, 2017 to change the approach to providing the required volitional fish passage at the Lockwood Project to a bypass reach volitional fishway.

[16] The 2012 ISPP and 2016 BO required the design, installation, and operation of an upstream fish lift at the Shawmut Project by May 2021. Because the Shawmut fish lift is being considered as part of the Project relicensing, the design and construction of the lift and the operation of the new upstream fish lift in accordance with agency approved operational plan will be components of the Final SPP to be filed not later than May 31, 2022.

1.4 PROPOSED ACTION – INTERIM SPECIES PROTECTION PLAN (ISPP) EXTENSION

Because the ISPPs for the four projects expired December 31, 2019, and because FERC rejected the final SPP for the Projects and returned it to the Licensees for further consultation with the agencies, in their July 29, 2020 letter, the Licensees requested that the Commission extend the terms of the ISPPs until such time that the ISPPs were supplanted by the final SPP. In their letter of December 2, 2020, FERC determined that an appropriate deadline for the expiration of the ISPPs is May 31, 2022; noting that this expiration date would coincide with the extended deadline to complete the design and construction of upstream fish passage at Lockwood and Weston, as set forth in FERC's Order of July 13, 2020.

Accordingly, the proposed action is to extend the terms of the ISPPs for the Weston, Shawmut, Hydro-Kennebec, and Lockwood Projects through May 31, 2022. During this extension period the Licensee would continue to comply with the terms and conditions of the ISPPs and the 2012, 2013 and 2017 BOs until and unless supplanted by a new BO for the ISPP extension.

By extending the ISPP terms and continuing to comply with terms of the respective BOs, Atlantic salmon will be protected through a combination of enhanced upstream and downstream passage, avoiding and minimizing delay, injury, and protection of critical migration habitat in the Project areas. Extending the ISPP terms will also afford protections for listed shortnose sturgeon and Atlantic sturgeon at the Lockwood Project.

A summary of the ongoing and proposed measures that will be carried out by the Licensees for the protection of Atlantic salmon through the extension of the ISPPs are outlined in Table 1-2. These measures are discussed in more detail in Section 5.0 and Section 6.0. Measures to be undertaken to protect shortnose and Atlantic sturgeon are set forth in the Lockwood Sturgeon Handling Plan and are summarized in Section 5.2.

TABLE 1-2 OVERVIEW OF PROPOSED ISPP EXTENSION MEASURES

PROJECT	UPSTREAM PASSAGE MEASURES	DOWNSTREAM PASSAGE MEASURES	MONITORING MEASURES AND MANAGEMENT
Lockwood	Continue to operate the main channel fish lift in cooperation with MDMR, in coordination with the other fisheries agencies. As an additional "upstream passage improvement" measure, the vee-gate opening setting is adjusted annually during the fish passage season to improve passage for shad and herring. As an additional "upstream passage improvement" measure, during the fishway operation season unit operation is prioritized (first-on, last-off) from Unit No. 7 (closest to fishway) through No.1 to enhance fishway entrance attraction. Complete construction of the Lockwood bypass volitional upstream fishway by May 2022, as approved under the ISPP extended schedule.	Continue to operate and maintain the existing downstream fish passage facility (surface sluice gate) and associated forebay fish guidance boom April 1 to December 31. Continue to open the deep gate next to Unit No. 1 at night for the period September 15 to October 31 for downstream eel passage. Continue to provide additional downstream passage for salmon by opening small surface weir located between Units 6 and 7, April 1 to December 31, as conditions allow. As an additional "adaptive management" measure, provide additional passage for anadromous species by providing three submerged orifices cut into the flashboards along the spillway, as conditions allow.	Continue to implement the site- specific fish passage operational plan and Sturgeon Handling Plan. Continue to prepare annual fishway monitoring reports and hold annual meeting with fishery agencies.

PROJECT	UPSTREAM PASSAGE MEASURES	DOWNSTREAM PASSAGE MEASURES	MONITORING MEASURES AND MANAGEMENT
Hydro-Kennebec	Continue to operate the existing upstream fish lift in consultation with fisheries agencies and approved operational plan.	Continue to operate the existing downstream fish passage facility (surface sluice) and maintain the forebay fish guidance boom April 1 to December 1.	Continue to implement the site-specific fish passage operational plan. Continue to prepare annual fishway monitoring reports and hold annual meeting with fishery agencies.
Shawmut	Continue to utilize trap and truck operations from Lockwood to provide upstream passage for all anadromous species at Shawmut. Trap and truck operations at Lockwood will be carried out in coordination with MDMR and the other fisheries agencies.	Continue to provide downstream fish passage through the surface sluice and Tainter gate April 1 through June 15 and November 1 to December 31 for Atlantic salmon and other anadromous species. As an additional "adaptive management" measure, continue to lower 4 sections of hinge boards adjacent to the canal headworks for the Atlantic salmon smolt migration season to provide approximately 560 cfs of spill flow. Continue to operate the deep gate for 8 hours a night for 6 weeks starting September 15, in conjunction with nighttime shutdown of Units 7 and 8 for American eel passage.	Continue to implement the site- specific fish passage operational plan. Continue to prepare annual fishway monitoring reports and hold annual meeting with fishery agencies.

PROJECT	UPSTREAM PASSAGE MEASURES	DOWNSTREAM PASSAGE MEASURES	MONITORING MEASURES AND MANAGEMENT
Weston	Continue to utilize trap and truck operations from Lockwood to provide upstream passage for all anadromous species at Weston. Trap and truck operations at Lockwood will be carried out in coordination with MDMR and the other fisheries agencies. Complete construction of the Weston upstream fishway by May 2022, as approved under the ISPP extended schedule.	Continue to operate and maintain the existing downstream fish passage facility (surface sluice gate) and associated forebay fish guidance boom April 1 to December 31. Continue to operate the existing downstream fish passage facility (surface sluice) and maintain the forebay fish guidance boom April 1 through June 15 and November 1 to December 31 for Atlantic salmon. Continue to open the sluice gate at 6% of unit flow September 15 to October 31 for downstream eel passage.	Continue to implement the site- specific fish passage operational plan. Continue to prepare annual fishway monitoring reports and hold annual meeting with fishery agencies.

1.5 ESA LISTING OF ATLANTIC SALMON

The GOM DPS of Atlantic salmon was first listed as endangered by the Services on November 17, 2000 (USFWS and NMFS 2000). The GOM DPS designation in 2000 included all naturally reproducing Atlantic salmon populations occurring in an area from the Kennebec River downstream of the former Edwards Dam site extending north to the international border between Canada and the United States at the mouth of the St. Croix River. The November 2000 final rule listing the GOM DPS did not include fish that inhabit the mainstem and tributaries of the Penobscot River above the site of the former Bangor Dam, the Kennebec River above the site of the former Edwards Dam, or the Androscoggin River (USFWS and NMFS 2000).

The 2006 Status Review for anadromous Atlantic salmon in the U.S. (Fay et al. 2006) assessed genetic and life history information and concluded that the GOM DPS, as defined in 2000,

should be redefined to encompass the Penobscot, Kennebec, and Androscoggin rivers. On June 19, 2009, the Services published a final rule determining that naturally spawned and conservation hatchery populations of anadromous Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, including those that were already listed in November 2000, constitute a distinct population segment (DPS) and hence a "species" for listing as endangered under the ESA (USFWS and NMFS 2009). This range includes the lower portions of the Kennebec River.

The GOM DPS of Atlantic salmon is divided into three salmon habitat recovery units (SHRUs) within the range of the GOM DPS and includes the following: the Downeast Coastal SHRU, the Penobscot Bay SHRU, and the Merrymeeting Bay SHRU. The three SHRUs were created to ensure that Atlantic salmon were widely distributed across the DPS such that recovery of the GOM DPS of Atlantic salmon is not limited to one river or one geographic location, because widely distributed species are less likely to become threatened or endangered by limited genetic variability and tend to be more stable over space and time (NMFS 2009a).

The Merrymeeting Bay SHRU contains historically accessible spawning and rearing habitat for Atlantic salmon. Most of the habitat within the Merrymeeting Bay SHRU is in the Kennebec River basin. A variety of issues and conditions, including dams, affect Atlantic salmon recovery in the Kennebec River, also including agriculture, forestry, changing land use, hatcheries and stocking, roads and road crossings, mining, dredging, aquaculture, and introductions of non-native species such as smallmouth bass (NMFS 2009a).

1.5.1 CRITICAL HABITAT DESIGNATION

As a result of the June 19, 2009, endangered species listing, NMFS was required to evaluate historical occupancy of the watershed for the process of designating critical habitat for the GOM DPS. Section 3 of the ESA defines critical habitat as the following:

1. Specific areas within the geographical area occupied by the species at the time of listing, in which are found those physical or biological features that are essential to the conservation of the listed species and that may require special management considerations or protection; and
2. Specific areas outside the geographical area occupied by the species at the time of listing that are essential for the conservation of a listed species.

As part of the critical habitat designation, NMFS described the known primary constituent elements (PCEs) that are deemed essential to the conservation of the GOM DPS, including (1) sites for spawning and rearing and (2) sites for migration (excluding marine migration). The physical and biological features of the two PCEs for Atlantic salmon critical habitat are as follows:

Physical and Biological Features of the Spawning and Rearing PCE:

A1. Deep, oxygenated pools and cover (e.g., boulders, woody debris, vegetation, etc.), near freshwater spawning sites, necessary to support adult migrants during the summer while they await spawning in the fall.

A2. Freshwater spawning sites that contain clean, permeable gravel and cobble substrate with oxygenated water and cool water temperatures to support spawning activity, egg incubation, and larval development.

A3. Freshwater spawning and rearing sites with clean, permeable gravel and cobble substrate with oxygenated water and cool water temperatures to support emergence, territorial development and feeding activities of Atlantic salmon fry.

A4. Freshwater rearing sites with space to accommodate growth and survival of Atlantic salmon parr.

A5. Freshwater rearing sites with a combination of river, stream, and lake habitats that accommodate parr's ability to occupy many niches and maximize parr production.

A6. Freshwater rearing sites with cool, oxygenated water to support growth and survival of Atlantic salmon parr.

A7. Freshwater rearing sites with diverse food resources to support growth and survival of Atlantic salmon parr.

Physical and Biological Features of the Migration PCE:

B1. Freshwater and estuary migratory sites free from physical and biological barriers that delay or prevent access of adult salmon seeking spawning grounds needed to support recovered populations.

B2. Freshwater and estuary migration sites with pool, lake, and instream habitat that provide cool, oxygenated water and cover items (e.g., boulders, woody debris, and vegetation) to serve as temporary holding and resting areas during upstream migration of adult salmon.

B3. Freshwater and estuary migration sites with abundant, diverse native fish communities to serve as a protective buffer against predation.

B4. Freshwater and estuary migration sites free from physical and biological barriers that delay or prevent emigration of smolts to the marine environment.

B5. Freshwater and estuary migration sites with sufficiently cool water temperatures and water flows that coincide with diurnal cues to stimulate smolt migration.

B6. Freshwater migration sites with water chemistry needed to support sea water adaptation of smolts.

On June 19, 2009, NMFS designated as critical habitat 45 specific areas occupied by GOM DPS Atlantic salmon at the time of listing. Critical habitat includes the stream channels within the designated stream reaches, and includes a lateral extent as defined by the ordinary high-water line (33 C.F.R. 329.11). Critical habitat in estuaries is defined by the perimeter of the water body as displayed on standard 1:24,000 scale topographic maps or the elevation of extreme high water, whichever is greater. Critical habitat is designated to include all perennial rivers, streams, and

estuaries and lakes connected to the marine environment within the range of the GOM DPS of Atlantic salmon, except for those particular areas within the range which are specifically excluded (NMFS 2009b).

The Lockwood, Hydro-Kennebec, Shawmut, and Weston projects all lie within the designated critical habitat of the Merrymeeting Bay SHRU for Atlantic salmon. Critical habitat is further delineated into HUC 10 watersheds. At the time that Atlantic salmon were listed under the ESA, NMFS reported that in the Merrymeeting Bay SHRU (including the Androscoggin River, Sheepscott River and Kennebec River) there were an estimated 372,600 units of historically accessible spawning and rearing habitat for Atlantic salmon, found among approximately 5,950 km2 of historically accessible rivers, streams, and lake. Of these units, 136,000 units of habitat were considered to be critical habitat. Of these, NMFS estimated there to be nearly 40,000 functional equivalents of habitat or approximately 11 percent of the historical functional potential. This estimate was based on the configuration of dams within the SHRU that limit migration and degradation of physical and biological features from land use activities which reduce the productivity of habitat within each HUC 10 (NMFS 2009b). NMFS further determined that for each SHRU to achieve recovery objectives for Atlantic salmon, 30,000 fully functional units of habitat are needed (NMFS 2018).[17]

The Kennebec River in the vicinity of the Lockwood, Hydro-Kennebec, Shawmut, and Weston Projects serves as migration habitat for adults returning to freshwater to spawn and for smolts and kelts returning to the ocean. According to the 2013 BO, the nearest mapped rearing habitat upstream of the four Projects is within the Sandy River located approximately 11miles upstream of the Weston Project dam. However, a GIS-based Atlantic salmon habitat model (Wright et al. 2008) shows that habitat exists in the mainstem of the Kennebec River downstream of the Shawmut, Hydro-Kennebec, and Lockwood Projects (NMFS 2013). The available habitat units downstream of Lockwood is currently accessible to pre-spawn adults and could be used for spawning[18] and rearing of juvenile salmon. There is also significant juvenile habitat in Wesserunsett Stream which flows into the mainstem Kennebec River downstream of Weston dam. Despite this production potential, it is unlikely that much of this habitat is used, as pre-spawn salmon are currently trucked from Lockwood to spawning and rearing habitat in the Sandy River (NMFS 2013).

[17] More recent and detailed estimates of salmon spawning and rearing habitat in the Kennebec River basin are available on Maine's Stream Viewer. https://webapps2.cgis-solutions.com/MaineStreamViewer/.

[18] Although the model does not identify habitat that is suitable for spawning, MDMR has conducted field surveys of mainstem habitat and certain tributaries in order to identify areas of suitable habitat for salmon spawning and rearing. These efforts have identified suitable spawning habitat in the mainstem river below the Lockwood Project, some of which is within 300 meters of the Project.

1.5.2 ATLANTIC SALMON RECOVERY PLAN

Efforts by federal, state, and local government agencies, as well as many private conservation organizations aimed at protecting Atlantic salmon and its habitat in Maine have been underway for well over 100 years. The 2019 *Final Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon* (the Plan) for listed GOM DPS presents a strategy for recovering Atlantic salmon in the rivers listed as endangered under the ESA (USFWS and NMFS 2019).

The Plan focuses on the three statutory requirements in the ESA including: site-specific recovery actions; objective, measurable criteria for delisting; and time and cost estimates to achieve recovery and intermediate steps. It is based on two premises: first, that recovery must focus on rivers and estuaries located in the GOM DPS until threats in the marine environment are better understood; and second, that survival of Atlantic salmon in the GOM DPS depends on conservation hatcheries through much of the recovery process (USFWS and NMFS 2019). The main objectives of the Plan are to maintain self-sustaining, wild populations with access to sufficient suitable habitat in each SHRU, and to ensure that necessary management options for marine survival are in place. In addition, the plan seeks to reduce or eliminate all threats that either individually or in combination might endanger the DPS (USFWS and NMFS 2019).

The current recovery criteria for downgrading classification from endangered to threatened consist of:

1. Abundance: The entire DPS has a total annual returns of at least 1,500 adults originating from wild origin, or hatchery stocked eggs, fry or parr spawning in the wild, with at least two of the three SHRUs having a minimum annual escapement of 500 naturally reared adult returns;
2. Productivity: The population in each of at least two of the three SHRUs must have a positive mean growth rate greater than 1.0 in the 10-year (two generation) period preceding reclassification; and
3. Habitat: In each of the SHRUs where the abundance and productivity criterion have been met, there is a minimum of 7,500 accessible and suitable spawning and rearing habitat for the offspring of the 1,500 naturally reared adults (USFWS and NMFS 2019).

The longer-term recovery target for the delisting of Atlantic salmon consists of:

1. Abundance: The DPS has a self-sustaining annual escapement of at least 2,000 wild origin adults in each SHRU for a DPS-wide total of at least 6,000 wild adults;
2. Productivity: Each SHRU has a positive mean growth rate of greater than 1.0 in the 10-year (two generation) period preceding delisting. In addition, at the time of delisting, the DPS demonstrates self-sustaining persistence; whereby the total wild population in each SHRU has less than a 50-percent probability of falling below 500 adult wild spawners in the next 15 years based on population viability analysis (PVA) projections and

3. Habitat: Sufficient suitable spawning and rearing habitat for the offspring of 6,000 wild adults is accessible and distributed throughout designated Atlantic salmon critical habitat, and with at least 30,000 accessible and suitable habitat units in each SHRU, located according to the known migratory patterns of returning wild adult salmon. This would require both habitat protection and restoration at significant levels.

According to the 2020 Report for the *Collaborative Management Strategy for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, the abundance of wild and naturally reared returning s remains well below what is needed for either reclassification or delisting with 6 percent of the total of 1,528 pre-spawn salmon returning to the Merrymeeting Bay SHRU. Progress is being made, however, as the abundance of returning salmon was more than 20 percent higher than the 10-year average and the proportion of naturally reared fish was 8 percent higher than the 10-year average. The mean 10-year population growth rate for the GOM DPS as a whole was reported to be 1.12 in 2019 and was 1.84 for the Merrymeeting Bay SHRU. The amount of habitat that is considered "suitable and accessible" in the Merrymeeting Bay SHRU is 12,423 habitat units; representing 166 percent of the units needed for downlisting and 41.41 percent of the units needed for delisting (CMS 2020)

The recovery plan focuses on the site-specific actions necessary to recover the GOM DPS of Atlantic salmon. The eight categories of recovery actions include:

- Habitat Connectivity, intended to enhance connectivity between the ocean and freshwater habitats important for salmon recovery;
- Genetic Diversity, intended to maintain the genetic diversity of Atlantic salmon populations over time;
- Conservation Hatchery, intended to increase adult spawners through the conservation hatchery program;
- Freshwater Conservation, intended to increase adult spawners through the freshwater production of smolts;
- Marine and Estuary, intended to increase survival in these habitats by increasing understanding of these salmon ecosystems and identifying the location and timing of constraints to the marine productivity of salmon in support of management actions to improve survival;
- Federal/Tribal Coordination, intended to ensure federal agencies and associated programs continue to recognize and uphold federal Tribal Trust responsibilities;
- Funding Program Actions, intended to identify funding programs that support state, local and NGO conservation efforts that benefit Atlantic salmon recovery; and
- Outreach, Education, and Engagement, intended to collaborate with partners and engage interested parties in recovery efforts for the GOM DPS (USFWS and NMFS 2019).

For geographically based recovery actions, the SHRU-level work plans describe threats and recovery activities with a high priority within a 5-year period. Threats listed for the overall Merrymeeting Bay SHRU consist of:

- Climate change and the adverse effect it may have on habitats most suitable for Atlantic salmon;
- Dams and culverts that block or impede access to Atlantic salmon spawning and rearing habitat degrade habitat features for native riverine species;
- The stocking and introduction of non-native species, particularly smallmouth bass, that compete with and prey on Atlantic salmon;
- No dedicated hatchery stocks for a stocking program within the SHRU (except the Sheepscot River)
- Pollution attributed to land use and development practices in the Merrymeeting Bay SHRU that can harm Atlantic salmon and degrade the productive capacity of freshwater and estuary habitats;
- Historic and current land uses that have degraded the complexity and productivity of freshwater habitats that support Atlantic salmon (e.g., historic log drives, past and current agriculture and forestry practices, and residential development practices); and
- Limited resources to assess all areas that could be occupied by Atlantic salmon.

Recovery actions are also outlined in the recovery plan (USFWS and NMFS 2019). The overarching recovery actions identified for the Merrymeeting Bay SHRU and/or the Kennebec River that are relevant to the Kennebec projects ISPP are:

- Seek out opportunities at dams and road crossings throughout the SHRU where access can be improved for diadromous fish, including river herring and Atlantic salmon.
- Evaluate, through consultation, dam or culvert modification or installation project to assure that projects provide for upstream and downstream passage of all life stages of Atlantic salmon sufficient to sustain recovery.
- Develop production capacity and an independent donor broodstock program to support the Merrymeeting Bay SHRU that: 1) preserves and promote the genetic diversity of existing stocks, 2) prevents the further loss of family groups, 3) allows for marine and freshwater selection to maximize fitness, 4) accounts for habitat variability and climate change scenarios, and 5) promotes the development of locally adapted stocks.

The Plan includes a table (Table 1-1) that generally identifies the priority, timing, and involved parties for the various actions, but it is important to recognize that annual decisions regarding recovery priorities would be formulated with the SHRU-level work plans (USFWS and NMFS 2019). SHRU-level work plans provide the basis for determining activities that should be implemented in the short-term for each of the Plan's recovery actions. The *Merrymeeting Bay Work Site Specific Threats Work Plan* includes the following actions relevant to the Kennebec River or the Kennebec Projects' ISPP:

- Bond Brook is a focus area for identifying and address anthropogenic barriers that block or impair access to migratory fish, including Atlantic salmon because of the limited opportunities with the Kennebec River below the Lockwood Dam for Atlantic salmon spawning and rearing. *Under the license for the Hydro-Kennebec Project, the Licensee operates and maintains an Atlantic salmon fish passage facility on Bond Brook.*
- Lockwood:
    - Develop performance standards for Lockwood and incorporate those standards into a final SPP. Final SPPs will be in place by 2017, and the other projects by 2020. *As indicated herein, a Final SPP is due to be filed with the FERC by May 31, 2022.*
    - Conduct downstream survival studies to assess effects of the Lockwood Dam on smolt survival, and modify operations to improve survival necessary to meet or exceed performance standards. *Four years of downstream smolt studies have been conducted (2013 – 2015) to date with an efficiency range of 97.7 to 100 percent.*
    - Construct effective upstream fish passage at Lockwood by 2019. *As indicated herein, the upstream fish passage facility at Lockwood is required to be operational by May 2022.*
    - Test upstream survival and fish passage efficiency at the Lockwood facility by 2019 to assure that the effects of the dam and its operations meet or exceed the performance standards. *To be completed once constructed.*
    - Conduct routine inspections of Lockwood tailrace to assure adult salmon are not being held up. *As indicated herein, the Project includes a Fish Stranding Plan[19] to address monitoring and relocation of Atlantic salmon that may be stranded in the bypass reach of the dam.*
- Hydro Kennebec
    - Develop performance standards for the Hydro-Kennebec dam and incorporate them into a final SPP. Final SPPs will be in place by 2017. *As indicated herein, a Final SPP is due to be filed with the FERC by May 31, 2022.*
    - Conduct downstream survival studies to assess effects of this Project on smolt survival, and modify operations to improve survival necessary to meet or exceed performance standards. *Three years of downstream smolt studies have been conducted (2012 – 2014) to date with an efficiency range of 92.1 to 98.0 percent.*
    - Construct effective upstream fish passage at Hydro-Kennebec by 2019. *As indicated herein, the upstream fish passage facility at Hydro-Kennebec was completed in 2017.*
    - Test upstream survival and fish passage efficiency at the Hydro-Kennebec facility to assure that the effects of the dam and its operations meet or exceed the performance standards. *To be completed.*

[19] The Fish Rescue Plan as required by Article 407 of the Lockwood Project License was filed with the FERC on September 2, 2005 and approved by the FERC on May 16, 2006.

- Shawmut
    - Develop performance standards for the Shawmut dam and incorporate them into a final SPP. Final SPPs will be in place by 2020. *As indicated herein, a Final SPP is due to be filed with the FERC by May 31, 2022. However, the relicensing and requisite Section 7 consultation for the Shawmut Project is being undertaken in a separate but parallel track and performance standards may be incorporated into the Project license under that consultation.*
    - Conduct downstream survival studies to assess effects of this Project on smolt survival, and modify operations to improve survival necessary to meet or exceed performance standards. *Three years of downstream smolt studies have been conducted (2013 – 2015) to date with an efficiency range of 90.6 to 96.3 percent.*
    - Construct effective upstream fish passage at Shawmut by 2019. *As indicated herein, the upstream fish passage facility at Shawmut is currently part of the proposed action for relicensing at the specific request of the NMFS.*
    - Test upstream survival and fish passage efficiency at Shawmut to assure that the effects of the dam and its operations meet or exceed the performance standards. *To be completed once constructed.*
- Weston
    - Develop performance standards for Weston and incorporate them into a final species protection plan. Final SPPs will be in place for by 2020. *As indicated herein, a Final SPP is due to be filed with the FERC by May 31, 2022.*
    - Conduct downstream survival studies to assess effects of these Projects on smolt survival, and modify operations to improve survival necessary to meet or exceed performance standards. *Three years of downstream smolt studies have been conducted (2013 – 2015) to date with an efficiency range of 89.5 to 99.7 percent.*
    - Construct effective upstream fish passage at Weston by 2019. *As indicated herein, the upstream fish passage facility at Weston is required to be operational by May 2022.*
    - Test upstream survival and fish passage efficiency at Weston to assure that the effects of the dam and its operations meet or exceed the performance standards. *To be completed once constructed.*
- The Sandy River is a priority area for receiving a donor stock from an out of basin source for population rebuilding in the Merrymeeting Bay SHRU. *Dam owners are identified as implementing entities for broodstock efforts in the Kennebec basin.*

The 2019 recovery plan generally discusses the successes of combined efforts undertaken on the Kennebec River to restore Atlantic salmon to the river as follows:

> *There has also been significant conservation successes in the Kennebec River watershed. The Kennebec River Diadromous Fish Restoration Project was initiated in 1986 when the Maine Department of Marine Resources (MDMR) signed a settlement agreement with the Kennebec Hydro-Developers Group (KHDG). A second settlement agreement signed in*

1998 by state and federal fisheries resource agencies, non-governmental organizations, and the KHDG resulted in the removal of Edwards Dam in Augusta to provide fish passage for all diadromous fish species, instituted schedules or triggers for fish passage at the seven KHDG dams, and provided additional funding for the stocking program. From 1837 to 1999 the Edwards Dam in Augusta prevented any upstream fish passage. Removal of Edwards dam restored full access to historical spawning habitat for species like Atlantic sturgeon, shortnose sturgeon, and rainbow smelt, but not for species including alewife, American shad and Atlantic salmon that migrated much further up the river (MDMR, 2007). With the removal of Edwards Dam, the first dam on the Mainstem is now the Lockwood Dam in Waterville. In 2006, a fish lift was constructed with the ability to trap and truck Atlantic upstream of three dams that continued to block access to the Sandy River. The Sandy River contains high quality, abundant Atlantic salmon spawning and nursery habitat.

2.0 PROJECT DESCRIPTIONS

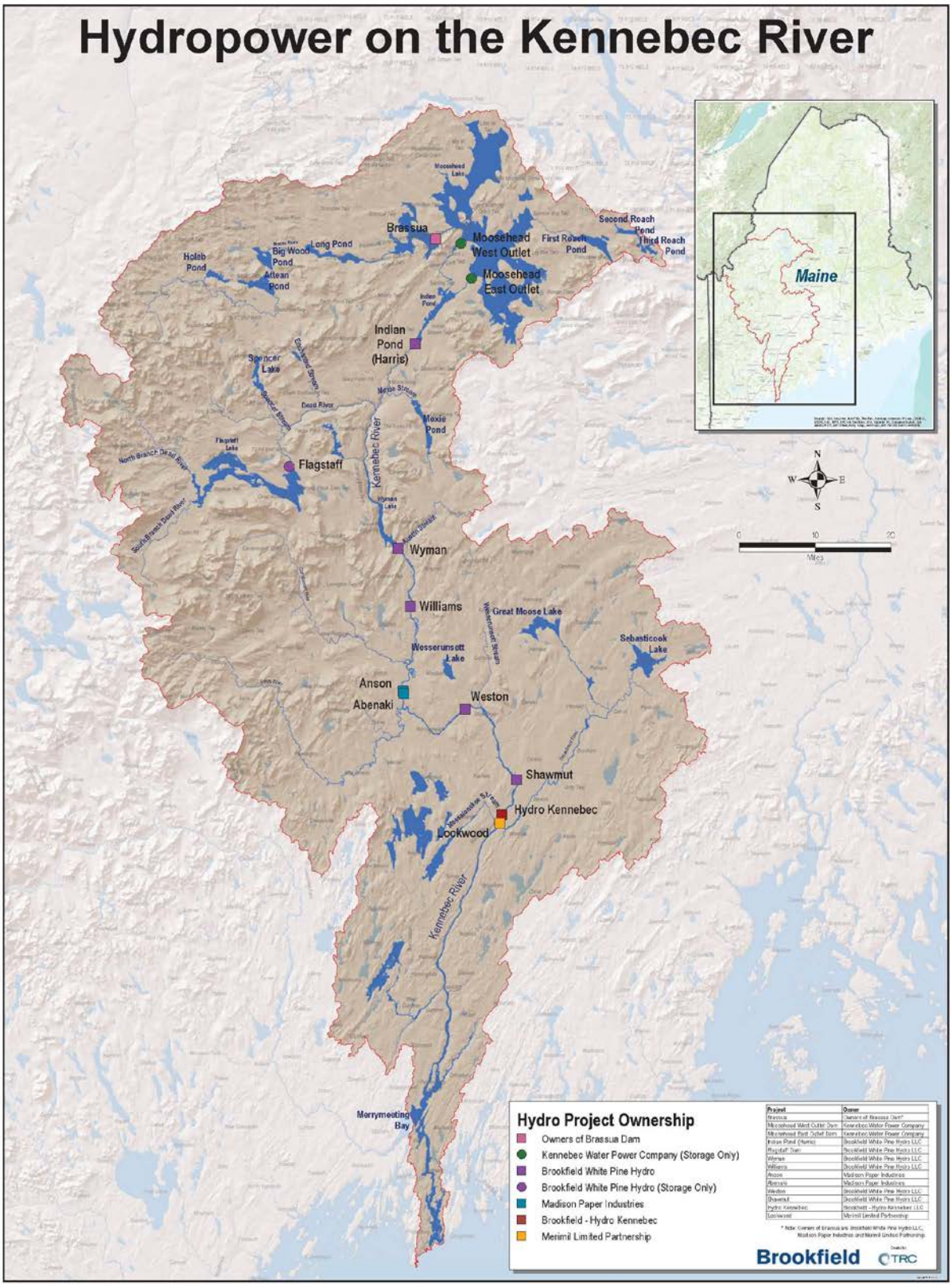
2.1 KENNEBEC RIVER BASIN

The Kennebec River basin is the largest of the watersheds that comprise the Merrymeeting Bay SHRU. The Kennebec River watershed covers an area of 5,910 square miles, approximately 1/5 of the state of Maine, and flows 138-miles from Moosehead Lake to Merrymeeting Bay where it joins the Androscoggin River. The Kennebec watershed is bordered on the west by the Androscoggin River basin, on the north and east by the Penobscot River basin, and by coastal streams and the Gulf of Maine on the south.

The Kennebec River's mainstem originates at the outlet of Moosehead Lake and flows generally southward through the towns and cities of Bingham, Solon, Anson, Madison, Norridgewock, Skowhegan, Waterville, and Augusta. The river transitions from a high gradient cold water river from upstream of Indian Pond to Madison, to a warmwater river from Skowhegan to Augusta. A 24-mile-long, mostly freshwater tidal segment of the river exists downstream from Augusta, and slightly brackish conditions exist periodically in Merrymeeting Bay (CABB 2006).

The Kennebec River basin has been extensively developed for over a century for industrial use, including driving of logs and pulp, mills, and hydroelectric power production. The Lockwood Project, located at river mile (RM) 63, is the lowermost dam and hydroelectric plant on the mainstem river. The drainage area above the Lockwood Project is 4,228-square miles. Other mainstem projects upstream of Lockwood include Hydro-Kennebec, Shawmut, Weston, Abenaki, Anson (FERC Project No. 2365), Williams (FERC Project No. 2335), Wyman (FERC Project No. 2329), and Harris (FERC Project No. 2142) (Figure 2-1). The Fort Halifax Project (FERC No. 2552), which was removed in 2008, was formerly located near the mouth of the tributary Sebasticook River, approximately 0.5 miles downstream of Lockwood. Edwards dam (FERC Project No. 2389), which was removed in 1999, was located about 18 miles downstream of Lockwood on the main stem.

FIGURE 2-1 LOCATION OF HYDROELECTRIC PROJECTS IN THE KENNEBEC RIVER BASIN



Source: Brookfield White Pine Hydro, 2019

2.2 LOCKWOOD PROJECT

2.2.1 EXISTING PROJECT FACILITIES AND OPERATIONS

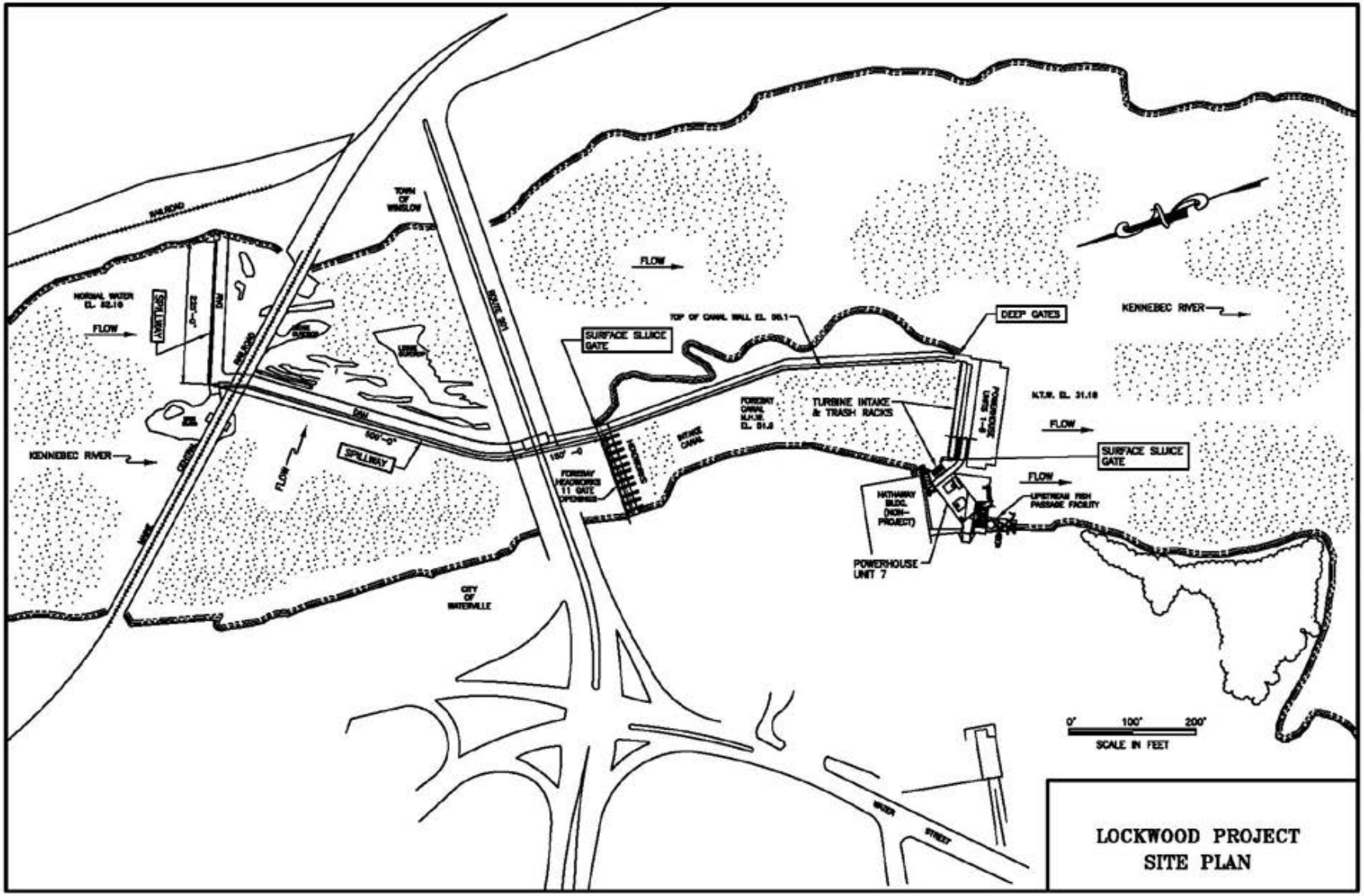
The Lockwood Project is owned by the Merimil Limited Partnership (MLP) and is located at RM 63 and is the first dam on the mainstem of the Kennebec River. The Lockwood Project includes an 81.5 acre impoundment, an 875-ft long and approximately 17-ft high dam with two spillway sections and a 160-ft long forebay headworks section, a 450-ft-long forebay canal, and two powerhouses. The dam and forebay headworks span the Kennebec River immediately upstream and downstream of the U.S. Route 201 Bridge along a site originally known as Ticonic Falls. The spillway sections impound the river on either side of a small island; the east spillway section begins at the east abutment of the dam and extends about 225 ft. in a westerly direction to the small island, while the west spillway extends about 650 ft. from the small island in a southwesterly direction to the forebay canal headworks, which in turn extend to the west bank of the river. Each spillway is equipped with 15-inch high wooden flashboards.

The headworks and intake structures are integral to the dam and the powerhouses, respectively. The forebay intake section contains eleven headgates measuring 8.5-ft wide by 12-ft high. From the headworks, the forebay canal directs water to two powerhouses located on the west bank of the Kennebec River: the original 1919 powerhouse contains six vertical Francis units and the 1989 powerhouse contains one horizontal Kaplan unit, which combined have a total authorized capacity of 6.8 MW and a flow of approximately 5,660 cubic feet per second (cfs).

The generating unit trash racks are serviced by a track mounted, hydraulically operated trash rake with trash removal capabilities. The trash racks screening the intakes are 2.0 inch clear spacing in front of Units 1-6 and 3.5 inch clear spacing in front of Unit 7. The project's tailrace returns the flow to the Kennebec River about 1,300 ft. downstream from the east spillway section.

The Lockwood Project is operated in a run-of-river mode. The normal full pond elevation is 52.16 feet above mean sea level (msl) when the flashboards are in place. The Project is normally operated to provide an instantaneous minimum flow of 2,114 cfs or inflow, if less, below the powerhouse to maintain downstream aquatic habitat in the river. Flow in the approximately 1,300-ft long bypassed reach is currently limited to leakage around and through the flashboards, including through three (3-ft long by 8-inches high) engineered orifices cut into the flash boards (estimated at a total of 50 cfs), or as spill over the flashboards when river flow exceeds about 5,600 cfs.

FIGURE 2-2 LOCKWOOD PROJECT



2.2.2 FISH PASSAGE FACILITIES

2.2.2.1 UPSTREAM PASSAGE

Upstream passage at Lockwood is currently provided via a main channel fish lift which was commissioned in Spring 2006. The facility is located on the west side of the original powerhouse and adjacent to the Unit 7 powerhouse and is designed to pass up to 164,640 alewives, 228,470 American shad and 4,750 Atlantic salmon. The fish lift is operated annually from May 1 to October 31, dependent on river conditions. During the river herring, shad, and Atlantic salmon peak migration season (lasting from approximately May through mid-July), the fish lift is operated seven days per week to meet resource agency trap and truck requirements. During that migration season, the fish lift is generally operated from early morning to evening.

The timing and frequency of lifts are a function of the number of migrating fish, water temperature and river flow, and the lift is operated based on direct camera monitoring of the fishway and V-gate entrance. During the remainder of the season (approximately mid-July through the end of October), lift cycles are less frequent and are specifically for the capture of Atlantic salmon. Pursuant to MDMR's Atlantic salmon handling protocol, the fish lift is not operated when the river water temperature exceeds 24.5ºC, in order to prevent injury or mortality of Atlantic salmon. However, if this temperature threshold is exceeded while shad are still migrating, the Licensee in consultation with MDMR has the option of continued operation of the fish lift to accommodate shad passage. If a salmon is observed in the hopper during a lift, the hopper can be placed back down into the water allowing the salmon to volitionally swim back downstream.

The lift operates with an attraction flow of approximately 170 cfs, an entrance flow velocity of 4 to 6 ft per second (fps) and a flow velocity over the hopper of 1.0 to 1.5 fps. An auxiliary water system provides the attraction flow upstream of the hopper. The 1,800-gallon hopper discharges water and fish into a 12-ft diameter 2,500-gallon sorting tank. River herring and shad are sorted into one of two ten-foot diameter 1,250-gallon sorting tanks. Atlantic salmon are removed and held in a 250-gallon isolation tank. Liquid oxygen is supplied to the sorting tanks and isolation tank via carbon micro porous stones to maintain safe dissolved oxygen levels at all times. Two auxiliary water pumps provide a constant flow of ambient river water to all the tanks and for filling of stocking truck tanks. Block ice is used, as necessary, to reduce water temperature in the Atlantic salmon holding tank in preparation for transport to the cooler waters of the Sandy River by MDMR staff. Other species of non-anadromous fish captured in the fish lift are returned to the tailrace via a discharge pipe. At the direction of MDIFW and MDMR, undesirable fish species (e.g. carp, white catfish, Northern pike, and gizzard shad, etc.) are removed and euthanized.

In accordance with the 2013 ISPP and BO, and as previously authorized by FERC, the Licensee is completing the final design of a new volitional vertical slot fishway for the Lockwood bypass

channel. The facility will be constructed in 2021 and operational by May 2022. The design and construction of this fishway are discussed in detail in Section 6.0.

2.2.2.2 DOWNSTREAM PASSAGE

Downstream fish passage is provided at the Lockwood Project via a 7-ft wide by 9-ft deep mechanical over-flow gate (fish sluice) located on the outboard side of the power canal just upstream of the Unit 1 trash rack and discharges directly into the river. Maximum flow through the gate is 6 percent of station capacity or 340 cfs. In 2009, a floating guidance boom was installed in the forebay angled across the forebay from the west wall of the canal downstream to the fish sluice to enhance use of the downstream passage. Following several years of evaluation and modifications made to the original guidance boom, the current design consists of a 300-ft long boom with two ten-ft-long plastic cylindrical "Tuff Boom" brand floats per section. From the upstream end, the first 250-ft of boom has 4-ft deep steel punch plate guidance panels (5/16" diameter holes). An additional 6-ft. of Dynema curtain is attached to the bottom of each panel. The lower 50-ft. section of boom has 10-ft.-deep steel punch plate guidance panels with no Dynema curtain attached at the bottom. All gaps between the panels are covered by rubber flanges.

In addition to the fish sluice gate and associated guidance boom, downstream migrating fish may also use the three submerged orifices (3-ft long by 8-inches high), cut into the flashboards along the spillway. The orifices are designed to provide flow through the ledges and pools in the bypass reach and pass a total of approximately 25 cfs of the required 50 cfs minimum flow at normal full pond, the remainder of which is provided by flashboard leakage. The orifices provide additional downstream passage routes along the spillway even when the Project is not spilling over the top of the flashboards.

2.3 HYDRO-KENNEBEC PROJECT

2.3.1 EXISTING PROJECT FACILITIES AND OPERATIONS

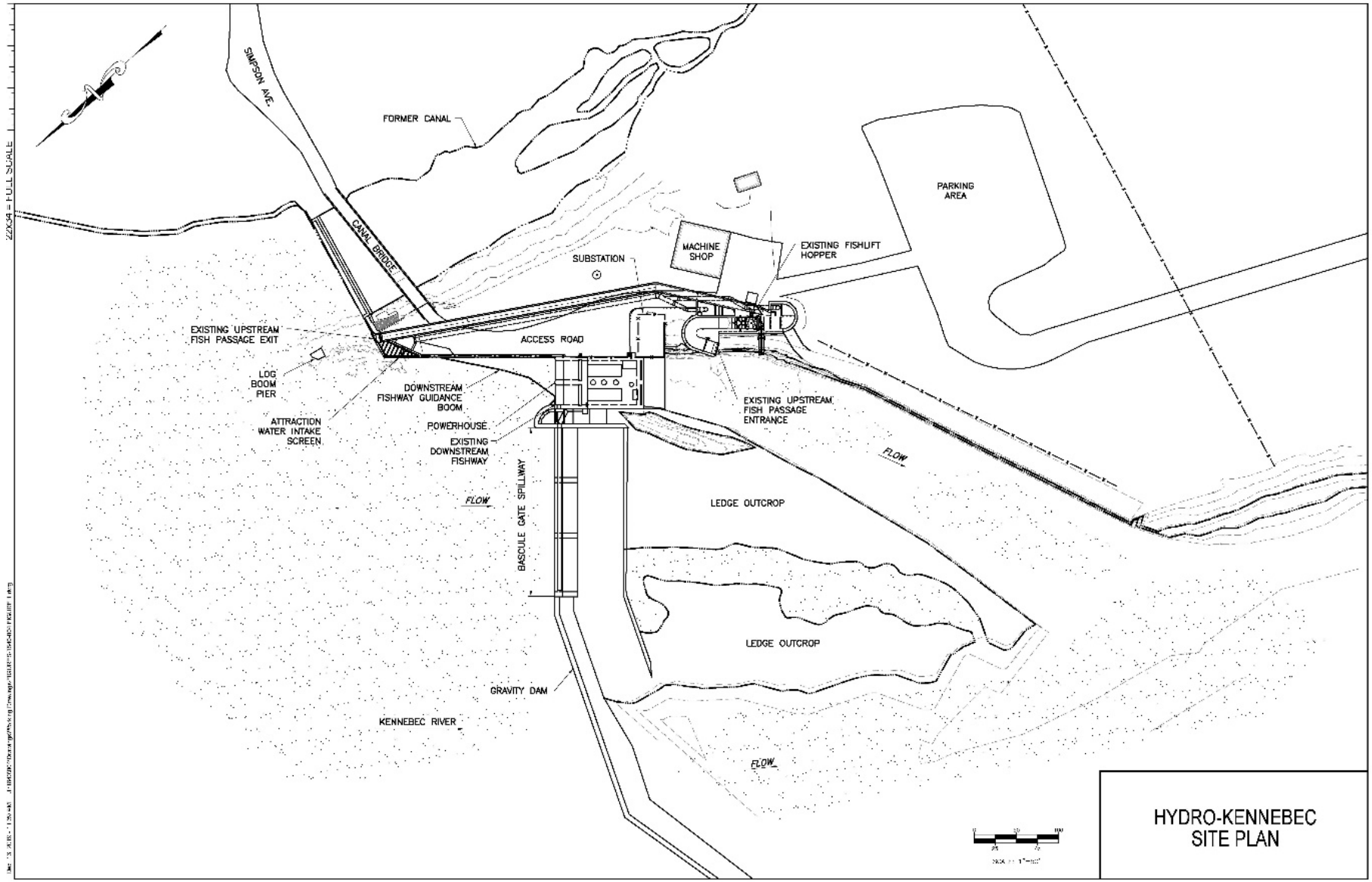
The Hydro-Kennebec Project is located at RM 64 on the Kennebec River in the cities of Waterville and Winslow, Maine. Hydro-Kennebec is the second dam upstream on the Kennebec River. The Hydro-Kennebec Project has a total authorized capacity of 15.4 MW. The principal features include a concrete gravity dam with flashboards, forebay, impoundment, and a powerhouse containing two horizontal pit-type Kaplan turbines.

The Project consists of a 555-ft. long ungated concrete gravity spillway and a 200-ft long gated spillway. The dam also includes an 18-ft. long east abutment adjacent to the powerhouse. The ungated spillway structure is 35-ft. high at its maximum section with 6-ft. high wooden flashboards, bringing the normal full headpond elevation to 81.0 feet. The gated spillway section has a permanent crest elevation of 68.0 feet and is equipped with three hydraulically controlled

gates (each 15-ft. high by 60-ft. wide) to maintain the normal full pond elevation of 81.0 feet. The impoundment is approximately 250 acres in area.

The powerhouse is located between the middle retaining wall and the left bank and is 131.5-ft long and 62.2-ft.- wide at its base. The intake has steel trash racks supported by concrete piers equipped with steel maintenance gates and a mechanical trash rake. Each of the two four-blade pit-type Kaplan turbine units are capable of operating over a flow range of 1,550 cfs to 3,961 cfs. Unit 2 is located on the bank side of the powerhouse and Unit 1 is located on the river side of the powerhouse. The turbines are approximately 13-feet in diameter and have an operating speed of 115 rpm. The runner speed (115 rpm) is stepped up using a speed increaser to result in a generator speed of 600 rpm. The powerhouse draft tube has roller gates, which are hydraulically operated. Flow from the turbines is directly discharged to the tailrace and into the Kennebec River. The tailrace is separated from the Kennebec River by a narrow section of bedrock stabilized by rock anchors.

FIGURE 2-3 HYDRO-KENNEBEC PROJECT



2.3.2 FISH PASSAGE FACILITIES

2.3.2.1 UPSTREAM PASSAGE

A fish lift was constructed at the Hydro-Kennebec Project in 2016-2017 and became operational in September 2017. The facility was designed in consultation with the fishery agencies and is designed to pass 12,000 Atlantic salmon, 210,000 American shad, 15,000 alewives, and 1,200,000 blueback herring. The fish lift consists of a tailrace entrance located immediately downstream of the Project powerhouse, a hopper elevator system, exit flume, and upstream exit located adjacent to the Project's abandoned gatehouse. The concrete upstream fish passage entrance is 14.0-ft wide and equipped with an adjustable overshot attraction flow gate. Fish are guided through a curved concrete entrance chamber leading to a 14-ft wide by 20-ft long lower flume. The elevator raises the hopper approximately 45 ft. to discharge fish and water to the 470-ft long exit flume.

A 40-ft wide attraction water intake screen and associated lifting structure (for cleaning) is installed adjacent to the fishway exit with 3/8-inch diameter holes to allow for screening of attraction flow. The fish lift facility is designed to operate under a normal headpond elevation of 81.0 ft. msl and a normal tailwater of elevation 54.0 ft. msl and is designed for river flows between 2,300 cfs and 23,000 cfs.

The Hydro-Kennebec fish lift has a minimum cycle time of approximately 10 minutes and can be operated in either automatic or manual mode. Water flow within the fish lift is adjusted by a series of manually controlled gates and valves. The system is designed to pass a range of attraction flow at the entrance gate of between 240 cfs to 400 cfs. Flow velocity is maintained at approximately 1-1.5 fps in the exit flume, 1-1.5 fps over the hopper, 2-4 fps in the entrance channel, and 4-6 fps at the fishway entrance.

2.3.2.2 DOWNSTREAM PASSAGE

The downstream passage facility at the Hydro-Kennebec Project consists of a floating angled guidance boom that guides fish to a deep-gated surface bypass slot that directs fish into a plunge pool and then to the tailwater area. The floating guidance boom was installed in the Hydro-Kennebec forebay to guide downstream migrating fish to a 4-ft wide by 8-ft deep gated surface weir capable of passing 320 cfs (4% of station flow). The surface weir discharges into a plunge pool which flows out to the tailrace.

The original boom (installed in 2006) was 160-ft long and utilized a 10-ft deep Kevlar curtain to guide the fish. In 2012, the Kevlar curtain was replaced with steel perforated plates (5/16 inch diameter holes) configured as a series of interlocking panels designed to be left in place year-round. The steel plates are 10-ft deep. The plunge pool has been modified several times since 2006 to improve fish survival through the facility. This includes adding depth to the plunge pool in 2007 by installing a weir in the fish bypass to minimize potential for fish injury. The plunge

pool was deepened further in 2012 by adding a stop-log structure to the downstream fish passageway. A confining sill was also installed on the roof of the draft tube extension in the tailrace to keep the discharge jet from spreading over the exposed draft tube roof.

2.4 SHAWMUT PROJECT

2.4.1 EXISTING PROJECT FACILITIES AND OPERATIONS

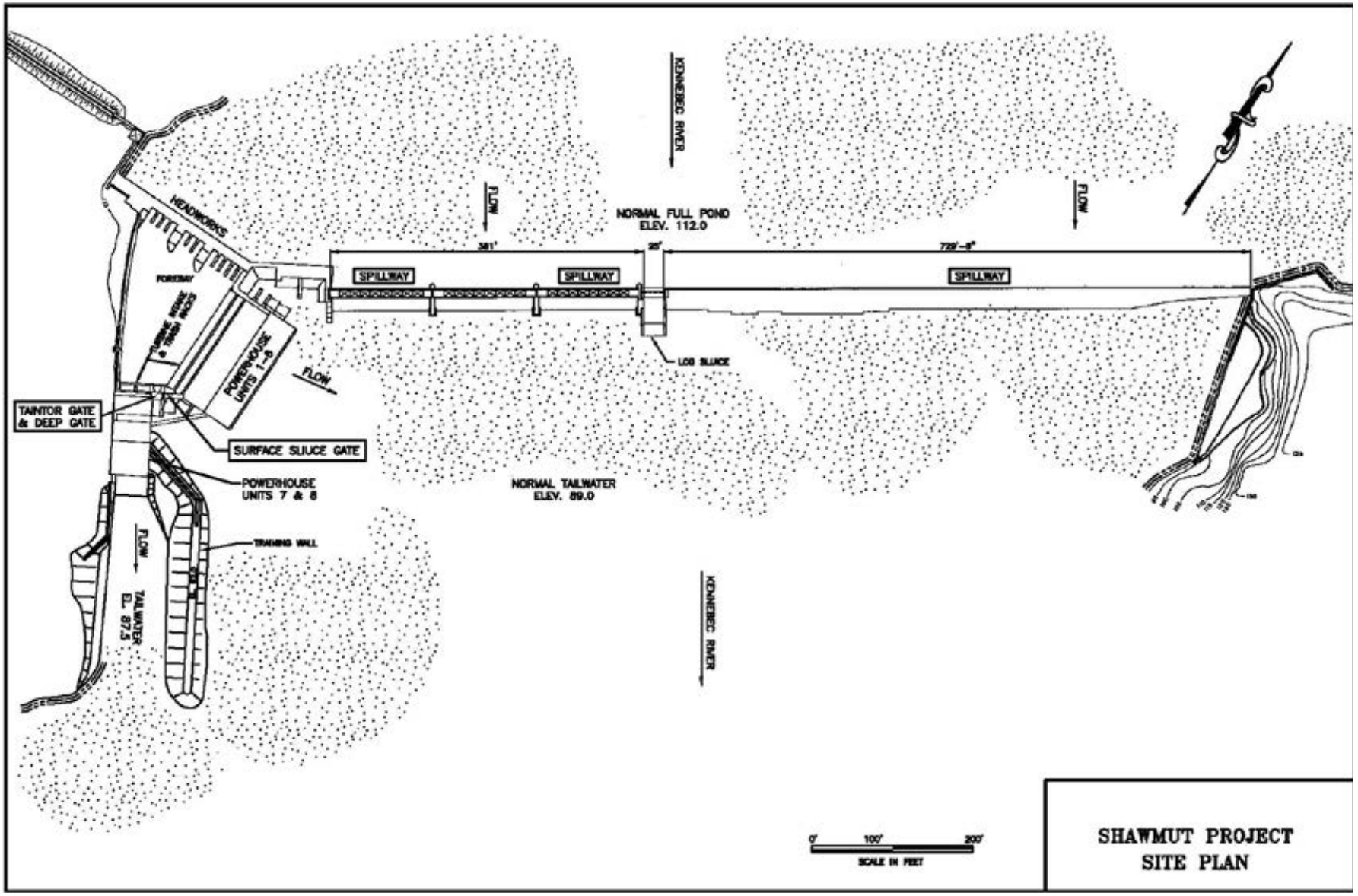
The Shawmut Project is located at RM 70 and is the third dam on the main stem of the Kennebec River. It includes a 1,310-acre impoundment, a 1,135-ft long dam with an average height of about 24 ft, headworks structure, enclosed forebay, and two powerhouses with intake structures. The crest of the dam has 380 ft. of hinged flashboards 4-ft high serviced by a steel bridge with a gantry crane, a 730-ft. long inflatable bladder composed of three sections, each 4.5-ft. high when inflated and a 25-ft.- wide by 8-ft. deep sluice equipped with a timber and steel gate.

The headworks and intake structures are integral to the dam and the powerhouses, respectively. The forebay intake section contains 11 headgates and 2 filler gates. Five of the headgates are installed in openings 10-ft. wide by 15.5-ft. high and six are installed in openings 10-ft. by 12.5-ft. The two filler gate openings are 4-ft. by 6-ft. A non-overflow concrete gravity section of dam connects the west end of the concrete filled forebay gate openings with a concrete cut-off wall which serves as a core wall for an earth dike.

The forebay is located immediately downstream of the headgate structure and is enclosed by two powerhouse structures, the 1924 powerhouse located to the east and the 1982 powerhouse located to the south. An approximately 240-ft. long concrete retaining wall is located on the west side of the forebay. Located at the south end of the forebay between the powerhouses is a 10-ft. by 7-ft. Tainter gate. In addition, a 6-ft. by 6-ft.-deep gate and a surface sluice (4-ft.-wide by 22-inch-deep, passing 35 cfs) which discharges into a 3-ft. deep plunge pool are located at the south end of the forebay. In the original powerhouse, the intake section has six open flumes each fitted with two 10.5-ft. by 14-ft. double-leaf slide gates and a continuous trash rack. In the newer powerhouse, the intake section contains two openings fitted with vertical headgates about 12-ft.high by 12-ft wide and operated by hydraulic cylinders. The trash racks are serviced by a track mounted, hydraulically operated trash rake with trash removal capabilities. The trash racks screening the intakes are 1.5-inch clear spacing in front of Units 1-6 and 3.5-inch clear spacing in front of Units 7 and 8.

The original powerhouse contains six horizontal Francis-design units and the newer powerhouse contains two horizontal propeller units, having a total combined authorized capacity of 8.74 MW and combined station flow of approximately 6,700 cfs. The Project's tailrace channels are excavated riverbed located downstream of the powerhouses. The Project is typically operated in a run-of-river mode, normally passing a minimum flow of 2,110 cfs, with a normal full pond elevation of about 112.0 ft msl.

FIGURE 2-4 SHAWMUT PROJECT



2.4.2 FISH PASSAGE FACILITIES

2.4.2.1 UPSTREAM PASSAGE

An upstream passage facility (fish lift) for the Shawmut Project was designed and submitted for approval under the FERC license pursuant to the ISPP and BO. On December 31, 2019, the Licensee filed final Shawmut fishway plans for review and approval by FERC. In a letter dated July 13, 2020, FERC determined that final fish lift approval would be considered in conjunction with the ongoing relicensing of the Shawmut Project. Until the Shawmut fish lift is completed, upstream fish passage at the Shawmut Project continues to be provided via trap and truck operations from Lockwood to habitats further upstream.

2.4.2.2 DOWNSTREAM PASSAGE

Downstream passage for Atlantic salmon at Shawmut is currently provided through a combination of a surface weir (sluice), Tainter gate, and opened hinged flashboards. The sluice is located within the forebay at the right side of the intake structure next to Unit 6. It is 4-ft wide by 22-inches deep and flow can be adjusted by adding or removing stoplogs. With all stoplogs removed, the sluice passes between 30 and 35 cfs which is discharged over the sill into a 3-ft deep plunge pool. The Tainter gate located next to the sluice measures 7 ft. high by 10-ft wide and can pass up to 600 cfs.

The sluice and Tainter gate are operated for Atlantic salmon smolt and kelt passage typically from April 1 through June 15 and from November 1 through December 31, as river flow and ice conditions allow. Downstream passage is also provided along the Shawmut spillway during periods of excess river flow that results in spill. To provide an additional passage during the Atlantic salmon smolt migration season, the Licensee also drops several sections of flashboards. Currently, four hinged flashboards sections located immediately adjacent to the power canal headworks are opened for the Atlantic salmon smolt migration season, April 1 to June 15, and provide up to approximately 560 cfs of spill flow.[20]

2.5 WESTON PROJECT

2.5.1 EXISTING PROJECT FACILITIES AND OPERATIONS

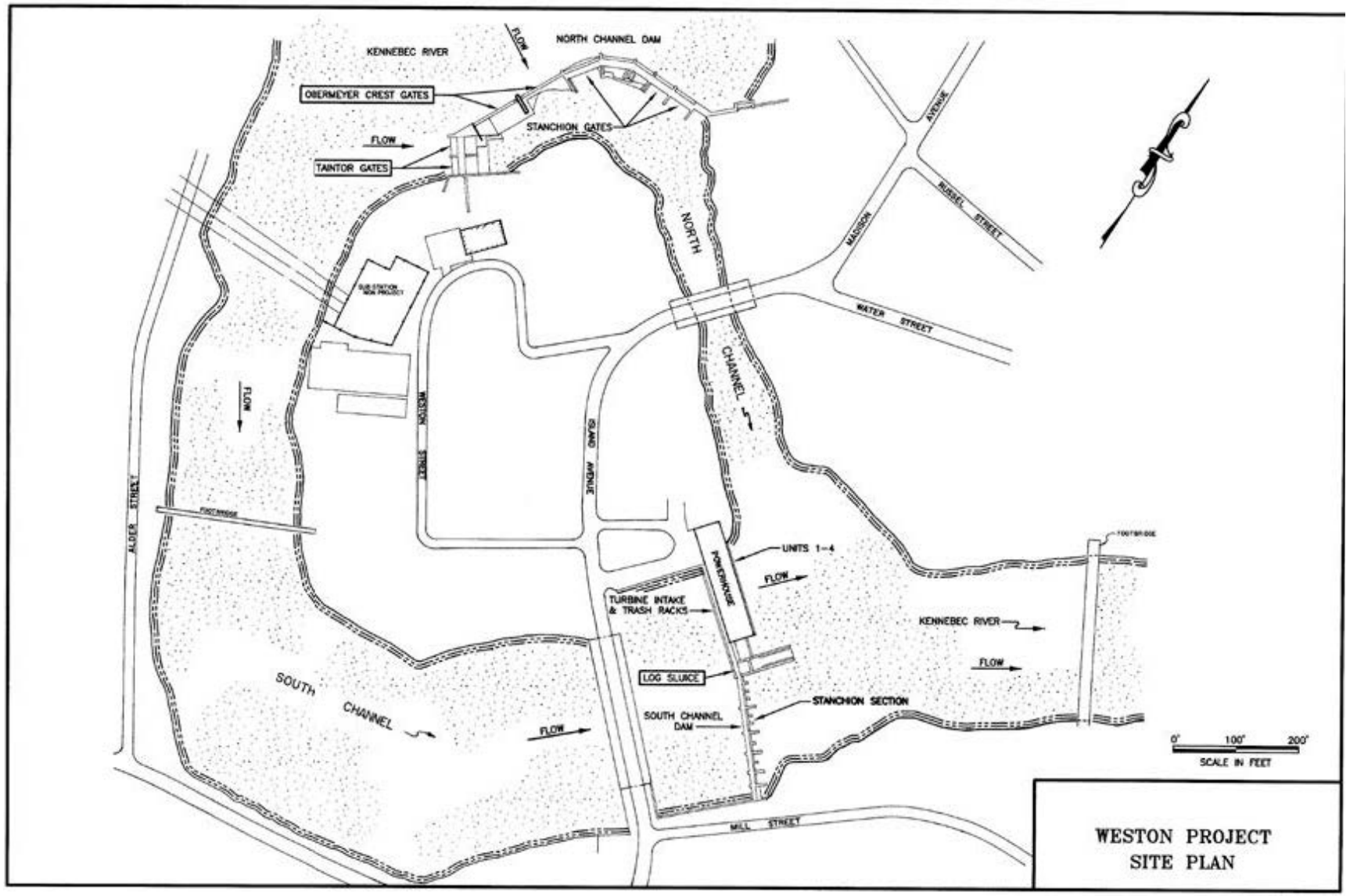
The Weston Project is located at RM 82 and is the fourth dam on the mainstem of the Kennebec River. The Weston Project includes a 930-acre impoundment, two dams, and one powerhouse. The two dams are constructed on the north and south channels of the Kennebec River where the river is divided by Weston Island.

[20] The hinged flashboard sections pass a flow of approximately 140 cfs per section. With three sections down the flow is approximately 420 cfs; with four sections down the flow is approximately 560 cfs.

The North Channel dam is a concrete gravity and buttress dam. The dam extends from the north bank of the Kennebec River to Weston Island, in a broad V-shape, following the high ledge of a natural falls. The South Channel dam is a concrete gravity and buttress dam that extends between abutment walls from the island to the south river bank. The powerhouse/intake section is integral to the Project dam and includes the headworks and four intake bays, one for each of the four turbine-generator units.

The Weston Project operates in a run-of-river mode, maintaining the impoundment water surface elevation within 1-ft. of the normal full pond elevation, during normal operations. A minimum flow requirement in the existing FERC license requires the Project to release a minimum flow of 1,947 cfs or inflow, whichever is less.

FIGURE 2-5 WESTON PROJECT



2.5.2 FISH PASSAGE FACILITIES

2.5.2.1 UPSTREAM PASSAGE

In accordance with the ISPP and BO, the Licensee is completing the final design of a new fish lift for the Weston Project. The facility will be constructed in 2021 and operational in May 2022. The design and construction of this fishway are discussed in detail in Section 6.0.

Until the Weston fish lift is completed, upstream fish passage at the Weston Project will continue to be provided via trap and truck operations from Lockwood to habitats further upstream. Atlantic salmon captured at the Lockwood lift are transported upstream by the MDMR to areas of suitable habitat, primarily the Sandy River, which is upstream of the Weston Project.

2.5.2.2 DOWNSTREAM PASSAGE

Downstream passage at the Weston Project is provided though a sluice gate and associated concrete flume located on the South Channel dam near the Unit 4 intake. The sluice is 20.8 ft. high and 70 ft long and discharges into a deep plunge pool. The gate is capable of discharging up to 2,250 cfs at full pond (approximately 38% of station unit flow) but is typically operated for fish passage to provide 8% of station unit flow from April 1 to June 15 (24 hours / 7 days a week) for smolts and 6% from September 15 to December 1 (8 hours per night).

In 2011, the Licensee enhanced the downstream passage facility by installing a 300-ft long floating guidance boom in front of the intakes with suspended 10-ft deep sections of 5/16-inch metal punch-plate screens leading to the sluice gate.

On the North Channel side of the Weston Project, there are two Tainter gates, an inflatable rubber dam section, and stanchion gate sections. Additional passage opportunities are provided at the North Channel side via spillage in times of high flows.

3.0 LISTED SPECIES LIFE HISTORY

3.1 ATLANTIC SALMON

Anadromous Atlantic salmon have a complex life history that includes spawning and rearing in freshwater rivers and streams, as well as extensive feeding migrations and sexual maturation in the marine environment (Fay et al. 2006). The freshwater juvenile stage of the life cycle can last from one to three years, after which juveniles undergo a physiological transformation (called smoltification) and migrate downstream to spend one to three years at sea before returning to freshwater to spawn in their natal rivers. Unlike Pacific salmon, Atlantic salmon do not die after spawning, and can return to sea to repeat the migratory cycle.

Although spawning by Atlantic salmon does not occur until late October or November, most adult Atlantic salmon ascend rivers beginning in the spring. In the GOM rivers, the peak upstream migration occurs in June, but may persist until the fall (Fay et al. 2006). After fish enter the freshwater environment, they cease feeding and darken in coloration. Salmon that return early in the spring spend nearly five months in the river before spawning, seeking cool water refuges (e.g., deep pools, springs, and mouths of small cold-water tributaries) during the summer months (Fay et al. 2006). Following spawning, adults (referred to as “kelts”) may move downstream in either the fall or the following spring, eventually reaching the estuary and ocean. Once in the marine environment, these salmon resume feeding and a very small percentage may return as repeat spawners one to two years later.

Preferred spawning habitat consists of gravel substrate with adequate water circulation to keep buried eggs well oxygenated. Water depth at spawning sites is typically 30 centimeters (cm) to 61 cm, and water velocity averages 60 cm per second (Fay et al. 2006). Spawning occurs from late October through November when water temperatures are roughly between 7.2 degrees Celsius (°C) to 10.0°C. The female uses its tail to scour or dig a series of nests in the gravel where the eggs are deposited; this series of nests is called a redd. One or more males fertilize the eggs as they are deposited in the redd. The female then continues digging upstream of the last deposition site, burying the fertilized eggs with clean gravel. A female salmon returning to spawn after spending two years at sea will produce approximately 7,500 eggs (Fay et al. 2006).

The eggs hatch in late March or April. At this stage, the young salmon are referred to as alevin or sac fry. Alevins remain in the redd for about six more weeks and are nourished by their yolk sac. Alevins emerge from the gravel in mid-May, and begin active feeding, at which time they are called fry (Fay et al. 2006). Within days, the salmon fry enter the parr stage, indicated by vertical bars (parr marks) visible on their sides. Parr prefer areas with adequate cover, water depths ranging from approximately 10 cm to 60 cm, water velocities between 30 cm and 92 cm per second, and water temperature near 16°C (Fay et al. 2006). Juvenile salmon are territorial and feed on a variety of aquatic invertebrates, including larvae of mayflies, stoneflies, chironomids, and caddis flies; aquatic annelids; mollusks; and numerous terrestrial invertebrate species that

fall into the river (Fay et al. 2006). In fall as flows increase, and as temperature and day length decrease, parr often shelter in the substrate. Movement may be quite limited in the winter, but can occur, particularly if the formation of ice reduces available habitat (Fay et al. 2006).

After remaining in freshwater habitat for one to three years (typically two years in Maine), parr undergo a series of physiological, morphological, and behavioral changes in a process called "smoltification." This transformation occurs in the spring and prepares the salmon "smolt" for its dramatic change in osmoregulatory needs that come with movement from a freshwater to marine environment (Fay et al. 2006). The smolt emigration period is rather short and lasts only two to three weeks for each individual (NMFS 2008). While not specifically assessed in the Kennebec River, naturally reared and wild smolts in Maine typically enter the sea during May to begin their ocean migration (Fay et al. 2006).

In the Penobscot River, smolts migrate between late April and early June with a peak migration in early May (Fay et al. 2006). The majority of smolts migrate in a short period of time, as demonstrated by NMFS' Penobscot River smolt trapping studies conducted between 2000 and 2005. These data show that 74 percent of the downstream run occurs in 15 days in mid-May and that the majority of the smolt migration appears to take place after water temperatures rise to 10°C (USFWS unpublished cited in Black Bear 2012). The USFWS conducted a review of literature regarding diurnal migration timing and found that a median of 80.7 percent of smolts migrated at night (USFWS unpublished cited in Black Bear 2012).

Smolts have been documented to move through the Narraguagus River estuary (located in Downeast Maine) to the middle portion of the bay at 0.7 kilometers per hour (km/h) and 1.0 km/h in the outer Narraguagus Bay (Kocik et al. 2009). Higher survival rates were observed for smolts that exhibited a reversal migratory pattern through the bay, suggesting that smolts moving out to sea with the flooding and ebbing tides are more likely to survive than those that do not, likely falling prey to various predators. Overall, this study documented low survival between the estuary and open marine environment from 36 percent to 47 percent (Kocik et al. 2009).

In the Kennebec River basin, rotary screw trap sampling conducted in the Sandy River during 2012-2015 provides some information on the seasonal timing of smolt outmigration for the Kennebec River projects (FPLE 2013; BWPH 2014, 2015). Although the dates of sampler installation and removal varied among years due to river conditions and site access, the date of peak capture for Atlantic salmon smolts ranged from May 7 to May 18 among the four sampling years. Atlantic salmon smolts were observed out-migrating from the Sandy as early as April 18 and as late as June 2, which corresponds to the generally accepted smolt outmigration period between late April and early June with a peak migration in early to mid-May.

Similar to the Narraguagus River, a two year study using wild smolts captured in the Sandy River screw traps confirmed that the smolts preferred to move at night in the estuary (USASAC 2017 Working Paper No. 17-05, unpublished). Upon reaching the extensive tidal estuary in Lower Kennebec River, smolts shifted from almost exclusive night migration to more daylight

migration, despite the presence of predators such as Seals, harbor porpoise, abundant Striped Bass, and other predatory fishes. Migration in the estuaries of both the Narraguagus and Kennebec rivers were influenced by tidal stage, which may cause the observed variability of net downstream movement rates through these estuaries.

Like the Narraguagus estuary, smolt survival is low in the Kennebec estuary. The two year study by NMFS and MDMR documented that survival from Lockwood Dam through the Merrymeeting Bay estuary was 37 percent in 2014 and 32 percent in 2015 (USASAC 2017 Working Paper No. 17-05, unpublished).

Once in the ocean, Atlantic salmon become highly migratory and undertake long migrations from their natal rivers (Fay et al. 2006). Major feeding areas in the ocean include the Davis Strait between Labrador and Greenland (USFWS and NMFS 2009). During their time at sea, Atlantic salmon undergo a period of rapid growth until they reach maturity and return to their natal river to complete the life cycle.

Although the GOM DPS yields the highest adult returns from natural reproduction and egg planting, particularly in rivers such as the Narraguagus and Sandy River, millions of salmon are stocked annually as eggs, fry, parr and smolts to provide adequate returns to continue the hatchery supplementation program throughout the DPS. Freshwater and marine survival rates of both wild and hatchery origin salmon remain extremely low (USFWS and NMFS 2009). According to the 2013 BO, “freshwater and marine survival rates…medians have been estimated by NMFS as 1.1% and 0.4%, respectively” (NMFS 2013). Such low rates cannot sustain a wild salmon population reliant upon natural reproduction.

3.2 ATLANTIC STURGEON

The Atlantic sturgeon is a long-lived, late maturing, estuarine dependent, anadromous species. Information in the following subsections is taken from the 2007 Atlantic sturgeon status review (Atlantic Sturgeon Status Review Team 2007), unless otherwise noted. The species’ historic range included major estuarine and riverine systems that spanned from Hamilton Inlet on the coast of Labrador to the Saint Johns River in Florida. Atlantic sturgeon spawn in freshwater, but spend most of their adult life in the marine environment. Spawning adults generally migrate upriver in the spring/early summer; February-March in southern systems, April-May in mid-Atlantic systems, and May-July in Canadian systems. In some southern rivers, a fall spawning migration may also occur. A fall upriver migration of ripening adults in the Saint John River, New Brunswick is also observed; however, this fall migration is not considered a spawning run as adults do not spawn until the spring. Atlantic sturgeon spawning is believed to occur in flowing water between the salt front and fall line of large rivers, where optimal flows are 46-76 cm/s and depths of 11-27 meters. Sturgeon eggs are highly adhesive and are deposited on the bottom substrate, usually on hard surfaces (e.g., cobble). Hatching occurs approximately 94-140 hours after egg deposition at temperatures of 20° and 18°C, respectively, and larvae assume a demersal existence. The yolk-sac larval stage is completed in about 8-12 days, during

which time the larvae move downstream to rearing grounds over a 6-12 day period. During the first half of their migration downstream, movement is limited to night. During the day, larvae use benthic structure (e.g., gravel matrix) as refugia. During the latter half of migration when larvae are more fully developed, movement to rearing grounds occurs both day and night. Juvenile sturgeon continue to move further downstream into brackish waters and eventually become residents in estuarine waters for months or years.

Upon reaching a size of approximately 76-92 cm, the subadults may move to coastal waters where populations may undertake long-range migrations. Tagging and genetic data indicate that subadult and adult Atlantic sturgeon may travel widely once they emigrate from rivers. Subadult Atlantic sturgeon transit between coastal and estuarine habitats, undergoing rapid growth. These migratory subadults, as well as adult sturgeon, are normally found in shallow (10-50 meters) near-shore areas dominated by gravel and sand substrate. Coastal features or shorelines where migratory Atlantic sturgeon commonly aggregate include the Bay of Fundy, Massachusetts Bay, Rhode Island, New Jersey, Delaware, Delaware Bay, Chesapeake Bay, and North Carolina, which presumably provide better foraging opportunities. Despite extensive mixing in coastal waters, Atlantic sturgeon return to their natal river to spawn as indicated from tagging records and the relatively low rates of gene flow reported in population genetic studies. Males usually begin their spawning migration early and leave after the spawning season, while females make rapid spawning migrations upstream and quickly depart following spawning.

Atlantic sturgeon have been aged to 60 years; however, this should be taken as an approximation, as the only age validation study conducted to date shows variations of ±5 years. Vital parameters of sturgeon populations show clinal variation with faster growth and earlier age at maturation in more southern systems, though not all data sets conform to this trend. For example, Atlantic sturgeon mature in South Carolina at 5-19 years, in the Hudson River at 11-21 years, and in the Saint Lawrence River at 22-34 years. Atlantic sturgeon likely do not spawn every year. Multiple studies have shown that spawning intervals range from 1-5 years for males and 2-5 for females. Fecundity of Atlantic sturgeon has been correlated with age and body size (ranging from 400,000 - 8 million eggs). The average age at which 50 percent of maximum lifetime egg production is achieved is estimated to be 29 years, approximately 3-10 times longer than for other bony fish species examined (NOAA 2012a).

The GOM DPS includes all Atlantic sturgeon that are spawned in the watersheds from the Maine/Canadian border and extending southward to include all associated watersheds draining into the Gulf of Maine as far south as Chatham, Massachusetts (NOAA 2012a). This includes the Kennebec River. Tagging and tracking data indicate that there is mixing of sturgeon from different DPSs throughout their marine range, and, consequently, NMFS determined that the marine ranges for the five DPSs are the same: all marine waters, including coastal bays and estuaries, from Labrador Inlet, Labrador, Canada to Cape Canaveral, Florida (NOAA 2012a, 2012b).

3.3 SHORTNOSE STURGEON

The shortnose sturgeon occurs in large coastal rivers of eastern North America. In the northern part of its range, the species is considered to be "freshwater amphidromous," meaning it spawns in freshwater, but regularly enters seawater during various stages of its life (NMFS 1998). Shortnose sturgeon are occasionally found near the mouths of rivers, and coastal migrations between the lower Penobscot River and the Androscoggin/Kennebec estuary (i.e., Merrymeeting Bay) have been documented (Zydlewski 2009, Fernandes et al. 2010). Juveniles typically move upstream in rivers in spring and summer and downstream in fall and winter, but inhabit reaches above the freshwater - saltwater interface. Adults may move into higher salinity areas on a more regular basis (NMFS 1998).

Shortnose sturgeon are a long-lived species. The maximum documented age is 67 years for females, while males seldom exceed 30 years of age (NMFS 1987). In the northern part of their range, females do not spawn until about 18 years of age, while males spawn at about 12 years of age (NMFS 1987). Shortnose sturgeon females typically spawn every three to five years, while males may spawn as often as every one to three years (NMFS 1998). Spawning typically takes place in mid- to late spring when water temperatures reach 8-9°C; spawning ends when the water temperature reaches 12-15°C. Spawning may occur over a period of days to a few weeks. Overall spawning success can be negatively impacted if flows are unusually high during the spawning period (NMFS 1998).

Shortnose sturgeon typically seek the most accessible upstream areas for spawning, and may use a variety of micro-habitats. Channels appear to be important for spawning, which takes place over a variety of substrates (often gravel, rubble, or boulders), in shallow to relatively deep water and in moderate velocities (NMFS 1998).

Eggs are demersal and adhesive and remain near the spawning site. After eggs hatch, larval shortnose sturgeon are poor swimmers, and react negatively to light, instead seeking refuge among crevices and other cover on the bottom near the spawning site (NMFS 1998). After 9-12 days, the yolk sac is absorbed and the young sturgeon actively migrate downstream to locate suitable habitat. Young of year sturgeon typically inhabit deeper freshwater areas, and assume a more migratory behavior in the second summer of life (NMFS 1998).

Juvenile shortnose sturgeon (3 to 10 years old) typically inhabit the saltwater/freshwater interface in the lower reaches of rivers, foraging over fine-grained sand/silt/mud substrates. Juvenile and adult sturgeon can often use the same micro-habitats (NMFS 1998).

Adult shortnose sturgeon often inhabit short reaches of rivers, or concentration areas in summer and winter, where depth, velocity and substrate conditions combine to create favorable habitat for freshwater mussels, a preferred food item. Shortnose sturgeon will also forage in backwaters and in tidal channels under various levels of salinity (NMFS 1998).

Shortnose sturgeon are considered to be omnivorous. Juvenile sturgeon feed on a variety of benthic aquatic invertebrates (crustaceans, insects, worms, mollusks); adults show a preference for mollusks (NMFS 1998).

4.0 STATUS OF LISTED SPECIES IN PROJECT AREA

4.1 ATLANTIC SALMON

Runs of Atlantic salmon and other anadromous fish were once common in the Kennebec River, but have declined since the late 1700s and early 1800s with the industrialization of the river, which contributed to water quality issues, and the construction of dams throughout the river basin, including dams at the outlets of many of the lakes and ponds in the drainage, which prevents full access of migratory fish to historical habitat (NMFS 2013). Commercial harvesting, which has been restricted internationally since 2002, likewise contributed to historically depleted stocks. More recently, information indicates that climate change is having significant impacts on the overall survival and recovery of Atlantic salmon through effects to habitats, hydrologic regimes, environmental cues, and food sources (USFWS and NMFS 2019). Most significantly, however, are the rates of marine survival of GOM DPS Atlantic salmon, which are very low (NMFS' estimated median marine survival of 0.4%) (USFWS and NMFS, 2019 and NMFS, 2013).

Since the 1970s, the state of Maine and federal fishery agencies have undertaken numerous activities and efforts to restore anadromous fish stocks to the Kennebec. These efforts have focused on restoration of American shad, river herring, alewife, and Atlantic salmon. Today, the state of Maine has an established Kennebec River Diadromous Fish Restoration Project, the goal of which is to restore Maine's native diadromous fishes to their historic range and abundance in the watershed. These species include the alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), Atlantic sturgeon (*Acipenser oxyrhinchus oxyrhinchus*), shortnose sturgeon (*Acipenser brevirostrum*), rainbow smelt (*Osmerus mordax*), Atlantic salmon (*Salmo salar*), striped bass (*Morone saxatilis*), Atlantic tomcod (*Microgadus tomcod*), sea lamprey (*Petromyzon marinus*), and American eel (*Anguilla rostrata*) (State of Maine 2019). Major restoration efforts that have been undertaken by the state and federal fishery agencies, along with hydroelectric project and dam owners include:

- 1987 – First Kennebec Hydro Developers Group (KHDG) settlement agreement signed
- 1998 – Second KHDG settlement agreement signed
- 1987 – 1999 DMR stocks nearly 644,000 adult alewife into spawning and nursery habitat
- 1999 – Removal of Edwards Dam (Kennebec River)
- 2002 – Fish passage completed at Plymouth Pond Dam
- 2003 – Fish passage completed at Sebasticook Lake Dam (Sebasticook River)
- 2006 – Fish lift operational at the Lockwood Project (Kennebec River)
- 2006 – Fish lift operational at Benton Falls Project (Sebasticook River)
- 2006 – Fish lift operational at Burnham Project (Sebasticook River)

- 2006 – Removal of Madison Electric Works Project Dam (Sandy River)
- 1987 – 2007 DMR stocks over 37 million American shad fry into spawning and nursery habitat in the main stem river.
- 2009 – Removal of Fort Halifax Dam (Sebasticook River)
- 2001-2018 – Atlantic salmon egg, fry and smolt stocking in the Sandy River
- 2005-2019 – Installation and improvements to various downstream fish passages at Lockwood, Hydro-Kennebec, Shawmut, and Weston hydroelectric projects
- 2017 – Fish lift operational at Hydro-Kennebec Project
- 2019 – Fish lift design plans for Shawmut finalized
- January 2021 – Upstream fishway design plans for Lockwood bypass near finalized
- January 2021 – Upstream fish lift design plans for Weston near finalized

In the 1980s and 1990s, state and federal fishery agencies periodically stocked juvenile life states of Atlantic salmon in the Kennebec River drainage, primarily in the Sandy River. Starting in 2001, an egg planting program was undertaken in the Sandy River, which has become the primary Atlantic salmon hatchery supplementation strategy for the Kennebec River (USASAC 2019). Table 4-1 lists the Atlantic salmon stocking efforts undertaken in the Kennebec River basin in recent years. In addition, in 2020, 88,753 Atlantic salmon smolts were stocked in the mainstem Kennebec below Lockwood (MDMR 2020, personal communication).

TABLE 4-1 NUMBER OF ATLANTIC SALMON STOCKED BY LIFE STAGE IN THE SANDY RIVER

YEAR	EGGS	FRY	PARR	SMOLTS
2001-2008	320,000	169,000	0	0
2009	159,000	2,000	0	200
2010	600,000	147,000	0	0
2011	810,000	2,000	0	0
2012	921,000	2,000	0	0
2013	654,000	2,000	0	600
2014	1,151,000	2,000	0	0
2015	275,000	2,000	0	0
2016	619,000	3,000	0	0
2017	447,000	0	0	0
2018	1,228,000	0	0	0
2019	917,614	0	0	0
2020	672,580	0	0	0

Source: USASAC 2019; MDMR 2020.

Since 2006, returns of adult Atlantic salmon to the Kennebec River have been estimated based on the number of fish captured in the Lockwood fish lift. These totals are shown in Table 4-2[21] and Table 4-3. Table 4-3 provides age and origin information for returning adult salmon. Detailed biological information on all of the Atlantic salmon captured at the Lockwood fish lift since 2006, including date of capture, age, sex, origin, river temperature and river flow is provided in the annual Kennebec River Diadromous Fish Passage Reports (FPL Energy 2006-2011; Brookfield 2012-2018).

Currently, there are no reliable estimates of smolt production in the Sandy River. However, NMFS has estimated smolt production based on egg to smolt survival estimates from the literature to be 1.5% (NMFS 2013). On this basis, cohort estimates for smolt production from recent egg stockings in the Sandy River (Table 4-1) range from 2,385 (2009) to 18,420 (2018). According to NMFS, given that the Sandy River is relatively pristine, it is possible that production could exceed these estimates (NMFS 2013). In fact, some juvenile production data from the Sandy River suggests these smolt estimates are likely low (NMFS 2013). In addition, some amount of natural reproduction is likely occurring in the Sandy River (NMFS 2013).

[21] Since 2006, 19 Atlantic Salmon have been captured during annual spillway flashboard maintenance fish stranding surveys. In coordination with MLP, these fish were trucked by MDMR to the Sandy River and are not reflective in the above Lockwood lift totals.

TABLE 4-2 NUMBER OF ATLANTIC SALMON ADULTS CAPTURED AT THE LOCKWOOD PROJECT

YEAR	NUMBER OF ATLANTIC SALMON CAPTURED	NUMBER TRUCKED TO SANDY RIVER	NOTES
2006	15	15	-
2007	16	16	-
2008	22	22	-
2009	32	26	6 fish were domestic Salmon that had been stocked in the Sandy River in the fall 2008
2010	5	5	-
2011	60	60	-
2012	5	5	-
2013	7	7	-
2014	18	18	-
2015	31	30	1 fish that MDMR thought was a landlocked Salmon was not trucked to Sandy
2016	37	33	4 adult Salmon that were tagged and released downstream of Lockwood as part of a study were not trucked [A]
2017	39	35	4 adult Salmon that were tagged and released downstream of Lockwood as part of a study were not trucked [A]
2018	11	9	2 adult Salmon that were tagged and released downstream of Lockwood as part of a study were not trucked [B]
2019	56	40	16 adult Salmon tagged and released downstream of Lockwood as part of study were not trucked [B]
2020	51	51	

Sources: Brookfield 2020; USASAC 2020.

Notes:

A: Adult Salmon radio tagged and released back downstream by the Licensee in support of required passage studies.

B: Adult Salmon tagged and released downstream in support of a bio-energetic study being conducted by the University of Maine.

TABLE 4-3 ADULT SALMON RETURNS BY ORIGIN TO THE KENNEBEC RIVER 2006-2020*

	HATCHERY ORIGIN				WILD ORIGIN				
YEAR	1SW	2SW	3SW	REPEAT	1SW	2SW	3SW	REPEAT	TOTAL
2006	4	6	5	0	3	2	0	0	15
2007	2	5	0	0	2	6	0	0	16
2008	6	15	1	0	0	0	0	0	21
2009	0	16	0	6	1	10	0	0	33
2010	0	2	0	0	1	2	0	0	5
2011	0	21	0	0	2	41	0	0	64
2012	0	1	0	0	0	4	0	0	5
2013	0	1	0	0	0	7	0	0	8
2014	0	2	0	0	3	13	0	0	18
2015	0	2	0	0	3	26	0	0	31
2016	0	0	0	0	1	38	0	0	39
2017	0	0	0	0	3	25	2	0	40
2018	0	1	0	0	3	7	0	0	11
2019	2	0	0	0	3	49	0	1	55
2020	0	0	0	0	4	46	0	0	50

Source: USASAC 2019, MDMR (2020, preliminary total).
*USASAC totals and totals that Brookfield records at Lockwood may differ.

4.2 ATLANTIC STURGEON AND SHORTNOSE STURGEON

Atlantic and shortnose sturgeon have been documented below the Lockwood Project and elsewhere in the lower Kennebec River. The status of the populations of Atlantic sturgeon and shortnose sturgeon in the Kennebec River is unknown at this time, but in the Status Review of Atlantic sturgeon, it was noted that the Merrymeeting Bay estuary may provide significant habitat for both species (Atlantic Sturgeon Status Review Team 2007).

Prior to the removal of Edwards Dam in 1999, Atlantic and shortnose sturgeon had no access to the river between Edwards Dam and Lockwood Dam. Today, sturgeon have access to the full range of their historic Kennebec River habitat, as Ticonic Falls, the site of the Lockwood Project, is the historical limit of upstream migration for sturgeon on the Kennebec River (NMFS and USFWS 1998)

Because both sturgeon species have access to the Lockwood Project, the Licensee developed and implemented a Sturgeon Handling Plan.[22] The handling plan requires that if sturgeon are found in the fish lift, then certain procedures are implemented. In addition, the Licensee undertakes certain measures to ensure no sturgeon become stranded in the bypass reach during annual (for

[22] Order Issuing New License. 110 FERC ¶ 61,240 (2005).

flashboard replacement) or maintenance drawdowns of the impoundment. All of these procedures are detailed in the Sturgeon Handling Plan as included in the ISPP and as has been periodically updated as part of routine review of the Fish Passage Operations and Maintenance Plan (most recent update provided to the agencies on March 4, 2020).

Since Lockwood fish lift operations began in 2006, no sturgeon have been captured in the fish lift. Since 2003, no sturgeon have been observed to be stranded during periods of lowered river flows and impoundment levels, as a result of Project operations or maintenance.

5.0 POTENTIAL EFFECTS FROM EXISTING CONDITIONS ON LISTED SPECIES

5.1 ATLANTIC SALMON

Hydroelectric projects can affect Atlantic salmon in a variety of ways including hydrologic alteration, habitat alteration, upstream migratory impediment, entrainment/impingement of downstream migrant fishes, and water quality. The four Kennebec Projects are all operated as run-of-river projects and so have little effect on river hydrology (e.g., water quantity) nor on water quality and retention.

Water quality at all four Projects is good both upstream and downstream of the dams, and Project waters at all four Projects generally meet state water quality standards. The Lockwood, Hydro-Kennebec, and Weston projects have all been issued water quality certifications by the Maine Department of Environmental Protection (MDEP). Water quality at the Shawmut Project was recently evaluated as part of the ongoing FERC relicensing effort, and the study data shows that Project waters meet the state standards.[23]

Currently, the portion of the Kennebec River in which the Projects are located serves as an upstream and downstream migration corridor to and from suitable spawning and rearing habitat. It is not known how much the Project dams and impoundments have altered spawning and rearing habitat.

There is limited documented salmon spawning and rearing habitat downstream of the Lockwood Project (NMFS 2013). There is some spawning and rearing habitat between the four Projects primarily in tributaries such as Wesserunsett Stream, which joins the Kennebec River mainstem between the Shawmut and Weston projects. But the majority of the spawning and rearing habitat in the Kennebec River basin lies upstream of the Weston Project in the Sandy River and other major tributaries.

The 2013 BO states that a GIS-based Atlantic salmon habitat model (Wright et al. 2008) indicated that the majority of the spawning and rearing habitat in the Kennebec River basin lies upstream of the Weston Project in the Sandy River and other major tributaries. More recently, NMFS estimated the spawning and rearing habitat below each of the lower Kennebec dams using the Maine Stream Habitat Viewer which includes information regarding surveyed spawning

[23]In a letter dated December 3, 2018, the Maine Department of Environmental Protection concluded that the Shawmut Project impoundment and tailwaters meet applicable water quality standards.

habitat, surveyed rearing habitat, and modeled rearing habitat based on Wright et. al, 2008[24] (D. Tierney, NMFS, Pers Comm., 2019) (Table 5-1).

There is some spawning and rearing habitat between the four Projects, primarily in tributaries such as Wesserunsett Stream, which joins the Kennebec River mainstem between the Shawmut and Weston projects. According to the model, there is also a smaller Salmon habitat in the mainstem of the Kennebec River downstream of the Shawmut, Hydro-Kennebec, and Lockwood projects. Collectively, these 8,725 units of estimated mainstem rearing habitat (Table 5-1) has the potential to produce thousands of smolts annually.[25]

Despite the distribution of some habitat between Lockwood and Weston, it is unlikely that much of this habitat is currently used as pre-spawn Salmon are currently trucked to spawning and rearing habitat in the Sandy River well upstream of Lockwood. However, the 3131 habitat units downstream of Lockwood is currently accessible to pre-spawn adults and could be used for spawning and rearing of juvenile salmon. Although the model does not identify habitat that is suitable for spawning, MDMR has conducted field surveys of mainstem habitat and certain tributaries to identify areas of suitable habitat for Salmon spawning and rearing. These field efforts have identified suitable spawning habitat as close as 300 meters of the Lockwood Project. However, based on redd and electrofishing surveys of the habitat, MDMR has concluded that the habitat is rarely used for spawning (P. Christman, MDMR, Pers. Comm., 2013).

TABLE 5-1 NMFS ESTIMATED SALMON HABITAT BY REACH IN THE LOWER KENNEBEC

REACH	DOWNSTREAM HABITAT UNITS	PERCENTAGE OF TOTAL
Lockwood	3,131	4.3%
HK	2,081	2.9%
Shawmut	3,513	4.9%
Weston	16,576	23.0%
Above Weston*	46,833	64.9%
River Reach Total	**72,134**	**100%**

* Not including the Carrabassett River

[24] This habitat layer predicts the proportion of stream reaches containing Atlantic Salmon rearing habitat within the Gulf of Maine Atlantic Salmon Distinct Population Segment. The model uses 1) slope for stream reaches that are derived from contour and digital elevation model datasets, 2) cumulative drainage area, and 3) physiographic province, to identify stream reaches that have similar characteristics to areas where field crews have identified Atlantic Salmon rearing habitat. Given the predicted values, the legend categories are not distributed across the entire 1-100% range. Categories are: Class 1: Prediction that >50% of modeled reach is suitable habitat; Class 2: Prediction that 26-50% of modeled reach is suitable habitat; Class 3: Prediction that 10-26% of modeled reach is suitable habitat.

[25] Even based on a conservative production assumption of 0.5 smolt per unit of habitat, the collective habitat units below Shawmut have the potential to produce over 4,300 smolts and the collective habitat units below Weston have the potential to produce over 12,000 smolts annually.

The life stages of Atlantic salmon affected by the Projects include adults migrating upstream to spawn and downstream migrating smolts and kelts (Fay et al. 2006). Some of the effects of the Projects on returning Atlantic salmon adults have already been reduced through provision of upstream fish passage facilities (fish lifts) at Lockwood and Hydro-Kennebec, and trap and truck operations from Lockwood. However, while trap and truck operations can be highly effective at moving migrating salmon to upstream spawning areas (Sigourney et.al. 2015), such operations potentially can also result in impacts including injury, disorientation, disease, mortality, delay in migration, and interruption of the homing instinct. (NMFS 2013). Coldwater habitats in the Sandy River mitigate potential negative effects of transportation since the receiving waters are cold, well oxygenated, and provide abundant structural habitats for salmon to hold through the summer and spawn in the fall. The effects of the Projects on returning adult Atlantic salmon are being further reduced through provision of additional authorized upstream fish passage facilities that are in the process of being designed and installed at Lockwood (bypass volitional fishway), Shawmut (fish lift)[26], and Weston (fish lift). Effects to downstream migrating smolts and kelts have been similarly mitigated through the provision of downstream fish bypass facilities at Weston, Shawmut, Hydro-Kennebec, and Lockwood.

Operation of existing upstream and downstream fishways at the four lower Kennebec Projects will continue through the ISPP extension period. Construction of the previously authorized upstream fish passage facilities at Lockwood (bypass) and Weston will also continue through the ISPP extension period.

5.2 ATLANTIC AND SHORTNOSE STURGEON

It is not known how frequently sturgeon may be in the Lockwood Project area. However, the Project is situated at Ticonic Falls which are still partially visible at the Project spillway and would not have been passable by either sturgeon species. Since sturgeon are so rarely captured in the Lockwood fish lift, it seems likely that they infrequently occur in the Lockwood Project tailwaters. Thus, normal Lockwood Project operations should have minimal effect on shortnose and Atlantic sturgeon, or their habitat. There is the potential for sturgeon to be captured in the Lockwood fish lift, or otherwise encountered during Project maintenance activities; for example, during dewatering of the draft tubes for turbine inspection or maintenance activities. However, the likelihood of this occurring is low due to the limited number of sturgeon in the project area. For sturgeon that are captured in the fish lift, there is also a possibility that sturgeon could be affected by handling during the sorting process.

Both sturgeon species have access to the Lockwood Project powerhouse draft tubes, spillway, and existing fish lift. The Licensee has developed and implemented a Sturgeon Handling Plan,

[26] An upstream fish lift for Shawmut was previously authorized under the 2013 ISPP. In July 2020 FERC determined that the proposed Shawmut fish lift would be evaluated in conjunction with the Shawmut Project relicensing project. The December 31, 2019 Shawmut fish lift design is now being proposed as part of the final license application for the Shawmut Project.

which has been in place since 2006 and has been periodically updated. The current handling plan requires that if sturgeon are found in the fish lift or elsewhere in project facilities, that certain procedures are implemented as follows:

- For each sturgeon detected, the weight, length, and condition of the fish are recorded.
- Fish are scanned for PIT tags.
- River flow, bypass reach minimum flow, and water temperature are recorded.
- If alive and uninjured, the sturgeon are immediately returned downstream using specified handling techniques.
- The Licensee reports any live, uninjured sturgeon removed and returned to the river below the Project dam to NMFS within 24 hours.
- If any injured sturgeon are found, the Licensee reports it to NMFS immediately.
- Injured fish are photographed and measured, if possible, and the reporting sheet is submitted to NMFS within 24 hours.
- If the fish is badly injured, the fish is retained by the Licensee until notified by NMFS with instructions regarding potential rehabilitation.
- If any dead sturgeon are found, the Licensee reports it to NMFS within 24 hours.
- Any dead specimens or body parts are photographed, measured, scanned for tags, and all relevant information is recorded.
- Specimens are stored in a refrigerator by the Licensee until NMFS can obtain them for analysis.

Sturgeon may also occur in the Lockwood Project bypass reach. In May 2003, an adult sturgeon, believed to be a shortnose sturgeon, was rescued from a bypass reach pool at the base of Lockwood Dam during annual flashboard replacement. The annual lowering of the Lockwood Project impoundment required to replace flashboards can disrupt bypass flows for short periods (a few hours). During this time, fish could become stranded in isolated pools in the bypass reach. The handling plan includes measures to ensure safe handling of any sturgeon stranded during this period and commits the Licensee to undertaking the following measures to ensure no sturgeon become permanently stranded in the bypass reach during annual (for flashboard replacement) or periodic maintenance drawdowns of the impoundment.

- Designated employees and fish lift operation staff monitor the pools below the dam while the flashboards at the Project are replaced.
- If shortnose or Atlantic sturgeon become stranded in the Lockwood bypass reach, the Licensee returns them to the river downstream.
- For each fish removed from the pool, the weight, length, and condition of the fish is recorded.
- Fish are scanned for PIT tags.

- River flow, bypass reach minimum flow and water temperature are recorded.
- If stranded but alive and uninjured, the sturgeon are moved to the river below the Ticonic Falls in an area that provides egress.
- The Licensee reports to NMFS within 24 hours any live, uninjured sturgeon that are removed and relocated back to the river.
- If any injured sturgeon are found, the Licensee reports it to NMFS immediately.
- Injured fish are photographed and measured, if possible, and a reporting sheet is submitted to NMFS within 24 hours.
- If the fish is badly injured, the fish is retained by the Licensees, if possible, until it can be turned over to a NMFS recommended facility for potential rehabilitation.
- If any dead sturgeon are found, the Licensee reports it to NMFS within 24 hours.
- Any dead specimens or body parts are photographed, measured, scanned for tags and all relevant information is recorded.
- Specimens are stored in a freezer by the Licensee until NMFS can obtain them for analysis.

The Sturgeon Handling Plan will continue to be implemented during the ISPP extension period.

6.0 PROPOSED ACTION AND EFFECTS ANALYSIS

6.1 PROPOSED ISPP EXTENSION

The proposed action being considered in this BA is to extend the terms of the existing ISPPs for the Lockwood, Hydro-Kennebec, Shawmut, and Weston projects until May 31, 2022. Under this proposal, the Licensees would continue to operate the Projects and their associated upstream and downstream fish passage facilities under the terms of the existing ISPPs, and consistent with the terms of the BOs that were issued in 2012, 2013, and 2017 in support of FERC's issuance of the amended Project licenses to incorporate the terms of the ISPPs and any anticipated future BO issued specifically for this ISPP extension request. The Licensees will also continue to finalize plans, obtain permits for, and construct the previously authorized upstream fish passage facilities at Lockwood (bypass) and Weston.

The Lockwood, Hydro-Kennebec, Shawmut, and Weston projects all occur within the range of the endangered GOM DPS Atlantic salmon, and all four are located entirely in designated critical habitat for the species. The continued operation of the Projects may have adverse effects on the GOM DPS of Atlantic salmon and its designated critical habitat. In addition, the Lockwood Project is in designated critical habitat for threatened Atlantic sturgeon and within the known range of endangered shortnose sturgeon.

As discussed in Section 1.1, the Licensees filed a final SPP on December 31, 2019 which included a request to extend take coverage for the previously authorized activities (namely, upstream fish passage construction) to be continued. FERC returned the SPP to the Licensees for further consultation with the agencies in July 2020. In response to that action, in July 2020, the Licensees requested an extension to the existing ISPPs to allow more time for consultation with the agencies on the final SPP while concurrently extending take coverage for the construction of the Lockwood and Weston upstream fish passage facilities, both due for completion by May 2022 and for the operation of the existing upstream and downstream fish passage facilities on the lower Kennebec.

FERC's approval of the ISPP extensions until May 31, 2022 will 1) protect the listed species in the Project areas, and 2) allow the development by NMFS of an Incidental Take Statement (ITS) to account for any unavoidable "take" of each species for the duration of the extension.

The proposal to extend the ISPPs continues the commitments and measures for the protection of GOM DPS of Atlantic Salmon at the Projects. Atlantic salmon will be protected through a combination of continued upstream and downstream passage operations and the completion of previously authorized upstream fish passage facilities at Lockwood (bypass) and Weston. Together these measures will avoid and minimize delay, injury and predation, and will protect critical migration habitat in the Project areas.

Extending the ISPPs also includes the continuation of measures for protecting listed shortnose sturgeon and Atlantic sturgeon at the Lockwood Project through continued implementation of the Sturgeon Handling Plan.

The Licensee is requesting that FERC initiate a single, comprehensive consultation for extending the ISPPs for the four Projects for all three listed species (Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon) with NMFS. Accordingly, it is anticipated that NMFS will issue a single BO for all species and Projects being considered as part of the ISPP extension proposal.

The following sections discuss the anticipated effects of the proposed ISPP extensions on Atlantic salmon. Similarly, measures to be continued to protect shortnose sturgeon and Atlantic sturgeon at the Lockwood Project are discussed in Section 7.2.

6.2 UPSTREAM PASSAGE FOR ATLANTIC SALMON

6.2.1 LOCKWOOD

Under the ISPP extension period the Licensee will undertake the following measures for the Lockwood fish lift and bypass vertical slot fishway:

- Complete construction of a permanent vertical slot fishway to provide volitional passage for Atlantic salmon in the Lockwood bypass reach as previously approved by the FERC license amendment(s). The vertical slot fishway will be installed and operational by a target date of May 2022. Undertake construction under the terms and provisions of applicable fishway construction permits and the BO.
- Continue to operate the main channel Lockwood fish lift annually during Atlantic salmon migration periods (May 1 through October 31) in accordance with provisions of the ISPP and BO, and in consultation with MDMR and the other fisheries agencies.
- Not operate the lift to capture/truck Atlantic salmon when river water temperature is greater than 24.5° C.
- As an additional measure related to the operation of the fish lift, to aid in salmon capture the vee-gate setting will be reduced from the minimum 18-inch wide gap down to approximately 6 inches on September 1.
- As an additional measure, to aid in passage, provide three submerged orifices (3-ft. long by 8-inches high), cut into the flashboards along the spillway.
- Coordinate with MDMR to ensure that the trucking component of the fish lift at Lockwood will continue to be operated for Atlantic salmon, American shad and river herring.
- Undertake measures necessary to keep the Lockwood fish lift in good operating condition. If the fish lift malfunctions or becomes inoperable during the migration period, the fish lift will be repaired and returned to service as soon as it can be safely and reasonably done.
- Maintain records of all fish trapped and/or moved via the fish lift.

- Relocate, if necessary, the upstream eel passage facility in consultation with the agencies.

6.2.1.1 CONTINUED OPERATION OF EXISTING UPSTREAM PASSAGE FACILITY

The Lockwood fish lift has been operational since 2006. Prior to 2016, assessment of adult salmon usage of the fish lift was based primarily on fish lift captures and observation of adult salmon near the fishway entrance and in the tailwater area. Underwater cameras have been used to observe fish behavior at the fish lift entrance as well as to detect fish presence and initiate lifts, as necessary. Over time, modifications have been made to the entrance and attraction flows to improve attraction of fish (including salmon) into the fish lift entrance. A full description of the existing upstream fish passage facility is provided in Section 2.2.2.1.

Under the ISPP extension, the Licensee will continue to operate the Lockwood fish lift during Atlantic salmon migration periods between May 1-October 31. The Licensee will operate the fish lift, trap, sort, and truck facility for Atlantic salmon until permanent volitional passage is installed in the bypass reach. Per MDMR protocol, the Licensee will not operate the lift to capture/move salmon when river water temperatures are greater than 24.5° C.

As an additional measure related to the fish lift operation to aid in upstream salmon capture, the Licensee will reduce the vee-gate setting from the minimum 18-inch wide gap down to approximately 6 inches on September 1. The larger gap width is thought to improve passage into the hopper for river herring and shad. Once those runs are over for the season, the gap is narrowed with the intention of retaining salmon until the vee-gate can be closed. This vee-gate adjustment will be made annually in coordination with the MDMR.

Also as an additional measure, to aid in downstream passage some salmon may also use the three submerged orifices (3-ft long by 8-inches-high), cut into the flashboards along the spillway. The orifices are designed to provide flow through the ledges and pools in the bypass reach and pass a total of approximately 25 cfs of the required 50 cfs minimum flow at normal full pond. The orifices provide additional downstream passage routes along the spillway even when the Project is not spilling over the top of the flashboards. These orifices will continue to be provided during construction of the bypass fishway.

6.2.1.2 PROPOSED CONSTRUCTION OF UPSTREAM FISH PASSAGE FACILITY

Upstream volitional passage at the Lockwood Project was previously authorized under the 2013 ISPP. During Lockwood design efforts in 2014, the agencies suggested that the Licensee propose to FERC that the design and construction of the proposed new volitional fish passage component be postponed, and that the Licensee focus instead on determining why Lockwood's fish lift captures fewer American shad than expected and on working with the resource agencies and stakeholders to find a solution. MLP conducted several years of studies, including upstream shad passage (2015) and adult Atlantic salmon passage (2016 and 2017), to help inform modifications

and design considerations to improve the performance of the existing upstream fish passage facility.

Because studies and observations demonstrated that adult Atlantic salmon are being attracted into the Lockwood bypass reach, in August 2017, after consultation with the fisheries agencies, the Licensee requested a change in approach to providing volitional upstream passage at the Lockwood Project. In accordance with the ISPP and BO and in compliance with the existing Project license and Section 401 water quality certification, the design of the volitional fishway was developed in consultation with the fishery agencies and is being sized to accommodate the anticipated run of Atlantic salmon, American shad and river herring. During design development, the Licensee provided several conceptual designs for agency review, and ultimately a vertical slot fishway design was selected.

In accordance with the ISPP, FERC license, and WQC, Brookfield proposes to construct a vertical slot upstream fish passage facility at the Lockwood Project bypass reach to provide volitional passage for upstream migration of salmon and other anadromous species. The facility was designed in full consultation with NMFS, USFWS, MDMR, MDEP and MDIFW to determine the appropriate fish passage technology for the Lockwood Project and to finalize all aspects of design. The design consultation for supporting studies, and the conceptual 30 percent and 60 percent design efforts are provided in Table 6-1. The 90 percent design consultation/issue for bid meeting is scheduled for February 9, 2021 and the completion and filing of final design plans will occur over the course of February 2021.

TABLE 6-1 LOCKWOOD BYPASS REACH FISH PASSAGE DESIGN CONSULTATION TIMELINE

DESCRIPTION	DATES
Preliminary Design Consultations	
Conceptual Design Agency Meeting	2/7/2019
Conceptual Design Memorandum for Agency Review	4/4/2019
Conceptual Design Memorandum for Agency Review Meeting	4/12/2019
Conceptual Design Memorandum Update	10/7/2019
Conceptual Design Memorandum Update Agency Review Meeting	10/11/2019
CFD Study Results Submittal	3/23/2020
CFD Study Results Agency Meeting	3/27/2020
CFD Study Supplemental Results	4/7/2020
30% Design Consultations	
30% Design Submittal	7/10/2020
Lockwood and Weston Fish Passage Agency Meeting	7/23/2020
60% Design Consultations	
60% Design Submittal	11/5/2020
60% Design Review Meeting	11/10/2020
Supplemental Information Submittal (CFD and Hyd calcs)	11/19/2020
FWS email Response	11/30/2020
90% Design Consultations	
90% Design Submittal	2/3/2021
90% Design Review Meeting	2/9/2021

The vertical slot fishway will be built on the east side of the Kennebec River at the head of the bypass reach. The fish passage facility will be approximately 530-ft. long by approximately 60-ft. wide at its widest point and have a slope of 3.75%. An attraction flow channel will be constructed on the western side of the vertical slot ladder and will be approximately 260-ft. long by 10-ft. wide. Each of the 28 pools will be 16-ft. wide by 20-ft. long, will be connected by a 2-ft. wide full depth vertical slot with a drop of 0.75-ft between pools. The conveyance flow through the vertical slot fishway will range from 50 to 100 cfs, depending on the elevation of the headpond. The minimum depth in the fishway will be 4 ft. A range of 100 to 250 cfs of supplemental auxiliary attraction flow will be provided via a floor diffuser located in the flume just upstream of the fishway entrance. The 8-ft. wide entrance will have a hinged flap gate that will track with the tailwater elevation to maintain an attraction plume of water with a velocity of 4-6 fps and a minimum depth over the gate of 3 ft.

Fishway construction is expected to begin in Summer 2021 when spring river flows recede, and safe river access can be accomplished. The fishway is designed to accommodate 12,000 Atlantic salmon, 210,000 American shad, 150,000 alewife, and 1,200,000 blueback herring. The design of this fishway is undergoing final review and approval, with final design plans targeted for filing with FERC in February 2021, and construction permits were filed January 26, 2021. The facility will be constructed in 2021 and operational by May 2022.

Construction of the Lockwood bypass volitional fishway authorized under the ISPP will result in some short-term effects to Atlantic salmon migration habitat which will be minimized through planned implementation of the conditions included in the 2013 BO issued by NMFS. Further discussion of these effects is provided in Section 6.3.9.

6.2.2 HYDRO-KENNEBEC

The Hydro-Kennebec Project has an installed volitional fish lift facility. The fish lift was installed and became operational in September 2017. Startup and shake down of the fish lift was conducted in September and October 2017. The installed Hydro-Kennebec fish lift is designed to volitionally pass fish into the headpond and is not configured to trap, sort, or truck fish. During the ISPP extension period, the Licensee will continue to operate the fish lift in coordination with MDMR. The Licensee anticipates that MDMR will continue to provide guidance for the duration and frequency of lift operation following camera observations of salmon at the fishway entrance, attempt to capture the salmon, and, if caught, turn them over to MDMR to be trucked to the Sandy River. The Licensee will not operate the lift to capture/truck salmon when river water temperatures are greater than 24.5° C.

In summary, the following measures will be undertaken for upstream salmon passage at the Hydro-Kennebec Project.

- Continue to operate the Hydro-Kennebec fish lift annually, in accordance with provisions of the ISPP and BO, and as determined in consultation with MDMR and the other fisheries agencies.
- Do not operate the lift when river water temperature is greater than 24.5° C.
- Undertake measures necessary to keep the Hydro-Kennebec fish lift in good operating condition. If the fish lift malfunctions or becomes inoperable during the migration period, the fish lift will be repaired and returned to service as soon as it can be safely and reasonably done.
- Maintain records of all fish trapped and/or moved via the fish lift.

6.2.3 SHAWMUT

The Shawmut Project currently has no upstream passage facilities. Accordingly, during the ISPP extension period, interim upstream passage at the Shawmut Project for Atlantic salmon will continue to be provided by trap, sort, and truck operations from the Lockwood fish lift.

Upstream passage for Atlantic salmon and other anadromous species was approved for the Project under the 2013 ISPP, and the Licensee filed proposed design plans for the previously authorized fish lift for the Shawmut Project with FERC in December 2019. The proposed fish lift was designed to accommodate 12,000 Atlantic salmon, 177,000 American shad, 1,535,00 blueback herring, and 134,000 alewives. However, in July 2020 FERC determined that the fish lift design for Shawmut would be evaluated as part of the ongoing Shawmut relicensing process. As a result, it is not yet clear when permanent upstream passage at the Shawmut Project will be operational, and there will be no permanent upstream passage facilities at Shawmut during the interim ISPP extension period.

6.2.4 WESTON

The Weston Project currently has no upstream passage facilities. Upstream volitional passage at the Weston Project was previously authorized under the 2013 ISPP. In the interim, the Licensee will continue to utilize trap and truck operations from the Lockwood fish lift to provide upstream passage for Atlantic salmon at the Weston Project.

In accordance with the ISPP, FERC license, and WQC, Brookfield proposes to construct a fish lift and integrated Attraction Water System (AWS) spillway facility at the Weston Project to provide volitional passage for upstream migration of salmon and other anadromous species. The facility has been designed in full consultation with NMFS, USFWS, MDMR, MDEP and MDIFW to determine the appropriate fish passage technology for the Weston Project and to finalize all aspects of design. The design consultation for supporting studies, and the conceptual 30 percent and 60 percent design efforts are provided in Table 6-2. The 90 percent design consultation/issue for bid meeting is scheduled for February 9, 2021 and the completion and filing of final design plans will occur over the course of February 2021.

TABLE 6-2 WESTON FISH PASSAGE DESIGN CONSULTATION TIMELINE

DESCRIPTION	DATES
Preliminary Design Consultations	
Conceptual Design for Agency Review	7/15/2019
Conceptual Design for Agency Review Meeting	7/16/2019
Allen Email Prelim Design	2/24/2020
Weston Agency Comment Tracker	2/24/2020
Prelim Design Agency Meeting	3/27/2020

30% Design Consultations	
30% Design Submittal	6/23/2020
Lockwood and Weston Fish Passage Agency Meeting	7/23/2020
60% Design Consultations	
60% Design Submittal	10/23/2020
60% Design Review Meeting	11/10/2020
FWS email Response	11/30/2020
90% Design Consultations	
90% Design Submittal	2/3/2021
90% Design Review Meeting	2/9/2021

The Weston fish lift and integrated Attraction Water System (AWS) spillway will be located between the powerhouse and the log sluice on the south channel dam. The total system will be approximately 30-ft. wide by 70-ft. high. An approximate 15-ft. long section of the south channel dam will be removed down to elevation 144 feet to make space for installation of the AWS spillway which will have the capacity of up to 300 cfs and the fish lift has the capacity to pass 220 cfs.

The fish lift structure itself will have a 10-ft. entrance width where the fish will swim into and stay in a hopper with a volume of 490 cubic ft. The fish lift facility will provide a total attraction flow of up to 304 cfs and will have a cycle time of 15 minutes. The attraction flow will be provided via the isolation gate with a wedge wire screen that has 0.25-inch slot widths. Migrating fish will swim into the fish lift entrance (invert elevation of 115 feet), through a V-gate and then into the hopper, which will lift fish from an elevation of approximately 113-feet to an elevation of 165.5-feet where they will be sluiced down the approximately 215-ft. long by 20-inch smooth fiberglass conduit pipe set slope of 2% to an elevation of 159-ft. and exit into the headpond at elevation 156-ft. to continue their migration upstream. A 600-gallon flushing tank will discharge additional flow through the pipe for approximately 30 seconds to ensure fish safely exit the pipe after each lift.

Fish lift construction is expected to begin in Summer 2021 when spring river flows recede, and safe river access can be accomplished. The fish lift is expected to help facilitate the passage of 11,300 Atlantic salmon, 106,000 American shad, 51,000 alewives, and 922,000 blueback herring, per NOAA's design memorandum. The design of this fishway is undergoing final review and approval, with final design plans targeted for filing with FERC in February 2021; construction permits are in development and will be filed in the first quarter of 2021. The facility will be constructed in 2021 and operational by May 2022.

Construction of the Weston fish lift authorized under the ISPP will result in some short-term effects to Atlantic salmon migration habitat which will be minimized through planned

implementation of the conditions included in the 2013 BO issued by NMFS. Further discussion of these effects is provided in Section 6.3.9.

6.3 DOWNSTREAM PASSAGE FOR ATLANTIC SALMON

6.3.1 LOCKWOOD

The Lockwood Project has an installed downstream passage facility consisting of a 10-ft. deep floating guidance boom leading to a bypass gate located in the power canal (Section 2.2.2.2). Based on the results of the smolt studies conducted in 2013, 2014 and 2015, the three-year average station survival rate for Atlantic salmon smolts at the Lockwood Project is 98.6% (Table 6-4). During the ISPP extension period, the Licensee will continue to operate the existing downstream passage facility at Lockwood, and will undertake the following operational measures:

- Continue to operate the Lockwood canal bypass gate and floating guidance boom for utilization by adult and juvenile Atlantic salmon, April 1 through December 31, as river conditions allow.
- Ensure that the canal bypass gate is open and operating to pass the maximum flow through the gate, which is 6% of station unit flow.
- Undertake measures necessary to keep the guidance boom in place and in good operating condition. If the guidance boom becomes dislodged or damaged, repair or replacements to the guidance boom will be made as soon as can be safely and reasonably done.
- When river flow at the Project exceeds about 5,660 cfs, flow in excess of operating turbine capacity (except for pond fluctuations allowed by the license) will be spilled in accordance with the Project's high-water guidelines unless it is determined through consultation with NMFS that additional spill is needed for downstream passage.
- As an additional measure, to aid in passage, provide three submerged orifices (3-ft. long by 8-inches high), cut into the flashboards along the spillway.

6.3.2 HYDRO-KENNEBEC

The Hydro-Kennebec Project has an installed downstream passage facility consisting of a 10-ft. deep floating guidance boom leading to a deep gated bypass slot and plunge pool (Section 2.3.2.2). Based on the results of smolt studies conducted in 2012-2014, the three-year average station survival rate for Atlantic salmon smolts at the Hydro-Kennebec Project is 94.7%. The results of those studies for the Hydro-Kennebec Project are summarized in Table 6-4. During the ISPP extension period the Licensee will continue to operate the existing downstream passage facility at Hydro-Kennebec, and will undertake the following operational measures:

- Continue to operate the downstream bypass and floating guidance boom for utilization by adult and juvenile Atlantic salmon, April 1 through December 31, as river conditions allow.

- Ensure that the bypass is open and operating to pass the maximum flow of 4% of station unit flow.
- Undertake measures necessary to keep the guidance boom in place and in good operating condition. If the guidance boom becomes dislodged or damaged, repair or replacements to the guidance boom will be made as soon as can be safely and reasonably done.

6.3.3 SHAWMUT

Downstream passage for Atlantic salmon at Shawmut is provided through a combination of a sluice, Tainter gate and opened hinged flashboards (see Section 2.4.2.2). The results of downstream smolt studies conducted in 2013, 2014 and 2015 found passage effectiveness and station survival at Shawmut varied considerably depending on river flows, Project operations, and gate openings (see Table 6-4). On whole, the studies found that the 3-year station survival estimate for salmon smolts at Shawmut was 93.5%. Based on 2013-2015 study results and the Licensee's different tests of adding downstream passage through the Tainter gate and lowered flashboard sections, it was concluded that the lowering of one more hinged flashboard section (for a total of four sections), raising the flow from (420 cfs to 560 cfs) was expected to provide adequate flow to allow additional smolts to pass via this route. NMFS, by letter dated May 22, 2017, concluded that the additional measures are expected to result in whole station survival rates of more than 95%. During the ISPP extension period the Licensee will continue to operate the existing downstream passage facilities at Shawmut, and will undertake the following operational measures:

- Continue to operate the forebay bypass gate for utilization by adult and juvenile Atlantic salmon April 1 through December 31, as river conditions allow.
- Ensure that the forebay bypass gate is operated to maintain a flow of 6% of station unit flow through the gate.
- Continue to provide a flow of 600 cfs through the Tainter gate for the smolt passage season.
- Undertake measures necessary to keep the bypass facilities in good operating condition. If the facilities become damaged, repairs will be made as soon as can be safely and reasonably done.
- As an additional measure, drop four sections of hinged flashboard (passing about 560 cfs in total) for the month of May during the smolt passage season.

6.3.4 WESTON

The Weston Project has a downstream passage facility consisting of an existing sluice gate located on the South Channel dam and a 10-foot-deep floating guidance boom (see Section 2.5.2.2). The Licensee evaluated the effectiveness of the Weston bypass in 2012 after the boom was installed in 2011, and again in 2013-2015. In 2012, estimated whole station survival at the

Weston Project ranged from 90% to 94% under median river conditions and from 88% to 94% under low flow river conditions depending on allocated bypass flows. Downstream smolt studies conducted in 2013 – 2015 (see Table 6-4), found that the 3-year average whole station survival estimate at Weston was 95.0%. During the ISPP extension period the Licensee will continue to operate the existing downstream passage facilities at Weston and will undertake the following operational measures:

- Continue to operate the existing (and modified) bypass and floating guidance boom for utilization by adult and juvenile Atlantic salmon from April 1 through December 31, as river conditions allow.
- Ensure that the bypass/sluice gate is operated to maintain a flow of 6% of station unit flow for at least 8 hours per day from April 1 through June 15 for smolts, and between September 15 and December 1 for kelts and eels.
- Undertake measures necessary to keep the guidance boom in place and in good operating condition. If the guidance boom becomes dislodged or damaged, the licensee will repair or replace the guidance boom as soon as can be safely and reasonably done.

6.3.5 EFFECTS OF ISPP EXTENSION ON UPSTREAM PASSAGE FOR ATLANTIC SALMON

For the duration of the ISPP extension term, the Licensee will continue to operate the Lockwood fish lift to facilitate trap and truck passage of Atlantic salmon from below Lockwood Dam to spawning habitat in the Sandy River, above Weston Dam; thereby bypassing the mainstem Kennebec Projects of Hydro-Kennebec, Shawmut, and Weston. The Hydro-Kennebec fish passage facility will continue to be operated, in consultation with the MDMR, to pass any Atlantic salmon that may ascend the bypass reach and spillway portion of Lockwood Dam during high flow events. Atlantic salmon at the Hydro-Kennebec fishway will likewise be transported to the Sandy River.

Since 2006, adult Atlantic salmon returns to the Kennebec River have ranged from 5 to 64 fish (average = 27). Due to the limited availability of adult salmon, very limited upstream salmon passage studies have been conducted at the lower Kennebec River Projects.

In 2016 and 2017, the Licensee conducted Atlantic salmon adult radio-telemetry studies of upstream passage at the Lockwood Project. The results were promising and demonstrated that Atlantic salmon passage rates at the Lockwood fish lift are much higher than was previously estimated by NMFS in the 2013 BO, which were based on studies down at other fish lifts in other river systems. These results also demonstrated that lack of motivation in adult salmon returning to the Kennebec River to continue upstream may not be as problematic as previously thought.

The results of the 2016 and 2017 adult salmon studies also confirmed that some fish were finding the Lockwood bypass channel and ascending the dam. Of the 20 adults tagged in 2017, two

ascended the bypass reach and were able to pass upstream of the dam into the Lockwood impoundment (Normandeau 2018). As a result, the Licensee has, with cooperation from and in consultation with the MDMR, operated the Hydro-Kennebec fish lift to attempt to capture and trap any Atlantic salmon that have made it up into the Lockwood headpond on spill.

In addition, the Licensee proposes to finalize the design of a vertical slot fishway at the Lockwood Dam bypass reach and a fish lift facility at Weston Dam. NMFS' analysis in the previous BOs already concluded that the proposed measures would have a beneficial effect on salmon in general (i.e., the specific designs and locations had yet to be determined). In fact, and NMFS' 2012 and 2013 BiOps have already fully analyzed the proposed actions of providing upstream volitional passage at the Lockwood, Hydro Kennebec, Shawmut and Weston Projects. Among the analysis and conclusions in the BOs (and FERC's associated Biological Assessments[27]) are:

- *The construction of fishways at the Lockwood, Hydro-Kennebec, Shawmut, and Weston Projects will improve access to approximately 70,000 habitat units in the Merrymeeting Bay SHRU. In addition to the 37,105 habitat units available in the Sandy River, the new upstream fishways will improve access to 32,739 habitat units between the Hydro-Kennebec Project and the impassable dams in Madison (Wright et al. 2008). This habitat is primarily located in Bombazee Ripps, Wesserunsett Stream and Carrabassett Stream.*
- *The licensee's proposed project is expected to significantly benefit the distribution of the species by improving upstream and downstream passage at the Projects. The construction and operation of new volitional upstream fishways at the Lockwood, Shawmut, and Weston Projects will improve reproduction since the effects of transporting adult Atlantic salmon around the projects will be eliminated. Although these effects will not come into effect until after 2020, the actions that are proposed for the interim period will facilitate these improvements over the long term.*
- *The proposed ISPP will significantly benefit the distribution of the species by improving upstream passage at the Projects. Improved upstream passage is also expected to improve reproduction of the species since the effects of transporting adult Atlantic salmon around the Projects will be eliminated.*
- *The proposed action will not affect Atlantic salmon in a way that prevents the species from having a sufficient population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring and it will not result in effects to the environment which would prevent Atlantic salmon from completing their entire life cycle, including reproduction, sustenance, and shelter. The above analysis predicts that the proposed project will lead to an improvement in the reproduction and distribution of Atlantic salmon. This is the case because: 1) the new*

[27] FERC April 30, 2012 and March 14 and May 1, 2013 Biological Assessments (BA)

upstream fishways will reduce injury to adult Atlantic salmon that were transported upstream via trap and truck; 2) increased passage will improve the distribution of the species in the Kennebec River; and 3) improved access will increase reproduction in high quality spawning habitat in the upper Kennebec River and thus increase the number of returning Atlantic salmon.

These fishways will be constructed, beginning in the Summer of 2021 with a target operational date of May 2022, pending the requisite permitting and regulatory approvals. Construction activities will be timed to minimize impacts to listed species and will employ Best Management Practices to ensure effects to the aquatic environment are minimized. To that end, the Licensee will adhere to the Terms and Conditions of the 2012, 2013 and 2017 BOs, as applicable, for construction activities and any new Terms and Conditions issued for this ISPP extension. To whit, the following Terms and Conditions will be implemented:

a) Hold a pre-construction meeting with the contractor(s) to review all procedures and requirements for avoiding and minimizing impacts to Atlantic salmon and to emphasize the importance of these measures for protecting salmon.

b) Timing of in-water work: Work below the bankfull elevation should occur outside of the smolt outmigration period (April I to June 15) or within a dewatered cofferdam. The licensee must notify NMFS one week before in-water work begins.

c) Use Best Management Practices that will minimize concrete products (dust, chips, larger chunks) mobilized by construction activities from entering flowing or standing waters. Best practicable efforts shall be made to collect and remove all concrete products prior to rewatering of construction areas.

d) Employ erosion control and sediment containment devices at the Lockwood, Shawmut, and Weston Dams during in-water construction activities. During construction, all erosion control and sediment containment devices shall be inspected weekly, at a minimum, to ensure that they are working adequately. Any erosion control or sediment containment inadequacies will be immediately addressed until the disturbance is minimized.

e) Provide erosion control and sediment containment materials (e.g., silt fence, straw bales, aggregate) in excess of those installed, so they are readily available on site for immediate use during emergency erosion control needs.

f) Ensure that vehicles operated within 150 feet (46 m) of the construction site waterways will be tree of fluid leaks. Daily examination of vehicles for fluid leaks is required during periods operated within or above the waterway.

g) During construction activities, ensure that BMPs are implemented to prevent pollutants of any kind (sewage, waste spoils, petroleum products, etc.) from contacting water bodies or their substrate.

h) In any areas used for staging, access road, or storage, be prepared to evacuate all materials, equipment, and fuel if flooding of the area is expected to occur within 24 hours.

i) Perform vehicle maintenance, refueling of vehicles, and storage of fuel at least 150 feet (46 m) from the waterway, provided, however, that cranes and other semi-mobile equipment may be refueled in place.

j) At the end of each work shift, vehicles will not be stored within, or over, the waterway.

k) Prior to operating within the waterway, all equipment will be cleaned of external oil, grease, dirt, or caked mud. Any washing of equipment shall be conducted in a location that shall not contribute untreated wastewater to any flowing stream or drainage area.

l) Use temporary erosion and sediment controls on all exposed slopes during any hiatus in work exceeding seven days.

m) Place material removed during excavation only in locations where it cannot enter sensitive aquatic resources.

n) Minimize alteration or disturbance of the streambanks and existing riparian vegetation to the greatest extent possible.

o) Remove undesired vegetation and root nodes by mechanical means only. No herbicide application shall occur.

p) Mark and identify clearing limits. Construction activity or movement of equipment into existing vegetated areas shall not begin until clearing limits are marked.

q) Retain all existing vegetation within 150 feet (46 m) of the edge of the bank to the greatest extent practicable.

6.3.5.1 LOCKWOOD

The fish lift at Lockwood has been operational since 2006, and since that time has provided 405 Atlantic salmon with upstream passage. In addition, as a result of the associated trap, sort and truck facilities that have been operated at Lockwood since the fish lift became operational, salmon utilizing the Lockwood fish lift have been successfully trapped and transported upstream of the Hydro-Kennebec, Shawmut and Weston Projects and released into the Sandy River. Thus, since 2006, an estimated 372 Atlantic salmon have been afforded upstream passage past the four lower Kennebec Projects via trap and truck operations from the Lockwood fish lift (see Table 4-2. This passage will continue through the interim ISPP period.

Although salmon utilizing the Lockwood fish lift during the ISPP extension period will continue to be denied volitional passage, the Licensee's and MDMR's experience operating the Lockwood fish lift and associated trap and truck operations have demonstrated that trap and truck is a safe and effective means of moving upstream migrating Atlantic salmon directly into

premier spawning habitat in the Sandy River, thereby avoiding the potential for migration delays. Moreover, since all returning adult Atlantic salmon, as well as all stocked eggs, fry and smolts, have been stocked in the Sandy River, there would seem to be little or no adverse consequence to the lack of "volitional" passage currently associated with the operation of the Lockwood fish lift. In short, any Kennebec origin adult Atlantic salmon returning to spawn would likely be a recruit from the Sandy River, and therefore likely to be returning to the Sandy River to spawn.

Certain disadvantages that are often claimed to be associated with trap and truck passage include holding and handling stress, the potential for reduced passage by other species that will not enter traps, and the need for long-term, guaranteed operational funding for dedicated biological staff, equipment, supplies, vehicles and tanks, etc. However, at Lockwood, these potential impacts have been effectively mitigated through a variety of means. Holding and handling stress are minimized by not collecting salmon after river temperatures reach 24.5 C. Brookfield employs dedicated biological staff to facilitate fishway lift operation and provides funding of $75,000 annually to ensure sufficient staffing coverage for MDMR trucking operations. Also, the Licensee and MDMR use oxygenated and cooled tanks for transport.

Successful mitigation of the potential effects to salmon as a result of trap and truck operations have resulted in trap and transfer of approximately 372 adult salmon with no observed mortalities (ie., 100% survival rate) (P. Christman, Pers Comm., October 26, 2018).

In 2016 and 2017, the Licensee conducted Atlantic salmon adult radio-telemetry studies of upstream passage at the Lockwood Project. In both years, a total of 20 adult salmon were tagged at Lockwood. In 2016, 16 of the 18 test fish which returned to the Project area were recaptured in the fish lift. In 2017, 14 of the 20 test fish were recaptured in the fish lift. When both the 2016 and 2017 study years are considered, a total of 30 of 38 (79%) of tagged adult salmon which returned to the Lockwood Project area were recaptured at the fish lift. The mean duration of time test fish were active downstream of Lockwood from their initial detection until upstream passage was 43.5 days (range = 3.3-123.0 days) during 2016 and 17.0 days (range = 0.7-164.9 days) during 2017.

Upstream fish passage installation was authorized as an element of the 2013 ISPP and, as discussed elsewhere, while preliminarily anticipated to be the construction of a flume connecting the existing lift to the Lockwood headpond, the focus of complying with the requirement for volitional passage at the Lockwood Project shifted to a fishway in the bypass reach, following upstream Atlantic salmon (and shad) studies. Therefore, a vertical slot fishway will be constructed in the bypass reach of the Lockwood Project under the ISPP extension term. The vertical slot fishway design, developed in full consultation with the agencies, is known to be highly efficient for upstream passage of Atlantic salmon and returning adult Atlantic salmon will be provided volitional passage to the river upstream of Lockwood Dam via this passage facility. Provision of the volitional passage via a bypass fishway is expected to significantly increase upstream fish passage efficiency and reduce adult upstream migration delay by providing the fish

with a second upstream passage route, and by reducing the potential for adult salmon to be inadvertently delayed in the bypass reach. The new volitional upstream passage facility could also provide downstream migrating smolts and kelts with another downstream passage route. The bypass reach fishway will be constructed in 2021 and operational by May 2022. The effects to listed species from construction activities in analyzed in Section 6.3.9.1.

Continued operation of the Lockwood fish lift and associated trap and truck program will provide adult salmon upstream passage through the ISPP extension period (May 31, 2022) at which time the new bypass reach fishway will be operational.

6.3.5.2 HYDRO-KENNEBEC

A fish lift was constructed at the Hydro-Kennebec Project in 2016-2017 and became operational in September 2017. Since its completion, the fish lift has seen limited operation for Atlantic salmon (or other species), as all salmon captured at the Lockwood fish lift are trucked upstream of the Hydro-Kennebec, Shawmut, and Weston Projects, and released into the Sandy River. No studies of adult salmon have been conducted at the Hydro-Kennebec fish lift. Operation of the Lockwood fish lift and trap and truck are expected to continue through the ISPP extension period, thereby providing salmon that are captured and trucked a 100% upstream passage rate at the Hydro-Kennebec Project.

The continued operation of the Hydro-Kennebec fishway, specifically to capture Atlantic salmon that may ascend the Lockwood bypass reach in times of spill, will ensure that those returning adult salmon are trucked to the Sandy River and have a chance to spawn with fish trucked from the Lockwood fish lift.

6.3.5.3 SHAWMUT

There are no upstream fish passage facilities at the Shawmut Project. Upstream fish passage installation was authorized as an element of the 2013 ISPP and was anticipated to have been constructed in 2020 and operational in 2021. However, in July 2020, FERC determined that the proposed fish lift for the Shawmut Project would be considered as part of the relicensing proceedings for the Shawmut Project. As a result, it is not now known when upstream fish passage will be constructed and operational at Shawmut. However, operation of the Lockwood fish lift and trap and truck operations will be through the ISPP extension period, thereby providing salmon that are captured and trucked a 100% upstream passage rate at the Shawmut Project.

6.3.5.4 WESTON

There are no upstream fish passage facilities at the Weston Project. Upstream fish passage installation was authorized as an element of the 2013 ISPP. Therefore, an upstream fish lift will be constructed at the Weston Project under the ISPP extension term. The fish lift design,

developed in full consultation with the agencies, is known to be efficient for upstream passage of Atlantic salmon and returning adult Atlantic salmon will be provided volitional passage to the river upstream of Weston Dam via this passage facility. The upstream fish lift will be constructed in 2021, and operational in May 2022. The effects to listed species from construction activities in analyzed in Section 6.3.9.2.

Continued operation of the Lockwood fish lift and associated trap and truck program through the ISPP extension period (May 31, 2022) will provide adult salmon that are captured and trucked a 100% upstream passage rate at the Weston Project.

6.3.6 EFFECTS OF ISPP EXTENSIONS ON DOWNSTREAM PASSAGE FOR SALMON SMOLTS

The Licensee has conducted a number of downstream smolt passage studies at the four Kennebec River Projects, including most recently four years of study under the provisions of the Project ISPPs (2012-2015). These study results provide information that can be used to assess the effects of continued operation of the downstream passage facilities under the ISPP extension period. Table 6-3 summaries the Atlantic salmon smolt studies conducted by the Licensee during 2012-2015 at the Lockwood, Hydro-Kennebec, Shawmut, and Weston projects, under the provision of the ISPPs. The results of the studies are summarized in Table 6-4 which provides 3-year average results for smolt studies conducted over the period 2012-2015. Table 6-4 includes whole station survival estimates based on 3-year averages, and also provides robust estimates for passage route utilization and survival based on all smolts released upstream of a particular project.

TABLE 6-3 SUMMARY OF DOWNSTREAM SMOLT PASSAGE STUDIES CONDUCTED ON KENNEBEC PROJECTS 2012-2015

STUDY YEAR	STUDY REPORT NAME	STUDY DESCRIPTION
2012	*Downstream bypass effectiveness for the passage of Atlantic salmon smolts at the Hydro-Kennebec Project, Kennebec River, Maine* (Normandeau 2012).	Radio-tagged, hatchery-reared Atlantic salmon smolts were released into the Kennebec River upstream of the Hydro-Kennebec Project during the spring 2012 outmigration period to evaluate the effectiveness of the existing downstream bypass structure. Smolt passage data from that release group was coupled with downstream passage data for smolts released below the project (see Normandeau 2012b) to generate an estimate of dam passage survival using a paired release-recapture model.

STUDY YEAR	STUDY REPORT NAME	STUDY DESCRIPTION
2012	*Downstream bypass effectiveness for the passage of Atlantic salmon smolts at the Weston, Shawmut, and Lockwood Projects, Kennebec River, Maine* (Normandeau 2012b)	Radio-tagged, hatchery-reared Atlantic salmon smolts were released into the Kennebec River upstream of the Weston and Lockwood Projects during the spring 2012 outmigration period to evaluate the effectiveness of the existing downstream bypass structures at Weston, Shawmut, and Lockwood.
2013	*Evaluation of Atlantic salmon passage at the Weston, Shawmut, Hydro-Kennebec, and Lockwood Projects, Kennebec River and Brunswick Project, Androscoggin River, Maine, Spring 2013* (Normandeau 2013)	Smolt passage during the spring 2013 outmigration period was assessed using an array of stationary radio-telemetry receivers installed at the Weston, Shawmut, Hydro-Kennebec, and Lockwood, Projects. Radio-tagged, hatchery-reared Atlantic salmon smolts were released upstream and downstream of each Project to facilitate the use of a paired release-recapture model for estimation of dam passage survival.
2014	*Evaluation of Atlantic salmon passage at the Weston, Shawmut, Hydro-Kennebec, and Lockwood Projects, Kennebec River and Brunswick Project, Androscoggin River, Maine, Spring 2014* (Normandeau 2014)	Smolt passage during the spring 2014 outmigration period was assessed using an array of stationary radio-telemetry receivers installed at the Weston, Shawmut, Hydro-Kennebec, and Lockwood, Projects. Radio-tagged, hatchery-reared Atlantic salmon smolts were released upstream and downstream of each Project to facilitate the use of a paired release-recapture model for estimation of dam passage survival.
2015	*Evaluation of Atlantic salmon passage at the Weston, Shawmut, and Lockwood Projects, Kennebec River and Pejepscot and Brunswick*	Smolt passage during the spring 2015 outmigration period was assessed using an array of stationary radio-telemetry receivers installed at the

STUDY YEAR	STUDY REPORT NAME	STUDY DESCRIPTION
	Projects, Androscoggin River, Maine, Spring 2015 (Normandeau 2015)	Weston, Shawmut, and Lockwood, Projects. Radio-tagged, hatchery-reared Atlantic salmon smolts were released upstream and downstream of each Project to facilitate the use of a paired release-recapture model for estimation of dam passage survival.

TABLE 6-4 CURRENT DOWNSTREAM SMOLT PASSAGE ROUTES (PERCENT UTILIZATION) AND WHOLE STATION SURVIVAL RATES (BASED ON 3-YEARS, 2012-2015)

PROJECT	ROUTE	% UTILIZATION[3]	% SURVIVAL[1,2]
Lockwood (2013-2015)	Downstream Bypass	25.0%	98.5%
	Powerhouse		
	Units 1-6	6.6%	98.8%
	Unit 7	7.7%	90.6%
	Spill (Bypass Reach)	57.0%	100.0%
	WHOLE STATION	-	98.6%
Hydro-Kennebec (2012-2014)	Downstream Bypass	39.3%	97.9%
	Powerhouse		
	Unit 1	22.0%	93.2%
	Unit 2	5.3%	82.2%
	Spill	30.6%	100.0%
	WHOLE STATION	-	94.7%
Shawmut (2013-2015)	Downstream bypass	38.7%	97.4%
	Powerhouses		
	Units 1-6	11.6%	92.1%
	Units 7-8	21.1%	93.1%
	Hinged board spill[4]	5.2%	86.7%
	Spillway[4]	21.4%	100.0%
	WHOLE STATION	-	93.5%
Weston (2013-2015)	Downstream Bypass	42.8%	92.8%
	Powerhouse	30.6%	98.3%
	Spill (North Channel)	23.6%	94.7%
	WHOLE STATION	-	95.0%

Notes:

[1] Route-specific percent (%) survival values are based on the full number of radio-tagged smolts determined to have utilized a particular route regardless of release location (i.e., values for Shawmut represent smolts released upstream and downstream of Weston as well as immediately upstream of Shawmut). These values are adjusted to account for background mortality in the section of river between the dam and first downstream receiver.

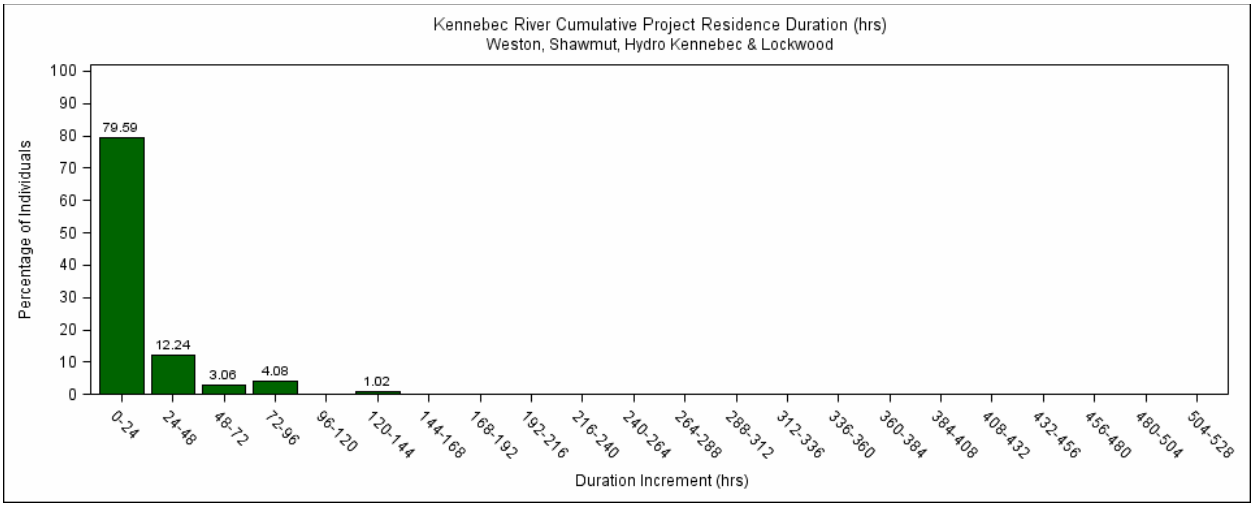
[2] Whole-station survival values represent the three year average at each project location based upon the subset of smolts released immediately upstream of each dam and adjusted for background mortality using passage success of the concurrent subset of smolts released immediately downstream of each dam.

[3] The percent (%) utilization represents the percentage of smolts utilizing a particular route over the three-year study period. Note that totals do not sum to 100% as during some years individuals which approached the project may have failed to pass or did so undetected.

[4] Hinge board spill only available during final release of 2014 study and 2015 study year and refers to smolts passing via the three sections opened adjacent to the power canal. Spillway refers to smolts passing via the central log sluice or Obermeyer sections (not distinguished).

Although smolt movement through a river system may be influenced by factors other than just passage through hydropower project dams and facilities, in the Kennebec, radio-tagged smolt passage results from the 2014-2015 study years provide some information about time of passage through the four Projects (i.e. potential delay). As shown in Figure 6-1, of the nearly 100 radio-tagged smolts released upstream of Weston and confirmed to have successfully passed downstream of Lockwood, approximately 99% did so in 96 or fewer hours of cumulative project residence duration at the four dams. This result suggests that timely downstream passage is being achieved at the four Kennebec Projects.

FIGURE 6-1 DISTRIBUTION OF THE CUMULATIVE RESIDENCE DURATIONS FOR RADIO-TAGGED SMOLTS OBSERVED AT THE WESTON, SHAWMUT, HYDRO-KENNEBEC, AND LOCKWOOD PROJECTS DURING THE 2013 AND 2014 STUDY YEARS



In addition to the route of passage survival estimates outlined above and summarized in Table 6-4, some level of injury to smolts is may occur during entrainment or via passage over Project spillways. Existing information is insufficient to quantify the level of injury.

6.3.6.1 LOCKWOOD

Continued operation of the downstream passage facilities at Lockwood as proposed during the ISPP extension will continue to provide out-migrating smolts with safe, timely and effective passage. Three-year average results for smolt studies conducted over the period 2013-2015 demonstrate that the majority of smolts pass the Lockwood Project via spill into the bypass reach (57.0%) and that the survival rate for these fish is 100%. The downstream bypass at Lockwood is utilized by 24.4% of smolts, with a survival rate of 98.5%. Some smolts pass via Unit 7 (7.7%) with a survival rate of 90.6%; while the remaining 66% of smolts pass through units 1-6, with a survival rate of 98.8%. The resulting whole stations survival estimate for Lockwood, based on three-year average data is 98.6%.

However, as an additional measure, the Licensee provides orifices in the flashboards that provide salmon smolts yet another safe downstream passage route. The flashboard orifices will continue to be provided throughout the construction of the new bypass upstream fishway. This additional measure is expected to further increase whole station survival for downstream passage of Atlantic salmon smolts at Lockwood.

6.3.6.2 HYDRO-KENNEBEC

Continued operation of the downstream passage facilities at Hydro-Kennebec under the terms of the existing ISPP and BO until May 2022 will provide out-migrating smolts with safe, timely and effective passage. Three-year average results of smolt studies conducted over the period 2012-2014 for the Hydro-Kennebec Project demonstrate that 39.3% of smolts are currently using the downstream bypass, and that these fish have a 97.9% survival rate. Other passage routes being utilized by smolts at Hydro-Kennebec include spill (30.6%) with a survival rate of 100% and Unit 1 passage (22.0%) with a survival rate of 93.2%. A small percentage of smolts (5.3%) pass the Project via Unit 2 with a lower survival rate of 82.2%. Overall, the whole station survival rate for salmon smolt at Hydro-Kennebec is 94.7%.

As demonstrated through study (and shown in Table 6-4), it is recognized that spill at the Hydro-Kennebec Project provides a very safe (100% survival) route of passage for juvenile Atlantic salmon. Flows in excess of turbine capacity are generally spilled. Thus, during higher flow spring periods, passage via spill would be expected to provide a greater proportion of overall passage, and therefore increase whole station survival during such years to greater than 95%.

6.3.6.3 SHAWMUT

Continued operation of the downstream passage facilities at Shawmut with the proposed during the ISPP extension period will provide out-migrating smolts with safe, timely and effective passage. The results of studies conducted in 2012-2015 and summarized in Table 6-4, demonstrate that the majority of smolts pass the Shawmut Project via the downstream bypass (sluice gate) (38.7%) and that the survival rate for these fish is 97.4%. The second largest portion of smolts pass via spill (21.4%) with a 100% survival rate. Only 5.2% of fish were found to pass the project via hinged board spill. The resulting whole stations survival estimate for Shawmut, based on three-year average data is 93.5%.

However, since that time, in consultation with the agencies the Licensee has implement additional measures to increase overall smolt survival by opening more flashboard sections and creating more spill. The practice of opening four flashboard sections during the smolt migration season in May will continue through the ISPP extension period and in combination with the other downstream passage measures is expected to provide a whole station survival rate for salmon smolts of 95% or greater.

6.3.6.4 WESTON

Continued operation of the downstream passage facilities at Weston during the ISPP extension period will provide out-migrating smolts with safe, timely and effective passage. The results of studies conducted in 2012-2015 and summarized in Table 6-4, demonstrate that the majority of smolts pass the Weston Project via the downstream bypass (sluice gate) (42.8%). Passage through the powerhouse units is estimated to be 30.6%, but these fish have an excellent survival rate of 98.3%. An estimated 23.6% of smolts pass via spill into the North Channel with a survival rate of 94.7%. The resulting whole station survival estimate for Weston, based on three-year average data is 95.0%.

6.3.7 EFFECTS OF ISPP EXTENSIONS ON DOWNSTREAM PASSAGE FOR SALMON KELTS

Due to the limited availability of adult salmon, downstream passage studies for kelts in the Kennebec are limited to a single pilot study which was conducted at Lockwood during the late-fall and early-winter 2007 (Normandeau 2008). Downstream passage data collection was limited to eleven hatchery-reared Atlantic salmon kelts that were released either just upstream of Lockwood or directly into the Lockwood power canal. The limited observations during this study indicated that 60% of out-migrating kelts passed downstream via spill into the bypassed reach with the remaining fish entering the power canal. Once in the power canal, kelts utilized the downstream bypass (50%) and the single Kaplan unit (Unit 7; 50%).

Although the Kennebec kelt study was limited to a handful of fish, more robust studies of Atlantic salmon kelts have been conducted on the Penobscot River and the results of those studies offer important insights into passage conditions and behaviors that would likely also occur on the lower Kennebec.

In particular, kelt studies conducted in the lower Penobscot River documented that most kelts passed the dams in spilled water, typically over the spillways but also through gates and sluices (Hall and Shepard 1990). Kelts that approached powerhouse intakes were deterred by coarse trash rack spacing and sought alternative routes of passage—typically passing via spillage after hours to days at the site (GNP 1989, Hall, and Shepard 1990). Observation of the initial approach of kelts at the Veazie and Milford projects generally reflected the distribution of flow, whereby the proportion of kelts that approached spillways was correlated with spillway flow (Hall and Shepard, 1990).

Lacking site-specific Kennebec River kelt studies, in support of the 2013 BO, whole station kelt survival for each of the Projects was estimated by integrating river flows, project operating flows, spill effectiveness, downstream bypass effectiveness rates, turbine entrainment rates and spillway and turbine survival rates. The estimates of whole station kelt survival at Weston, Shawmut, and Lockwood Projects under median flow conditions were estimated to be 73%, 89%, and 88%, respectively for these three stations. A similar estimate was assumed for whole station survival of kelts at the Hydro-Kennebec Project and was found to be 73% (NMFS 2012a).

On the Penobscot River, research has shown that adult salmon can drop downstream quickly past many dams. In 2010, eight fish that migrated downstream of Veazie Dam were recaptured 17 days after being released in the Piscataquis River, and "appeared in excellent condition and showed no adverse effects from passing downstream over multiple (seven) dams". MDMR researchers noted that "the presence of dams did not appear to impede downstream movement of motivated salmon and some fish passed seven dams in as many days." (Spencer et al. 2010, 2011). These studies suggest that project trashrack spacing and configuration minimizes or eliminates impingement and directs fish to downstream passage routes, and that at all Projects that have downstream passage facilities, adult salmon would be expected to find safe downstream passage. During periods of no spill (through gates or a fishway sluice), kelts may experience minor passage delay but are still likely to find a safe route of passage through spilled water.

Combined, the Penobscot River kelt studies along with the very small study of kelts conducted at Lockwood suggest that most Atlantic salmon kelts would be expected to pass the lower Kennebec River Projects via spill in the spring, either through gates, over spillways and/or through bypass sluice gates.

6.3.7.1 LOCKWOOD

The Licensee's proposal to operate the Lockwood bypass facilities during the ISPP extension period will also benefit Atlantic salmon kelt downstream passage at the Project. While there are not currently enough returning adult Atlantic salmon to conduct studies of downstream kelt passage, it is likely that the majority of kelts pass the Lockwood project via spill into the bypass reach (57.0%) or through the downstream bypass (sluice gate) (25%), and therefore are currently afforded safe and effective downstream passage at Lockwood. Further, as noted previously the Licensee plans to continue its practice of providing orifices in the spillway flashboards, which should also enhance safe and effective downstream passage for kelts.

6.3.7.2 HYDRO-KENNEBEC

The Licensee's proposal to operate the Hydro-Kennebec bypass facilities during the ISPP extension period will also benefit Atlantic salmon kelt downstream passage at the Project. While there are not currently enough returning adult Atlantic salmon to conduct studies of downstream kelt passage, it is likely that the majority of kelts pass the Hydro-Kennebec Project through the downstream bypass (39.3%) or via spill (30.6%), and therefore are currently afforded safe and effective downstream passage at the Project.

6.3.7.3 SHAWMUT

The Licensee's proposal to operate the Shawmut bypass facilities during the ISPP extension period will also benefit Atlantic salmon kelt downstream passage at the Project. While there are not currently enough returning adult Atlantic salmon to conduct studies of downstream kelt

passage, it is likely that the majority of kelts pass the Hydro-Kennebec Project through the downstream bypass (38.7%) or via spill (21.4%), and therefore are currently afforded safe and effective downstream passage at the Project.

6.3.7.4 WESTON

The Licensee's proposal to operate the Weston bypass facilities during the ISPP extension period will also benefit Atlantic salmon kelt downstream passage at the Project. While there are not currently enough returning adult Atlantic salmon to conduct studies of downstream kelt passage, it is likely that the majority of kelts pass the Weston Project through the downstream bypass (42.8%), another approximately ¼ of kelts (23.6%) likely pass via spill into the North Channel. Passage via these routes affords kelts with safe and effective downstream passage at the Project.

6.3.8 EFFECTS OF ISPP EXTENSION ON STURGEON AT LOCKWOOD

As discussed earlier, it is not known how frequently sturgeon may be in the Lockwood Project area. Since sturgeon are so rarely captured in the Lockwood fish lift, it seems likely that they infrequently occur in the Lockwood Project tailwaters. Thus, normal Lockwood Project operations should have minimal effect on shortnose and Atlantic sturgeon, or their habitat. However, because both sturgeon species have access to the Lockwood Project powerhouse draft tubes and existing fish lift, under the ISPP the Licensee developed and implemented a Sturgeon Handling Plan. The Sturgeon Handling Plan was most recently updated in 2020 (and provided as an appendix to the final SPP filed with the FERC on December 31, 2019), and the plan will continue to be implemented during the proposed ISPP extension period. The handling plan requires that if sturgeon are found in the fish lift or elsewhere in Project facilities, that certain procedures for handling, recording, and reporting are implemented as described in Section 5.2 and in the plan.

Sturgeon may also occur in the Lockwood Project bypass reach. In May 2003, an adult sturgeon, believed to be a shortnose sturgeon, was rescued from a bypass reach pool at the base of Lockwood Dam during annual flashboard replacement. The annual lowering of the Lockwood Project impoundment required to replace flashboards can disrupt bypass flows for short periods (a few hours). During this time, fish could become stranded in isolated pools in the bypass reach. The Sturgeon Handling Plan includes measures to ensure safe handling of any sturgeon stranded in the bypass reach during this period and commits the Licensee to undertake certain measures, as described in Section 5.2, for handling, recording, and reporting any incidences of sturgeon in the bypass reach. The proposed extension of the ISPP, which ensures continuation of the Sturgeon Handling Plan, will ensure no sturgeon become permanently stranded in the bypass reach during annual (for flashboard replacement) or periodic maintenance drawdowns of the impoundment. The potential effects of the Lockwood bypass fishway construction are discussed separately below.

6.3.9 FISHWAY CONSTRUCTION EFFECTS ON ATLANTIC SALMON

6.3.9.1 LOCKWOOD

Construction of the Lockwood bypass volitional fishway authorized under the ISPP will result in some short-term effects to Atlantic salmon migration habitat which will be minimized through planned implementation of the conditions included in the 2013 BO issued by NMFS. Likewise, shortnose and Atlantic sturgeon may be affected by fish lift construction because either species may be present in the vicinity of the Lockwood Project though are not expected to be present in large numbers. As described below, Brookfield has plans in place, during every phase of the construction project, to avoid, minimize and/or mitigate any potential impacts to aquatic habitats, and in particular migratory fish or their habitats.

Brookfield plans to begin construction of the Lockwood fishway in June 2021, upon completion of downstream smolt passage season and when spring river flows recede, and safe river access can be accomplished. The fishway will be built on the east side of the Kennebec River, under the railroad bridge, and over the north dam spillway. Construction is anticipated to be completed and the facility operational by May 2022.

The Lockwood fish lift and downstream fish passage facility will remain in operation during the duration of construction.

Access Road Installation

Construction activities will include the construction of a permanent access road adjacent to Benton Avenue in Winslow. This will involve some tree removal and grading. The upland access area will be surrounded with a silt fence system. It is not anticipated that the upland construction activities will effect salmon or habitats in the area of the bypass reach.

Fishway Construction Mobilization and Cofferdam Construction

The initial phase of fishway construction will involve materials delivery, lowering of the impoundment, and construction of a temporary cofferdam system.

A temporary contractor designed cofferdam will be constructed on the downstream side of the access road and around the fish lift construction area in the tailrace. A small temporary contractor designed cofferdam will also be constructed in the headpond, upstream of the fishway work area. All work will occur in the dry and within cofferdam areas. Turbidity curtain systems will be placed around the cofferdams. Filter fabric and fences will be installed at existing grade levels and sediment will be removed anywhere accumulation reaches 1/3 above the ground height of the fence. These measures will ensure sediment laden waters will not be released into the water way. Dewatering pumps will be used to pump water out of the work area. These pumps will utilize crushed stone and filter fabric to ensure sediment laden waters are not pumped back into the river system.

The temporary cofferdam structure will contribute to a temporary impact of 400 linear feet (LF) of headpond impact and 550 LF of tailwater impact. Installation of the cofferdam will have minor temporary impacts to aquatic habitat availability in the vicinity of the fishway. However, because construction and cofferdam installation will occur outside of the primary Atlantic salmon migration season, there will be no impacts to migratory habitat associated with the cofferdam. Further, the cofferdam will help to avoid any impacts to salmon or sturgeon habitat associated with fishway construction and will allow the major construction work to occur "in the dry."

For safety during cofferdam construction, the Project impoundment will be lowered 1.5 feet. The impoundment drawdown will not exceed a rate of approximately 1-inch per hour. When downstream flow regulation is necessary to raise the impoundment level after construction of the cofferdam, Brookfield will follow a 90/10 refill protocol rate: passing 90% of inflow and allowing 10% of inflow to refill the impoundment. Drawdown of the impoundment by 1.5 feet during the construction period will have no impacts on Atlantic salmon habitat. Because of the riverine nature of the Lockwood impoundment, any small areas of potential rearing habitat located throughout the impoundment should continue to be available to fish during this minimal drawdown.

A permanent crane access pad road base (approximately 2,550 square feet (SF)/950 cubic yards (CY) of fill) will additionally be constructed within the river to connect with the access road and allow for work area access during construction, and to provide access for continued fishway facility maintenance and operation, after construction. A temporary earth fill wet road (approximately 14,060 SF/1,050 CY of crushed stone or gravel fill) will be constructed in river, to facilitate access to the fishway construction area.

Because the activities associated with the installation of the cofferdam could potentially affect Atlantic salmon and other fish species in the construction area that may become trapped and stranded within these cofferdams during construction, Brookfield will develop a Fish Stranding Plan in consultation with NMFS, USFWS, MDMR and MDIFW, to avoid and minimize effects to fish specific to injury or mortality associated with stranding.

Specifically, immediately following closure of each cofferdam, on-site personnel will thoroughly inspect the entire dewatered areas for evidence of fish through visual observation and will promptly notify MDMR in the event fish are observed in the area. Should Atlantic salmon, sturgeon, or any fish greater than 20 inches in size be discovered, dewatering of the cofferdam area will cease to allow recovery without additional stressors. Fish will then be collected via long-handled, non-abrasive net or by herding into a rubber sock, and moved into the adjacent headpond or bypass reach. If cofferdams overtop due to a high flow event, the cofferdam will be visually resurveyed for fish prior to dewatering. If any injured Atlantic salmon or sturgeon are observed, dewatering will cease and Brookfield will report immediately to the NMFS and MDMR. Injured fish will be retained; photographed and measured, if possible, and reported to

NMFS within 24 hours; and transferred to MDMR. If any dead Atlantic salmon or sturgeon are observed, Brookfield will report to NMFS within 24 hours and dead specimens or body parts will be stored in a refrigerator and transferred to MDMR.

Demolition and Bedrock Removal

The next phase of work involves in-river bedrock removal and removal of the north spillway, to prepare for the fishway system construction:

- In-river bedrock excavation will occur in the proposed fishway footprint. These areas will be excavated to various slopes and elevations, in order to prepare the bedrock surface for the fish ladder. Bedrock excavation and rock removal will be completed utilizing blasting and mechanical methods such as excavator mounted hoe rams. Bedrock material (approximately 28,140 SF/2,985 CY) will be removed from the river.
- The north concrete spillway (approximately 3,700 SF/1,340 CY) will be removed, in order for the fishway, two crest gates, and flood wall to be placed in the spillway footprint. Both excavator mounted and handheld equipment (jack hammers, etc.) along with diamond saws and/or diamond wire tools will be utilized to remove the concrete spillway.
- Any excavated materials and/or spoils will be transported and disposed of in accordance with local, state, and federal regulations. No spoils will be stored on site.

Excavation of the bypass reach fishway is expected to have minimal effect on fisheries and Atlantic salmon critical habitats in that reach. This section is dominated by scoured bedrock and will be replaced with a volitional fishway providing egress for migratory species. Blasting and heavy machinery are expected to create noise disruptions and vibrations in the waterway. Should blasting be required during time periods when upstream migrating Atlantic salmon or Atlantic or shortnose sturgeon may be present in the bypass reach, Brookfield will develop a Blasting Plan in consultation with the agencies.

Fishway Construction

The fishway will be built on the east side of the Kennebec River at the head of the bypass reach channel. The vertical slot fishway will measure approximately 530-feet-long by approximately 60-feet-wide at its widest point. An attraction flow channel will be constructed on the west side of the vertical slot ladder and will be approximately 260-feet-long by 10-feet-wide.

To allow for fish passage system construction, in-river bedrock removal will occur and the concrete spillway will be removed. The fishway and attraction flow channel will be installed within the removed north spillway section along with two 71-foot-wide crest gates, and a 92-foot-long concrete floodwall, to replace spillway capacity. The two crest gates (approximately 2,860 SF/530 CY of fill) will replace the spillway west of the installed fishway, and the concrete

floodwall (approximately 2,030 SF/1,140 CY of fill) will be built to replace the spillway section east of the fishway. Concrete fill (approximately 23,390 SF/10,010 CY) will be placed over the excavated areas where the fishway will be secured; forms will be set and concrete pump trucks will be used.

As indicated above, the placement of fill will be undertaken behind cofferdams in the dry. There are no anticipated effects to fisheries resources from these activities.

Site Restoration and Demobilization

Upon completion of the fishway and associated crest gates, and floodwall construction, the impoundment will again be lowered 1.5 feet to allow for the contractor designed temporary cofferdam system to be removed. The turbidity curtain outside of the cofferdam system will be removed next. The work area and access road area will be cleaned and disturbed areas will be seeded with native seed mix. The upland silt fence system will be removed after the area is stabilized. This demobilization and restoration sequence will avoid any long term impacts to salmon and sturgeon habitat.

Summary

The composition and quantity of material proposed to be dredged, excavated, or placed as fill on a temporary or permanent basis, for the fishway construction is located in Table 6-5. Construction is anticipated to be completed and the facility operational by May 2022. This demobilization and restoration sequence will avoid any long term impacts to salmon and sturgeon habitat.

TABLE 6-5 LOCKWOOD FISHWAY EXCAVATION AND FILL QUANTITIES IN WATERS OF THE UNITED STATES*

ITEM	TEMPORARY FILL (SF/LF/CY)	EXCAVATED FILL (SF/CY)	PERMANENT FILL (SF/CY)
Temporary Dewatered Work Area Headpond/Tailwater	48,450 SF/73,720 SF		
Cofferdam Length Headpond/Tailwater	400 LF/550 LF		
Temporary Fill for Cofferdam Headpond/Tailwater	3,700 CY/8,140 CY		
Temporary Area for Wet Road Headpond/Tailwater	4,000 SF/10,060 SF		
Temporary Volume for Wet Road Headpond/Tailwater	300 CY/750 CY		
Permanent Earth Fill Area/Volume			9,090 SF/2,330 CY

ITEM	TEMPORARY FILL (SF/LF/CY)	EXCAVATED FILL (SF/CY)	PERMANENT FILL (SF/CY)
Permanent Crane Pad Fill Area/Volume			2,550 SF/950 CY
Headpond Bedrock Excavation Area/Volume		5,710 SF/590 CY	
Tailrace Bedrock Excavation Area/Volume		19,570 SF/2,310 CY	
Concrete Demolition Area/Volume		3,700 SF/1,340 CY	
Crest Gate Bedrock Excavation Area/Volume		2,860 SF/85 CY	
Permanent Concrete Headpond Area/Volume			5,530 SF/2,350 CY
Permanent Concrete Tailrace Area/Volume			17,860 SF/7,660 CY
Permanent Concrete Flood Wall Area/Volume			2,030 SF/1,140 CY
Permanent Concrete Crest Gate Area/Volume			2,860 SF/530 CY

*Material quantities from 60% Design

The mainstem Kennebec River serves as an important migratory corridor for adult Atlantic salmon migrating upriver to spawning habitat between May and October, as well as to out-migrating smolts between April and June and out-migrating kelts in early winter and spring. Potential effects associated with in-water construction generally include inhibiting fish passage, increasing noise and suspended sediment levels, causing direct injury and mortality during construction, and potentially spilling toxic substances (e.g., equipment leaks). The Lockwood interim upstream fish passage trap and truck facility will continue to move pre-spawn Atlantic salmon from Lockwood upriver to spawning and rearing habitat in the Sandy River. As work will be undertaken behind cofferdams, with appropriate stranding measures in place, the risk to injury and mortality is reduced. Appropriate Best Management Practices and a construction Soil Erosion and Sedimentation Plan, as required by the 2013 BO, will reduce the opportunities for suspended sediment and the proposed Blasting Plan will ensure protection from noise disruptions and vibrations in the waterway.

The plans and procedures described above are fully consistent wilt the terms and conditions included in the July 2013 BO for the authorized volitional fishway construction at Lockwood. These conditions include in-water work restrictions, adherence to Best Management Practices, and pollution and sediment controls. Construction of the fishway in accordance with the BO's terms and conditions, as proposed, will minimize any short-term impacts to Atlantic salmon, salmon migration habitat, or Atlantic or shortnose sturgeon. In-water work will be minimal, and to the extent possible will occur outside of the smolt and kelt outmigration periods and within the confines of the dewatered cofferdam area.

6.3.9.2 WESTON

Construction of a fish lift system at Weston authorized under the ISPP may have some short-term effects on Atlantic salmon, though the effects of the construction are likely to be restricted to the migration habitat immediately downriver of the Weston Project facilities. Shortnose and Atlantic sturgeon will not be affected by fish lift construction because neither species is present in the vicinity of the Weston Project and construction effects will be limited to the immediate Weston tailwater area.

Brookfield plans to begin construction in June 2021 upon completion of downstream smolt passage season and when spring river flows recede, and safe river access can be accomplished. The fishway will be built adjacent to the log sluice between the powerhouse and the South Channel Dam. Construction is anticipated to be completed and the facility operational by May 2022.

Access Road Installation

Construction activities will include the construction of a temporary access road adjacent to Mill Street in Skowhegan. This will involve some tree removal and grading. The upland portion of the access area will be surrounded with a silt fence system. It is not anticipated that the upland construction activities will effect salmon or habitats in the area of the bypass reach. To access the site a gravel parking area adjacent to mill street will be utilized as a staging area. The lower portion of the access road will be developed partially into the waterway. This access road will account for 830 CY of fill within the waterway. All access areas will be surrounded by appropriate erosion and sediment control measures.

Fishway Construction Mobilization and Cofferdam Construction

A temporary contractor designed cofferdam will be constructed on the downstream side of the access road and around the fish lift construction area in the tailrace. A small temporary contractor designed cofferdam will also be constructed in the headpond, upstream of the fish lift work area. All work will occur in the dry and within cofferdam areas. Turbidity curtain systems will be placed around the cofferdams. Filter fabric and fences will be installed at existing grade levels and sediment will be removed anywhere accumulation reaches 1/3 above the ground height of the fence. These measures will ensure sediment laden waters will not be released into the water way. Dewatering pumps will be used to pump water out of the work area. These pumps will utilize crushed stone and filter fabric to ensure sediment laden waters are not pumped back into the river system.

The temporary cofferdam structure will contribute to a temporary impact of 90 LF of headpond 480 LF of tailwater impact. The upstream cofferdam will account for approximately 760 CY of fill and will leave an approximately 870 SF area dewatered. The downstream cofferdam will account for approximately 4,910 CY of fill and leave an approximately 52,820 square foot area

dewatered below the dam. Installation of the cofferdams will have some minor temporary impacts to aquatic habitat availability in the vicinity of the fishway. However, because construction and cofferdam installation will occur outside of the primary Atlantic salmon migration season, there will be no impacts to migratory habitat associated with the cofferdam. Further, the cofferdam will help to avoid any impacts to salmon or sturgeon habitat associated with fishway construction and will allow the major construction work to occur "in the dry."

For safety during cofferdam construction, a minor drawdown of up to 4 feet to facilitate the installation of the upstream cofferdam is planned. The impoundment drawdown will not exceed a rate of approximately 1-inch per hour. When downstream flow regulation is necessary to raise the impoundment level after construction of the cofferdam, Brookfield will follow a 90/10 refill protocol rate: passing 90% of inflow and allowing 10% of inflow to refill the impoundment. The drawdown is anticipated to be in keeping with periodic drawdowns that have occurred at this station for routine maintenance activities and will be undertaken over a period of time to reduce the likelihood of stranding aquatic organisms.

Because the activities associated with the installation of the cofferdam could potentially affect Atlantic salmon and other fish species in the construction area that may become trapped and stranded within these cofferdams during construction, Brookfield will develop a Fish Stranding Plan in consultation with NMFS, USFWS, MDMR and MDIFW, to avoid and minimize effects to fish specific to injury or mortality associated with stranding.

Specifically, immediately following closure of each cofferdam, on-site personnel will thoroughly inspect the entire dewatered areas for evidence of fish through visual observation and will promptly notify MDMR in the event fish are observed in the area. Should Atlantic salmon, sturgeon, or any fish greater than 20 inches in size be discovered, dewatering of the cofferdam area will cease to allow recovery without additional stressors. Fish will then be collected via long-handled, non-abrasive net or by herding into a rubber sock, and moved into the adjacent headpond or bypass reach. If cofferdams overtop due to a high flow event, the cofferdam will be visually resurveyed for fish prior to dewatering. If any injured Atlantic salmon or sturgeon are observed, dewatering will cease and Brookfield will report immediately to the NMFS and MDMR. Injured fish will be retained; photographed and measured, if possible, and reported to NMFS within 24 hours; and transferred to MDMR. If any dead Atlantic salmon or sturgeon are observed, Brookfield will report to NMFS within 24 hours and dead specimens or body parts will be stored in a refrigerator and transferred to MDMR.

Demolition and Bedrock Removal

Once the cofferdam structures are set up and the work area is dry some bedrock and a small portion of the existing dam will be removed to prepare the area for the installation of the fish lift. Blasting will not be utilized for the removal of bedrock for this project. All excavated materials will be transported and disposed of in accordance with local, state, and federal regulations.

- In-river bedrock excavation will occur in the proposed fishway footprint. These areas will be excavated to various slopes and elevations, in order to prepare the bedrock surface for the fish lift and entrance. Bedrock excavation and rock removal will be completed utilizing mechanical methods such as excavator mounted hoe rams. Bedrock material (approximately 2,740 SF/800CY) will be removed from the river.
- A 360 SF/170 CY of the south channel dam will be removed, in order for the fishway exit flume to be placed. Handheld equipment (jack hammers, etc.) along with diamond saws and/or diamond wire tools will be utilized to remove the concrete.
- Any excavated materials and/or spoils will be transported and disposed of in accordance with local, state, and federal regulations. No spoils will be stored on site.

Fishway Construction

The fish lift structure will be constructed on the South Channel dam of the Weston Project and will be located between the existing powerhouse and log sluice. The fish lift system will contain a hopper capable of holding 490 cubic ft of water that in 15-minute intervals will lift fish to a 20-inch smooth fiberglass exit pipe that leads into the Weston impoundment.

Construction activities will begin with the removal of bedrock and a small portion of the dam between the existing powerhouse and log sluice, bringing the elevation of this section of the dam from 156 ft msl to 144 ft msl to prepare for instillation of the fish lift structure. The fish lift structure will be installed in the prepared area between the existing powerhouse and log sluice on the south channel dam. The fish lift will include an attraction water system (AWS) auxiliary spillway, a fish hopper, entrance and upstream screens, and an exit pipe. This area measures approximately 30.71 feet wide and will house the entire system. The entrance, entrance gate, hopper, upstream screen, and orifice panel weir will extend another 73.9 feet downstream from the downstream edge of the powerhouse. The fish lift structure itself will contribute to 200 SF/90 CY of permanent fill in the headpond, and 3,220SF/2,320 CY of permanent fill in the tailrace.

As indicated above, the placement of fill will be undertaken behind cofferdams in the dry. There are no anticipated effects to fisheries resources from these activities.

Site Restoration and Demobilization

Once construction is completed, the work area will be cleaned up inclusive of removing all components of the gravel access road and parking area. The impoundment will again be lowered up to 4 feet to allow for the contractor designed temporary cofferdam system to be removed.

To help ensure clean-up of temporary access road and parking areas, fabric will be placed under these areas at the time of their construction. Cofferdam structures will then be removed, followed by the turbidity curtains, and Brookfield will pass 15 cfs over the new concrete structures as appropriate. All access areas and laydown areas will then be returned to their natural state and

reseeded and replanted, as necessary. This demobilization and restoration sequence will avoid any long impacts to salmon and sturgeon habitat.

Summary

The composition and quantity of material proposed to be dredged, excavated, or placed as fill on a temporary or permanent basis, for the fishway construction is located in Table 6-6. Construction is anticipated to be completed and the facility operational by May 2022. This demobilization and restoration sequence will avoid any long impacts to salmon and sturgeon habitat.

TABLE 6-6 WESTON FISHWAY EXCAVATION AND FILL QUANTITIES IN WATERS OF THE UNITED STATES*

ITEM	TEMPORARY FILL (SF/LF/CY)	EXCAVATED FILL (SF/CY)	PERMANENT FILL (SF/CY)
Temporary Dewatered Area Headpond/Tailrace	870 SF/52,820 SF		
Cofferdam Length Headpond/Tailrace	90 LF/480 LF		
Temporary Fill for Cofferdam Headpond/Tailrace	760 CY/4,910 CY		
Access Road Area/Volume	11,100 SF/830 CY		
Bedrock Excavation Area/Volume		2,740 SF/800CY	
Concrete Area Headpond/Tailrace			200 SF/3,220 SF
Concrete Volume Headpond/Tailrace			90 CY/2,230 CY

*Material quantities from 60% Design

The mainstem Kennebec River serves as an important migratory corridor for adult Atlantic salmon migrating upriver to spawning habitat between May and October, as well as to out-migrating smolts between April and June and out-migrating kelts in early winter and spring. Potential effects associated with in-water construction generally include inhibiting fish passage, increasing noise and suspended sediment levels, causing direct injury and mortality during construction, and potentially spilling toxic substances (e.g., equipment leaks). Interim upstream fish passage at the Weston project involves trapping and trucking pre-spawn Atlantic salmon from Lockwood upriver to spawning and rearing habitat in the Sandy River. Therefore, no pre-spawn Atlantic salmon will be in the vicinity of the Weston Project at the time of construction. In addition, as work will be undertaken behind cofferdams, with appropriate stranding measures in place, the risk to injury and mortality is reduced. Appropriate Best Management Practices and a construction Soil Erosion and Sedimentation Plan, as required by the 2013 BO, will reduce the opportunities for suspended sediment.

Implementation of the terms and conditions included in the July 2013 BO for the authorized fish lift construction at Weston will minimize any short-term impacts to Atlantic salmon migration habitat for out-migrating smolts and kelts. These conditions include in-water work restrictions, adherence to Best Management Practices, and pollution and sediment controls. In-water work will be minimal, and to the extent possible will occur outside of the smolt and kelt outmigration periods and within the confines of a dewatered cofferdam. By ensuring in-river construction occurs outside of the outmigration period effects to out-migrating smolts and kelts will be minimized.

6.3.10 Effects of Bypass Fishway Construction on Sturgeon at Lockwood

Sturgeon are believed to occur infrequently in the Lockwood Project area. However, there is at least one known event of a sturgeon being stranded in the Lockwood Project bypass reach. In May 2003, an adult sturgeon, believed to be a shortnose sturgeon, was rescued from a bypass reach pool at the base of Lockwood Dam during annual flashboard replacement. Since then no other incidences of sturgeon occurring in the bypass reach have been observed. However, the May 2003 occurrence demonstrates that under certain high flow conditions, sturgeon may make their way into the bypass reach.

Planned fishway construction in the Lockwood bypass reach has the potential to affect sturgeon that may occur in the bypass during high flow events that result in spillage in the bypass. However, because in-water work will be minimal and will occur during periods when flow in the bypass reach is typically very low, and because it is likely that sturgeon use of the bypass reach is limited to periods of high flow in the reach, it is not anticipated that the planned fishway construction will affect shortnose or Atlantic sturgeon.

The majority of construction activities will occur in the dry behind cofferdams, as discussed above. The Licensee's Sturgeon Handling Plan for the Lockwood Project provides for safe handling of any Atlantic or shortnose sturgeon that may be encountered at the Project, including during fishway construction. Provisions of the plan related to potential stranding of sturgeon in the Lockwood bypass reach during Project operations will be implemented throughout the bypass fishway construction period and are expected to ensure no sturgeon become permanently stranded in the bypass reach during fishway construction or behind cofferdams or in the event that drawdowns of the impoundment are required. The Licensee will review the Sturgeon Handling Plan with the agencies prior to the commencement of fishway construction to ensure that measures are in place that would ensure sturgeon safety during all phases of fishway construction.

7.0 DETERMINATION OF EFFECTS

Based on the analyses contained in this BA, the determination of effect of the proposed extension of ISPPs for Atlantic salmon (and its designated critical habitat), shortnose sturgeon, and Atlantic sturgeon is provided below.

7.1 ATLANTIC SALMON

As discussed in Section 6.0, extending the term of the ISPPs until May 31, 2022 while continuing the operation of the Lockwood, Hydro-Kennebec, Shawmut, and Weston Projects with the fish passage measures and facilities previously authorized and operated under the ISPPs, the related FERC license amendments, and the terms of the 2012 and 2013 BOs, is likely to adversely affect (LAA) a small proportion of GOM DPS Atlantic salmon at the Projects. While these effects are detailed within this BA and summarized below, the duration of this activity is brief; generally impacting one but potentially up to two passage seasons.

The LAA determination for the Lockwood, Hydro-Kennebec, Shawmut, and Weston Projects is based on the likelihood that a portion of upstream migrating adult salmon may not utilize the Lockwood Project fish lift and therefore be unable to reach the Sandy River spawning habitat. Overall, about 20% of adult salmon are likely to be prevented from passing all four Project dams and reaching Sandy River spawning habitat. During the extension period the Licensees will continue operate the upstream fish passage facilities at Lockwood and Hydro-Kennebec to try to minimize this affect.

Downstream migrating smolts and kelts are also likely to be adversely affected as a result of the extension of the ISPPs until May 31, 2022. Downstream passage whole station survival estimates for the four Projects range from a high of 98.6% at Lockwood to a low of 93.5% at Shawmut, and result in a cumulative downstream passage survival rate for smolts of 82.9%. However, additional measures that have been instituted at the Projects and which will be continued during the ISPP extension period, including particularly the dropping of four hinged flashboards at Shawmut during the smolt migration season, is likely to improve the cumulative smolt survival rate. Although there is no site-specific information on kelt survival on the lower Kennebec, kelts are also likely to be adversely affected by the ISPP extension at rates similar to smolts. The Licensee will continue to manage the four Projects to avoid or minimize the effects on smolts and kelts through the continued operation of the downstream fishways previously authorized under the ISPPs, and the additional fish protection and enhancement measures that have been instituted at the Projects under the terms and conditions of the 2012 and 2013 ISPPs and BOs and any new BO issued for this ISPP extension. In addition it is important to note, that any minor impacts to aquatic habitats in general, and listed species habitats in particular, are temporary and very short-term; really just a single fish passage season.

Extending the ISPP term to include the period of construction of new fishways at Lockwood (bypass) and Weston is not likely to adversely affect upstream or downstream migrating Atlantic salmon. There may be some short-term effects on Atlantic salmon migration habitat, but such affects will be minimized by the Licensee's plans during fishway construction to implement best management practices and the conditions included in the 2013 BO issued by NMFS.

The Licensee foresees no overall destruction or adverse modification of critical habitat as a result of extending the terms of the ISPPs, though there will be continued effects to the migratory primary constituent elements (PCEs) of the critical habitat designated for Atlantic salmon (see discussion in Section 1.0). The measures to promote restoration of GOM DPS Atlantic salmon in the Kennebec River, as undertaken through previous and ongoing implementation of the provisions of the ISPPs, including fishway construction, have resulted in improvements to upstream and downstream fish passage measures at the Lockwood, Hydro-Kennebec, Shawmut, and Weston Projects over the years. Continuation of the ISPP measures and the terms and provisions of the 2012 and 2013 BOs, including operation of fish passage facilities, monitoring, consultation, and annual reporting, as well as fishway construction at Lockwood and Weston, will ensure protection and/or appropriate mitigation for migratory PCEs for GOM DPS Atlantic salmon. The Proposed Action to extend the terms of the ISPPs until May 31, 2022 with the continued operation of the Project fishways and the construction of new upstream fishways at Lockwood (bypass) and Weston, as described herein, is expected to minimize adverse effects to Atlantic salmon and its critical habitat.

7.2 SHORTNOSE STURGEON AND ATLANTIC STURGEON

Due to the limited occurrence of sturgeon species at the Lockwood Project, extending the term of the ISPP, including continued implementation of the Sturgeon Handling Plan would have minimal or no effect on shortnose sturgeon or Atlantic sturgeon. There is a possibility that sturgeon could be captured in the fish lift trap and handled during the sorting process, or stranded in the bypass reach, or trapped during planned dewatering of the draft tubes for turbine inspection or maintenance activities, or during fishway construction. If any of these occur, Licensee staff would take the steps specified in the Sturgeon Handling Plan (Appendix A of the SPP) to return the sturgeon to the river downstream of the Project. Implementation of the Sturgeon Handling Plan will provide for safe handling of any Atlantic or shortnose sturgeon that may be encountered by personnel during fish lift operations, construction, or maintenance activities. However, the handling of any sturgeon collected in the fishway or stranded in the bypass reach would constitute a take under ESA. Therefore, the Proposed Action is likely to adversely affect (LAA) a small number of sturgeon at the Lockwood Project.

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