



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930

June 18, 2024

Debbie-Anne A. Reese, Acting Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: Comments on Brookfield White Pine Hydro LLC's Pre-Application Document for the Brunswick Hydroelectric Project (P-2284), FERC's Scoping Document, and ILP Study Requests

Dear Acting Secretary Reese:

On February 21, 2014, Brookfield White Pine Hydro LLC (Brookfield or BWPH) issued a Notice of Intent to file a license application and Pre-Application Document (PAD) for the Brunswick Hydroelectric Project (P-2284). On April 16, 2024, FERC issued its Scoping Document 1, soliciting comments and study requests.

Attached for filing, please find our comments on the PAD and Scoping Document. In addition, we are including requests for five studies. If you have any questions or need additional information, please contact Matt Buhyoff (Matt.Buhyoff@noaa.gov).

Sincerely,

for

Jennifer Anderson
Assistant Regional Administrator
for Protected Resources

Attachment (Comments/Study Requests)

cc: Service List



**Attachment to June 18, 2024 Letter
Brunswick Relicensing
National Marine Fisheries Service Comments and Study Requests**

1 PROJECT BACKGROUND

The Brunswick Hydroelectric Project (Brunswick or Project) is the first obstruction on the Androscoggin River, spanning the width of the river in the towns of Brunswick and Topsham, Maine. The project consists of a dam, spillway, fish passage facilities, a powerhouse containing three propeller-style turbine generators, and ancillary equipment. The project has a normal pool elevation of 39.4 feet, has a reservoir surface area approximately 300 acres extending 4.5 miles upstream.

2 FEDERAL STATUTORY REQUIREMENTS

We have a long-term interest in the relicensing of the project and the measures to protect and enhance fisheries resources that will be included as elements of the federal license. Our responsibilities in this matter are codified under our authorities pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.), which requires that the federal action agency give great weight to the comments of federal and state resource agencies; the Endangered Species Act (16 U.S.C. §1531 et seq.) of 1973 as amended, which requires Federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species or adversely modify designated critical habitat; the Magnuson-Stevens Fishery Conservation and Management Act (50 CFR 600.920), which requires consultation between the federal action agency and the National Marine Fisheries Service (NMFS) for projects that affect essential fish habitat; and the Federal Power Act 16 U.S.C. §803 and 811, for the protection of anadromous fish resources and their habitat affected by the licensing, operation, and maintenance of hydroelectric projects.

3 RESOURCES UNDER NMFS JURISDICTION

NMFS is a trustee for coastal and living marine resources, including commercial and recreational fisheries; diadromous species; marine mammals, and marine, estuarine, and coastal habitat systems. Estuary and coastal riverine habitat systems, including rivers such as the Androscoggin, provide an integral component of significant ecological functions for the larger marine environment. Estuaries and coastal rivers support many living marine resources. Species such as alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), American shad (*Alosa sapidissima*), Atlantic salmon (*Salmo salar*), sea lamprey (*Petromyzon marinus*), and American eel (*Anguilla rostrata*) rely on rivers and estuaries, including the Androscoggin, for refuge, spawning, rearing and nursery habitat.

Our work is guided by two core mandates – to ensure the productivity and sustainability of fisheries and fishing communities through science-based decision-making and compliance with regulations, and to recover and conserve protected resources through the use of sound natural and social sciences and compliance with regulations.

4 PROTECTED SPECIES IN THE PROJECT AREA

We are dedicated to managing, conserving, and rebuilding populations of endangered and threatened marine and anadromous species in rivers, bays, estuaries and marine waters of the

United States. The following species protected under the ESA occur in the Androscoggin River: Gulf of Maine distinct population segment (GOM DPS) of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*) and the GOM DPS of Atlantic salmon (*Salmo salar*). Additionally, the project area includes critical habitat designated for the GOM DPS of Atlantic sturgeon and the GOM DPS of Atlantic salmon.

Atlantic salmon

The GOM DPS of Atlantic salmon is listed as endangered under the ESA (65 FR 69459 and 74 FR 29344). The GOM DPS includes all anadromous Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Denny's River. Included are all associated conservation hatchery populations used to supplement these natural populations. The Brunswick Project is located within the GOM DPS of Atlantic salmon and thus has the potential to affect the species. The overarching goal of NMFS and the U.S. Fish and Wildlife Service (USFWS) (collectively, the Services) with respect to endangered Atlantic salmon is to recover the species and conserve the ecosystem in which they depend. While adult returns are low, we fully expect that Atlantic salmon will continue to be present in the Androscoggin River during the term of any new license issued by the Federal Energy Regulatory Commission (FERC). As such, potential project effects to listed Atlantic salmon during the term of the new license must be addressed within the context of this licensing proceeding.

Coincident with the June 19, 2009 endangered listing, we designated critical habitat for the GOM DPS of Atlantic salmon (74 FR 29300). The Brunswick Project is located within designated critical habitat for Atlantic salmon.

In February 2019, the Services jointly issued a Recovery Plan for the GOM DPS of Atlantic salmon¹. The Recovery Plan presents a recovery strategy based on the biological and ecological needs of the species as well as current threats and conservation accomplishments that affect its long-term viability. The plan uses the Recovery Enhancement Vision (REV) approach and focuses on the three statutory requirements for recovery plans. These include site-specific recovery actions, objective, measurable criteria for delisting, and time and cost estimates to achieve recovery and intermediate steps. The Recovery Plan is based on two premises: first, that recovery must focus on rivers and estuaries located in the GOM DPS until the Services have a better understanding of the threats in the marine environment, and second, that survival of Atlantic salmon in the GOM DPS will be dependent on conservation hatcheries through much of the recovery process. In addition, the scientific foundation for the plan includes conservation biology principles regarding population viability, an understanding of freshwater habitat viability, and threats abatement needs.

Atlantic sturgeon

Atlantic sturgeon occur in the project area below the Brunswick Dam. On February 6, 2012, NMFS listed five DPSs of Atlantic sturgeon under the ESA: Gulf of Maine (GOM), New York Bight (NYB), Chesapeake Bay (CB), Carolina, and South Atlantic (77 FR 5880 and 77 FR

¹ USFWS, & NMFS. (2019). Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (*Salmo salar*): Final Plan for the 2009 ESA Listing. US Fish and Wildlife Service, National Marine Fisheries Service.

5914). The GOM DPS is listed as threatened, and the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs are listed as endangered. Only individuals from the GOM DPS are expected to occur in the project area. In 2017, we designated critical habitat for all five DPSs (82 FR 39160; August 17, 2017). Critical habitat designated for the GOM DPS includes the Androscoggin River mainstem from the Brunswick Dam downstream to where the mainstem river drainage discharges into Merrymeeting Bay and thus includes the project area below the Dam.

Shortnose sturgeon

Shortnose sturgeon occur in the project area below the Brunswick dam. Shortnose sturgeon were listed as endangered in 1967 (32 FR 4001), and the species remained on the endangered species list with the enactment of the ESA in 1973. The Shortnose Sturgeon Status Review Team published a Biological Assessment for shortnose sturgeon in 2010. The report summarized the status of shortnose sturgeon within each river and identified stressors that continue to affect the abundance and stability of these populations².

5 NOAA COMMENTS ON THE PRE-APPLICATION DOCUMENT (PAD)

Based on our review of the PAD submitted by Brookfield, we offer the following comments:

5.1 PAD, section 2.1 Process Plan and Schedule

Review of the Initial Study Report, with an anticipated submittal on January 1, 2026, will determine whether an additional study season is necessary. We understand that the process plan and schedule proposed by Brookfield is largely defined by regulatory milestones. However, per the process plan included in the PAD, following the issuance of the Initial Study Report, stakeholders will not have an opportunity to begin resolving any potential disagreements until March 2, 2026, with any resolution from FERC not occurring until May 1, 2026. Typically, migration of sea run fish in the Androscoggin River begins between the middle and end of April every year. As currently proposed, the schedule will not allow for the determination regarding the necessity for additional studies or modifications to existing studies until after much of the 2026 spring migration season, thereby largely precluding the opportunity for studies in 2026. As a result, the proposed schedule could result in the study phase of the relicensing process taking a year longer than necessary, or could unnecessarily bias FERC's determination against requiring needed additional information in order to maintain an expeditious licensing schedule. We encourage Brookfield to file its Initial Study Report well in advance of January 1, 2026 to avoid any such potential conflicts.

5.2 PAD Section 3.3.7 Fish Passage Facilities

On page 19, Brookfield notes that the fishway operates under an "interim informal agreement" where "MDMR [Maine Department of Marine Resources] voluntarily operates the fishway from May 1 to July 31 annually, and BWPH operates it for the remainder of the fish passage season."

² Shortnose Sturgeon Status Review Team. SSSRT. 2010. A Biological Assessment of shortnose sturgeon (*Acipenser brevirostrum*). Report to National Marine Fisheries Service, Northeast Regional Office. November 1, 2010. 417 pp.

NMFS Comment:

Brookfield’s description of fishway operations is insufficient to determine exactly how the fishway is operated under its “interim informal agreement” with MDMR. As such, please describe specific fishway operations throughout the year, including, but not limited to, specifics such as: 1) The diel and weekly timing fishway operation (e.g., when the fishway open and when it closes); 2) the seasonal timing and daily timing of trap and truck operations; 3) a description of lift cycle timing throughout the fish passage season.

On page 20, Brookfield notes that “although the vertical slot fishway is designed to run volitionally, BWPH does not operate it in a volitional manor to prevent the passage of invasive species.”

NMFS Comment:

Please describe under what license requirement or other agreement Brookfield operates the Brunswick fishway to prevent the volitional/swim-through passage of migratory species. Given that the fishway operates such that volitional/swim-through passage is precluded, please include additional information regarding operation of the existing fishway during times when trap and truck operations are not active, including, but not limited to: 1) the periodicity of operations where the facility prevents fish passage into the headpond; and 2) specifics surrounding invasive species sorting/culling operations.

On page 20, Brookfield states: “...an additional 70 cfs passed via a gravity fed pipe from the headpond to a diffusion area at the lower end of the fishway...”

NMFS Comment:

It is our understanding that the auxiliary water system does not come from the headpond, but rather the fishway exit flume.

5.3 PAD Figure 5.2.1.2-1

Please provide flow duration curves utilizing data from the previous 10 years only, as this more recent data better represents the current and expected future flow regime given changing climate conditions.

5.4 PAD Section 5.3.5.9

On page 129, Brookfield states: “the suggested provisions for design, installation, and operation of fish passage facilities [in MDMR’s draft Fisheries Management Plan (draft FMP)] are inconsistent with the current SPP and terms of the existing FERC license.”

NMFS Comment:

Our consultation under section 7 of the Endangered Species Act on the continued operation of the Brunswick Project pursuant to Brookfield and FERC’s 2019 Species Protection Plan was predicated on Brookfield’s voluntary request to amend its existing project license to incorporate measures to help protect ESA listed salmon and sturgeon. Because Brookfield did not propose them, our 2021 Biological Opinion³ did not consider all of the provisions for fish passage improvements contained in MDMR’s draft FMP.

³ FERC Accession #: 20211228-5096

However, we would gladly consult with Brookfield and FERC at any time on additional operational improvements and fish passage facilities to benefit both Atlantic salmon and co-evolved diadromous species, which are a defined feature of federally-designated critical habitat for Atlantic salmon. Therefore, we would like to clarify that the measures defined in the current SPP are not currently, nor ever will be, an impediment to any suggestions for the improvement of fish passage at the Brunswick Project.

5.5 PAD 6.2.3.2 Proposed Studies

Please ensure that any proposed CFD modeling study utilizes modeling that is three-dimensional, as opposed to depth-averaged.

6 COMMENTS ON FERC’S SCOPING DOCUMENT 1

Based on our review of FERC’s Scoping Document 1 (SD1), we offer the following comments:

6.1 Section 3.5.3 Project Decommissioning

On page 19, SD1 indicates that project decommissioning is not a reasonable alternative to relicensing the project with appropriate environmental measures. The Brunswick Project directly affects endangered Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon and critical habitat designated for Atlantic salmon and Atlantic sturgeon. The 2009 listing rule for Atlantic salmon specifically highlighted dams as one of three most significant threats contributing to the decline of Atlantic salmon in Maine. Hydropower dams in the Merrymeeting Bay Habitat Recovery Unit significantly impede the migration of Atlantic salmon and other diadromous fish and either reduce or eliminate access to roughly 352,000 units of historically accessible spawning and rearing habitat. The 2019 Recovery Plan for the GOM DPS of Atlantic salmon lists dam removals within threats-based criteria necessary to eliminate the threat of extinction and to support a recovered GOM DPS of Atlantic salmon. Dam removal is also a specific recovery action for increasing the carrying capacity for Atlantic salmon to support a growing and self-sustaining population. Furthermore, we note that project decommissioning with dam removal is the only alternative that would completely eliminate the threat to Atlantic salmon and their critical habitat posed by the Brunswick Project. While we do not consider the Brunswick Dam to be an impediment to sturgeon passage (given its location at natural falls considered to be the likely historic upstream limit of the range of these species), project operations affect critical habitat designated for Atlantic sturgeon and have the potential to affect spawning and rearing habitat, spawning behavior, and early life stage development for Atlantic and shortnose sturgeon. As such, we recommend the Commission consider project decommissioning with removal as a reasonable alternative in its NEPA analysis.

7 REQUESTED STUDIES

Study 1: Evaluation of Stranding Risk/Bathymetry Study

The area below the approximately 322-foot-long spillway section of the project includes a substantial ledge area that could pose a risk for stranding certain species and life stages of up- and downstream migrating fish. Brookfield has previously acknowledged this potential risk. On page 119 of the PAD, Brookfield notes that its Final Species Protection Plan (Final SPP), filed on December 31, 2019⁴ included a proposal to “conduct a bathymetry study of the below [sic]

⁴ Brookfield White Pine Hydro LLC (BWPH). 2019. Species Protection Plan for Atlantic Salmon, Atlantic

the Project spillway to investigate potential for and possible solutions to, fish stranding.” To our knowledge, Brookfield has not yet conducted this study. As such, we are requesting a study consistent with the study proposed by Brookfield in its SPP. However, whereas that proposed/required study was specific to the species considered in the Endangered Species Act (ESA) consultation (i.e., Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon), we request that this study be expanded to include alewife, American shad, and blueback herring.

Study Plan Criteria

1. The goal of the study is to evaluate: 1) the effect of project operations and the physical configuration of the project spillway(s) on stranding risk of up- and downstream migratory fish, specifically: Atlantic salmon, Atlantic sturgeon, shortnose sturgeon, alewife, American shad, and blueback herring; and 2) identify alternatives, as necessary, to mitigate for stranding risk.
2. NMFS is a federal resource agency with a mandate to protect and conserve fisheries resources and associated habitat. Resource management goals and plans are codified in our regulatory statutes. We rely on the best available data to support conservation recommendations and management decisions. Data sought in this study are not readily available. This study is an appropriate request for the pre-application period.
3. The requestor, NMFS, is a federal resource agency.
4. Information in the PAD was not sufficient to evaluate the potential for Project-related stranding effects, nor to identify suitable alternatives to mitigate such effects. Brookfield’s 2019 SPP proposes a study to investigate the potential for and possible solutions to fish stranding at the projects, but to our knowledge, that study has not yet been performed. Our December 2021 Biological Opinion⁵ recognized that project operations could result in the potential for stranding of sturgeon in downstream pools during maintenance and/or replacement of flashboards in the spring and for salmon in the ledges downstream of the dam. There is no information regarding the potential risk for stranding of up- and downstream migrating alewife, blueback herring, or American shad.
5. As described above, the project is configured such that the spillway section is directly upstream of perched ledge (formerly a natural falls). Project operations dictate the timing and magnitude of flows downstream of the spillway. Under certain hydraulic conditions, with influence from project operations, areas of the perched ledge may be passable to certain species and lifestages of upstream migrating species and is accessible to downstream migrating fish when/if project operations allow for spill. When the project restricts flow to the spillway, stranding of fish in pools downstream of the spillway could occur. This study will assist FERC in identifying the risk of stranding by species and lifestage and provide information relevant to the development of mitigation measures to reduce or eliminate stranding risk.
6. We anticipate that the study would entail two phases. The first phase of the study would require a desktop analysis of stranding risk potential for up- and downstream migrating

Sturgeon, and Shortnose Sturgeon at the Brunswick and Lewiston Falls Projects on the Androscoggin River, Maine. 128 pp.

⁵ FERC Accession #: 20211228-5096

fish (species identified above) throughout the fish passage season (~ early April to mid-November). Risk potential could be defined using known project operations for each month under varying hydraulic conditions (e.g., low, middle, high flow) combined with a subjective-style expert analysis of risk of stranding based upon species- and lifestage specific characteristics (e.g., migratory timing, swimming ability, etc.). The second phase of the study would require a bathymetric survey of the spillway paired with flow-modeling information (i.e., HEC-RAS or similar model) and/or visual surveys of the spillway during “high risk” periods identified in the first phase.

7. Both a desktop analysis and field work would be required over the course of a year to complete our requested study. We estimate that this study would cost roughly \$30,000. The level of effort and cost of the recommended study is commensurate with a project the size of the Brunswick Project and the likely license term. Both stranding evaluations and bathymetric surveys are common studies, generally accepted in the scientific community. Brookfield has not proposed any alternatives to this study.

Study 2: Upstream and Downstream Passage Alternatives Study (Modification of Proposed Study)

Page 227 of Brookfield’s PAD indicates that it is proposing the following study:

Upstream and Downstream Passage Alternatives Study

BWPH is proposing to conduct an Upstream and Downstream Passage Alternatives Study that will include evaluations of previously conducted telemetry studies at the Project, an evaluation of the existing upstream and downstream fish passage facilities at the Project as compared to agency design criteria, a desktop evaluation of entrainment potential, as well as an evaluation of potential upstream and downstream passage alternatives. The study results will be used to identify potential measures and/or modifications, as necessary, for improving upstream and downstream fish passage at the Project.

We agree with Brookfield that existing information regarding the project’s effects on fish passage unequivocally demonstrate a need to develop a wide range of alternatives to significantly improve the safety, timeliness, and effectiveness of fish passage at the Brunswick Project. However, the study as currently proposed is insufficient to adequately inform the development of alternatives. As such, we are requesting three additional studies that will inform the development of alternatives: 1) *Upstream Behavior, Movement, and Project Interaction Study*; 2) *Upstream Passage of Sea Lamprey*; and 3) *Downstream Fish Passage Effectiveness for Adult and Juvenile Alosines*. As we describe in the study requests below, the information derived from our requested studies will be necessary to adequately inform the development of up- and downstream passage alternatives. Additionally, the study, as proposed, does not contain enough detail to adequately define its goals and objectives, nor whether the methodology would be suitable to achieve the stated goals and objectives.

In addition to those studies, we are requesting modifications to the above proposed study:

- 1) As indicated above, we are requesting three studies (below) to inform the development of adequate alternative: 1) *Upstream Behavior, Movement, and Project Interaction Study*; 2) *Upstream Passage of Sea Lamprey*; and 3) *Downstream Fish Passage Effectiveness for Adult*

and Juvenile Alosines. We are also requesting the following modification to the proposed study [modification in bold italics]:

BWPH is proposing to conduct an Upstream and Downstream Passage Alternatives Study that will include evaluations of previously conducted telemetry studies at the Project, ***as well as the results of the 1) Upstream Behavior, Movement, and Project Interaction Study; 2) Upstream Passage of Sea Lamprey; and 3) Downstream Fish Passage Effectiveness for Adult and Juvenile Alosines.***

2) Brookfield's proposed study includes insufficient detail regarding the goals and objectives or proposed methodology. Our agency is an active participant in the relicensing of the Worumbo Hydroelectric Project (FERC No. 3428), the third dam upstream on the Androscoggin River. On September 28, 2021, FERC issued a Study Plan Determination for that project, which included an approval for Brown Bear II Hydro, Inc's (BB2H) proposed downstream passage alternative study⁶. We recommend that Brookfield modify its proposed *Upstream and Downstream Passage Alternatives Study* to incorporate elements of BB2H's *Downstream Passage Alternatives Study*⁷. At a minimum, we recommend the following inclusions:

- A more clearly defined goal that specifies that the study will determine conceptual options and expected performance for improved up- and downstream passage that will reduce delay, increase passage efficiency, and increase survival for American eels, blueback herring, alewives, American shad, Atlantic salmon, and sea lamprey.
- A more clearly defined methodology that includes specifications of resource agency consultation during each stage/task of the study. The adequate development of alternatives will require subjective expert analysis and interpretation of data and consultation regarding engineering designs suitable to achieve objectives for multiple fish species, including endangered Atlantic salmon.
- Ensure that any alternatives are consistent with current fish passage guidelines published by the Services.

Study Plan Criteria

1. As described above, our requested goal of the study is to determine conceptual options and expected performance for improved up- and downstream passage alternatives that will reduce delay, increase passage efficiency, and increase survival for American eels, blueback herring, alewives, American shad, Atlantic salmon, and sea lamprey.
2. NMFS is a federal resource agency with a mandate to protect and conserve fisheries resources and associated habitat. Resource management goals and plans are codified in our regulatory statutes. We rely on the best available data to support conservation recommendations and management decisions. Data sought in this study are not readily available. This study is an appropriate request for the pre-application period.
3. The requestor, NMFS, is a federal resource agency.
4. As described above, information provided in the applicant-proposed study does not sufficiently define explicit goals and objectives, nor does it provide sufficiently detailed methodology to determine whether the study could reasonably achieve its stated goals and objectives. More detail is needed to ensure that any approved Passage Alternatives

⁶ FERC Accession #: 20210928-3001

⁷ FERC Accession #: 20210903-5115; pages 63-66

study is adequate to inform the Commission and stakeholders of feasible and effective alternatives for the protection, mitigation, and enhancement of migratory fish.

5. The operation of the Brunswick Project directly affects the up- and downstream passage of migrating fish. Existing information demonstrates a need to develop a wide range of alternatives to significantly improve the safety, timeliness, and effectiveness of fish passage at the project.
6. As described above, the study proposal does not adequately specify goals or objectives, nor does it include methodology with sufficient specificity. At a minimum, we request a modification of the study proposal to incorporate the elements described above. Additionally, we request that the proposed *Upstream and Downstream Passage Alternatives Study* be modified to more closely resemble the goals and methodology presented in the Worumbo Project's *Downstream Passage Alternatives Study*, a relicensing study approved by the Commission in 2021. As such, this modification is consistent with generally accepted practice.
7. On page 66 of the PAD, Brookfield estimates that the study would be conducted over the course of a year and would cost between \$45,000 and \$90,000. We do not anticipate that our requested modifications would result in any substantial changes to this cost estimate.

Study 3: Upstream Behavior, Movement, and Project Interaction Study

Existing information documents that project effects result in poor or no passage of upstream migrating alosines (American shad, blueback herring, and river herring). For this reason, Brookfield is proposing a study of upstream passage alternatives. However, existing information is insufficient to adequately inform the development of upstream alternatives. Therefore, we are requesting this study to fill in information gaps necessary to produce robust, well-informed alternatives to upstream fish passage.

Study Plan Criteria

1. The goal of this study is to assess the project-related effects on alosine (American shad, blueback herring, and river herring), behavior in and downstream of the project tailrace. The objectives of the study are to:
 - Assess alosine distribution and movement in the project's tailrace and the proximal downstream river reach.
 - Assess alosine utilization of the existing project fishway, the effectiveness of the existing fishway entrance, and alosine movement near potential alternative fishway entrance locations.
 - Determine extent of alosine behavioral modification due to project-induced passage delay.
 - Assess passage outcomes following alosine behavioral modification as it relates to the presence of predators such as striped bass (*Morone saxatilis*).
2. NMFS is a federal resource agency with a mandate to protect and conserve fisheries resources and associated habitat. Resource management goals and plans are codified in our regulatory statutes. We rely on the best available data to support conservation

recommendations and management decisions. Data sought in this study are not readily available. This study is an appropriate request for the pre-application period.

3. The requestor, NMFS, is a federal resource agency.
4. Existing information, including that which is provided in the PAD, documents that the Brunswick facility is ineffective for upstream migrating alosines (whole station effectiveness = 5.9% for river herring and 0% for American shad). However, while information from the January 2023 radio telemetry studies⁸ were sufficient to define project effects on the effectiveness of upstream fish passage, they are insufficient to adequately define the causal mechanisms relative to the inefficiency of passage at the site, and thus, they are insufficient to adequately inform the development of alternatives, a study proposed by Brookfield. More detailed information regarding the movement of alosines in the project tailrace is necessary to ensure that any approved Passage Alternatives study is adequate to inform the Commission and stakeholders of feasible and effective alternatives for the protection, mitigation, and enhancement of migratory fish.
5. Diadromous species use rivers to migrate between ocean and freshwater habitats to complete their life history. Dams impede or block this migration and the configuration and unique operations of dams can impact migratory behavior. The requested study will provide critical information that will support the development of feasible and appropriate fish passage alternatives at the Project.
6. We recommend utilizing acoustic telemetry methods for this study including both two-dimensional (2D) and three-dimensional (3D) tracking, with passive receivers, as well as CFD modeling information from Brookfield's proposed *Computational Fluid Dynamics Modeling – Upstream and Downstream Passage* study. Brookfield should tag a statistically significant number of adult river herring (blueback herring and alewife) and American shad during the migration run of each species at the Project.

Fish should be collected, tagged, and released downstream of the Project. River herring species should be tagged in the proportion they are encountered. Following tagging, all species should be released with an equal number of non-tagged fish to facilitate schooling behavior. Brookfield should record river flows and project operations throughout the study. During the study period, Brookfield should document the Project's operational conditions to inform study results.

Without adequate sample sizes, study results will be questionable. To obtain a statistically significant sample size, Brookfield should first run power analyses to determine the number of fish they would need to tag to determine passage differences between all release cohorts through the project (i.e., attraction, within fishway, and overall passage for each cohort).

We note that during similar tagging studies for the Lowell Project on the Merrimack River in Massachusetts (FERC No. 2790), the number of fish tagged in studies paired

⁸ Normandeau (Normandeau Associates, Inc.). 2023. Study Report for Pre-Construction Fish Passage Monitoring Associated with the Frank J. Wood Bridge. Report prepared for Maine Department of Transportation. October 2023.

with a substantial number of study fish leaving the study area, resulted in too few remaining detections to answer study questions and arrive at meaningful conclusions. Therefore, when developing the statistically significant sample size, attrition should be considered.

On May 10, 2024, FERC determined that a project licensee should conduct a similar study utilizing Juvenile Salmon Acoustic Telemetry System (JSATS) to monitor tagged alosines in the riverine environment downstream of the Lawrence Hydroelectric Project (FERC No. 2800) on the Merrimack River in Massachusetts. The JSATS technology was developed by the Pacific Northwest National Laboratory (PNNL) to monitor the behavior, movement, habitat use, and survival of juvenile salmonids migrating downstream in the Pacific Northwest. JSATS has been previously used to: (1) estimate route specific dam passage; (2) observe predator–prey interactions; and (3) evaluate fish behavior in dam tailraces using high-accuracy, high-efficiency three-dimensional (3D) tracking. JSATS technology would provide the detailed analysis necessary to understand alosine behavior in and near the Brunswick dam tailrace and to inform mitigation measures that would address well-documented concerns about poor alosine passage

7. This study will require one migratory season, provided sufficient numbers of fish can be collected and successfully tagged. We estimate the cost will be approximately \$500,000. The level of effort and cost of the recommended study is commensurate with a project the size of the Brunswick Project and the likely license term. Hydroacoustic studies are generally accepted in the scientific community. Brookfield has not proposed any alternatives to this study.

Study 4: Upstream Passage of Sea Lamprey

There is no site-specific information available to define project effects on upstream migrating sea lamprey. This baseline information is essential for informing any reliable analysis of fish passage alternatives, a study proposed by the licensee.

Study Plan Criteria

1. The goal of this study is to evaluate the effectiveness of the existing upstream fish passage facility for adult sea lamprey under a range of flow conditions during the migration season (May 1 – July 31) and identify the project facilities and downstream areas to which sea lamprey are attracted. Specific objectives are to: 1) estimate the proportion of sea lamprey that approach and successfully use the vertical slot or approach the spillway/bypass reach or other areas downstream of the project; 2) determine and quantify delay downstream of the Brunswick Project for this species.; 3) document the hourly distribution of upstream migrating sea lamprey that attempt and those that complete passage attempts; and 4) determine and quantify injury associated with upstream migration at the Brunswick Project.
2. NMFS is a federal resource agency with a mandate to protect and conserve fisheries resources and associated habitat. Resource management goals and plans are codified in our regulatory statutes. We rely on the best available data to support conservation recommendations and management decisions. Data sought in this study are not readily available. This study is an appropriate request for the pre-application period.

3. The requestor, NMFS, is a federal resource agency.
 4. The effectiveness of the upstream fish passage facility has only been studied for adult river herring and adult American shad. Apart from fishway counts and observations, no data exists on the passage efficiency or other impacts of upstream passage of the Brunswick facility for sea lamprey. Additionally, no information exists to determine how and where sea lamprey approach the project and if they interact with the turbines or the bypass reach. This information is essential to inform the development of adequate fish passage alternatives, a study proposed by Brookfield.
 5. Hydropower projects may have differential impacts on different species of upstream migrating fish, depending on configuration and operational settings. Data derived from this study is necessary for the adequate development evaluation of fish passage alternatives and will inform the Commission's licensing process.
 6. We recommend that radio telemetry or hydroacoustic methods be used to evaluate the upstream passage facilities for adult sea lamprey. Radio telemetry was similarly used by Peterson et al. 2023⁹. Similar to previous telemetry studies at the site, sea lamprey can be captured using the current facilities at the Brunswick fishway.
 7. This study will require at least one season, provided sufficient numbers of fish can be collected and successfully tagged. We estimate the cost will be approximately \$100,000. The level of effort and cost of the recommended study is commensurate with a project the size of the Brunswick Project and the likely license term. Passage evaluations using radio-telemetry or similar methods are generally accepted in the scientific community. Brookfield has not proposed any alternatives to this study.

Study 5: Downstream Fish Passage Effectiveness for Adult and Juvenile Alosines

There is no site-specific information available to define project effects on downstream migrating sea-run species other than juvenile Atlantic salmon. This baseline information is essential for informing any reliable analysis of fish passage alternatives, a study proposed by the licensee.

Study Plan Criteria

1. The goal of this study is to determine the effectiveness of the existing downstream fish passage facility for adult and juvenile alosines (American shad, blueback herring, and alewife) during their migration season (July 1 to August 31 for summer, low flow conditions for adult and early juvenile alosines AND September 1 to October 30 for fall moderate flow and freshet conditions for larger juvenile alosines) under a range of flow conditions. Specific objectives for each species and life stage are to: 1) estimate injury and mortality through all routes of passage at the facility; 2) document the proportion of migrants that utilize the routes of passage during the range of environmental and operational conditions present their migration season; 3) estimate forebay residence time; 4) determine temporal rate of arrival at the dam; and 5) estimate transit time through the headpond, past the project, and through defined reaches downstream.

⁹ Peterson E, R Thors, D Frechette, and JD Zydlewski. 2023. Adult sea lamprey approach and passage at the Milford dam fishway, Penobscot River, Maine, United States. North American Journal of Fisheries Management, DOI: 10.1002/nafm.10919

2. NMFS is a federal resource agency with a mandate to protect and conserve fisheries resources and associated habitat. Resource management goals and plans are codified in our regulatory statutes. We rely on the best available data to support conservation recommendations and management decisions. Data sought in this study are not readily available. This study is an appropriate request for the pre-application period.
3. The requestor, NMFS, is a federal resource agency.
 4. No site-specific information (e.g., route of passage, injury, mortality, or delay rates) exists regarding project effects on the downstream passage for any diadromous species other than juvenile Atlantic salmon. As described above, any reliable development of alternatives first requires an understanding of the existing effects of the projects on the species and life stages migrating past the project on a seasonal basis – this includes route selection, survival, and injury information.
 5. Hydropower projects may have differential impacts on different species and lifestages of downstream migrating fish. The configuration and operations of projects result in changes in route of passage and each route presents different risks for injury and mortality. Data derived from this study is necessary for the adequate development evaluation of fish passage alternatives, and will inform the Commission’s licensing process.
 6. We recommend that a suite of methods including acoustic and/or radio telemetry, hi-z tagging, and split beam hydroacoustics be used to evaluate downstream passage facilities for all species and life stages listed in the goals and objectives. Adult alosines can be tagged with radio tags either before upstream passage or tagged post-spawning, can be released downstream of the Pejepscot project (which is located upstream of the Brunswick project), and be allowed to volitionally approach the Brunswick Project and attempt to pass downstream. Large juvenile alosines caught at the outlet of Sabattus Pond, fitted with nano radio tags, and released downstream of the Pejepscot Project will provide detailed information about juvenile downstream fish passage at the Brunswick Project. Methods for this approach were developed explicitly for testing of hydropower facilities with funding support from Pacific Northwest National Laboratory. In addition, split beam hydroacoustics in the area upstream of the turbines and sections of the spillway would allow assessment of route of passage by large schools of untagged juvenile alosines. If results from the initial phase of this study demonstrates that turbine entrainment is significant for any species or life stage, a second year of study would utilize hi-z tags or draft tube netting to directly assess mortality and injury through the turbine route of passage. We are specifically requesting empirical studies of downstream passage as opposed to desktop studies, because desktop studies: 1) are unable to determine route utilization of downstream migrating fish; and 2) survival estimates derived from desktop studies are often highly inaccurate (see Ellsworth Project, FERC No. 2727)¹⁰. For these reasons, desktop studies would be inappropriate for use in the development of downstream alternatives.
 7. This study will require one migratory season, provided sufficient numbers of fish can be collected and successfully tagged. We estimate the cost will be approximately \$500,000.

¹⁰ FERC Accession Numbers 20130904-3002 and 20141230-3032

The level of effort and cost of the recommended study is commensurate with a project the size of the Brunswick Project and the likely license term. Fish passage effectiveness/survival studies are generally accepted in the scientific community. Brookfield has not proposed any alternatives to this study.