FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426
December 30, 2024

OFFICE OF ENERGY PROJECTS

Project No. 2284-052 – Maine
Brunswick Hydroelectric Project
Brookfield White Pine Hydro LLC

Michael Scarzello
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Reference: Study Plan Determination for the Brunswick Hydroelectric Project

Dear Mr. Scarzello:

Pursuant to 18 C.F.R. § 5.13(c) of the Commission's regulations, this letter contains the study plan determination for the Brunswick Hydroelectric Project located on the Androscoggin River, in the towns of Brunswick and Topsham, Maine. The determination is based on the study criteria set forth in section 5.9(b) of the Commission's regulations, applicable law, Commission policy and practice, and the record of information.

Background

On August 2, 2024, Brookfield White Pine Hydro LLC (BWPH) filed its proposed plan for twelve studies on water quality, fishery resources, terrestrial resources, recreation resources, and historical resources in support of its intent to relicense the project.

BWPH held Initial Study Plan Meetings on August 28 and October 9, 2024. Comments on the Proposed Study Plan (PSP) were filed by the U.S. Fish and Wildlife Service (FWS, National Marine Fisheries Service (NMFS), National Park Service (NPS), Maine Department of Marine Resources (Maine DMR), Friends of Merrymeeting Bay (FOMB), and the Merrymeeting Bay Chapter of Trout Unlimited (MMBTU).

On December 2, 2024, BWPH filed a Revised Study Plan (RSP) that included the same twelve proposed studies included in the PSP. Comments on the RSP were filed by FWS; the Free the Andro Coalition (Merrymeeting Bay Chapter of Trout Unlimited, Maine Rivers, American Rivers, and the Maine Council of Trout Unlimited); Maine DMR; and NMFS.

Study Plan Determination

Eleven of BWPH's proposed studies are approved as filed and one is approved with modifications. This determination also approves one requested study and denies five others (see Appendix A). In Appendix B, we explain the specific bases for adopting or not adopting the requested studies. Although Commission staff considered all study plan criteria in section 5.9 of the Commission's regulations, we only reference the specific study criteria that are particularly relevant to the determination.

Studies for which no issues were raised in comments on the proposed study plan are not discussed in this determination. Unless otherwise indicated, BWPH must complete all components of the approved studies as described in BWPH's RSP. Pursuant to section 5.15(c)(1) of the Commission's regulations, the initial study report for all studies in the approved study plan must be filed by January 2, 2026.

Nothing in this study plan determination is intended, in any way, to limit any agency's proper exercise of its independent statutory authority to require additional studies. In addition, BWPH may choose to conduct any study not specifically required herein that it feels would add pertinent information to the record.

If you have any questions, please contact Michael Tust at michael.tust@ferc.gov or (202) 502-6522.

Sincerely,
JOHN WOOD
Digitally signed by JOHN WOOD
Date: 2024.12.30 12:43:26 -05'00'
for
Terry L. Turpin
Director
Office of Energy Projects

Enclosures: Appendix A – Summary of studies subject to this determination
Appendix B – Staff's recommendations on proposed and requested studies

APPENDIX A

SUMMARY OF DETERMINATIONS ON PROPOSED AND REQUESTED STUDIES

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
Water Quality Assessment	BWPH Maine DEP	X		
Tailwater Benthic Macroinvertebrate Study	BWPH Maine DEP	X		
Computational Fluid Dynamics Modeling	BWPH	X		
Upstream and Downstream Fish Passage Alternatives Study	BWPH NMFS FWS Maine DMR FOMB	X		
Visual Surveys of Upstream American Eel Movements	BWPH		X	
Diadromous Fish Behavior, Movement, and Project Interaction Study	BWPH NMFS FWS Maine DMR	X		
Fish Assemblage Study	BWPH Maine DIFW	X		
Evaluation of Stranding Risk/Bathymetry Study	BWPH NMFS FWS Maine DMR	X		
Mussel Survey	BWPH FWS	X		
Recreation Study	BWPH	X		
Historic Architectural Survey	BWPH	X		
Prehistoric and Historic Archeological Survey	BWPH	X		
Temperature and DO Profile in the Project Area Upstream of the Dam	FOMB			X

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
Downstream Fish Passage Effectiveness for Adult and Juvenile Alosines	NMFS FWS Maine DMR			X
Downstream American Eel Passage Assessment	FWS Maine DMR			X
Dam Decommissioning and Removal with Site Restoration	FOMB			X
Benthic Macroinvertebrate Profile in the Project Area Upstream of the Dam	FOMB			X
Invasive Plant Survey	FWS	X		

APPENDIX B

STAFF'S RECOMMENDATIONS ON PROPOSED AND REQUESTED STUDIES

The following discusses staff's recommendations on studies proposed by Brookfield White Pine Hydro LLC (BWPH), requests for study modifications, and requests for additional studies. We base our recommendations on the study criteria outlined in the Federal Energy Regulatory Commission's (Commission) regulations [18 C.F.R. section 5.9(b)(1)-(7)], applicable law, Commission policy and practice, and the record of information.

I. Required Studies

Diadromous Fish Behavior, Movement, and Project Interaction Study

Proposed Study

In response to requests from NMFS, FWS, and Maine DMR, BWPH proposes to assess the behavior of American shad, alewife, blueback herring, and sea lamprey in and downstream of the project tailrace. The proposed study would be conducted in a phased approach to first ensure site-specific performance of the proposed technology followed by collection of fish behavior and movement information. Phase I would evaluate and validate a Juvenile Salmon Acoustic Telemetry System (JSATS) technology[1] to determine if it can provide consistent and adequate coverage of the study area required to evaluate fish behavior. If the JSATS technology proves appropriate for use at the project, Phase II would focus on the evaluation of movement and behavior of migratory American shad, alewife, blueback herring, and sea lamprey in the tailrace and downstream reach.

The Phase 1 feasibility evaluation would consist of testing acoustic receivers deployed at six different pilot deployment locations covering a range of flow and channel/infrastructure morphology in the vicinity of the project tailrace and proximal downstream reach. BWPH would test the hydrophones using an acoustic transmitter

[1] The JSATS system is composed of three major components: acoustic transmitters, receivers, and the associated management/processing software. Each transmitter produces a signal at a fixed interval by inducing high-frequency (416.7 kHz) waves in the water. Submerged hydrophones receive the signals and convert them to an electrical impulse which is relayed to the receiver. The receiver identifies the signal as a unique identification code and then logs them along with the ID of the receiving hydrophone, time and date of the detection, and any other information relayed by the transmitter (e.g., pressure).

placed in a piece of polyethylene tubing. Test tags would be attached to a fixed point under a boat and driven through the test array for several minutes. Concurrently with passage of the test tags through the test array, high accuracy GPS points would be collected once per second to create a continuous GPS track of the known position of the test tag over time.

BWPH asserts that it is important to test the JSATS system first because there a variety of hydro-geomorphic variables that could create detection problems and reduce adequate coverage of the study area including flow speeds that vary spatially and temporally as changes in tide, river discharge, and project operations occur during the passage season, background noise generated by the friction of water on the outer casing of the hydrophones during varied flow conditions, and shallow water due to bottom topography (e.g., spillway ledge habitat) or tidal influence.

Phase II objectives include: 1) assessing the distribution and movement of tagged American shad, alewife, blueback herring, and sea lamprey in the tailrace and downstream river reach; 2) assessing movement of these species near the existing fishway entrance and near potential alternative fishway entrance locations; and 3) determining the extent of fish behavioral modification due to project induced passage delay. The final receiver layout and study design for this phase would be informed by the detection range and efficiency information collected during Phase I of this study. BWPH assumes that a minimum of 10-12 receivers would be required within the primary detection zone of the study area.

Phase I would be conducted during the spring 2025. BWPH would (1) summarize data and results from that effort, and (2) update the Phase II section of this study plan for inclusion in the ISR to be filed with the Commission by January 2, 2026.[2] If JSATS proves to be an appropriate tool to address fish movement and behavior in the project tailrace and proximal downstream reach, Phase II would be conducted during spring 2026 and results included in the USR to be filed with the Commission by January 2, 2027.

Comments on the Study

The FWS states in its letter filed November 1, 2024, that it is concerned that the proposed phased approach would result in a delay that would potentially require other proposed studies (e.g., CFD study and upstream alternatives study) to need to be re-done. The FWS suggested that Brookfield conduct both phases in a single year. The FWS

[2] If the due date falls on a weekend or holiday, the due date is the following business day.

states that it can assist with this effort by providing its input on Phase 1 results as quickly as possible, including being on site while the study is conducted, if necessary.

In its reply comments, BWPH points out that Phase 1 would require boat-based sampling and as a result could only be conducted under river conditions which allow for safe access to the project tailwater and proximal downstream reach. BWPH assumes that winter ice and early spring freshet conditions would limit access to that reach until closer to the onset of the diadromous fish passage season in early May. Because BWPH would rely on the in-situ measurements of receiver range and detection rates to finalize an array design for Phase 2, Phase 2 would not be initiated until the number and placement of receivers is identified along with methodologies for deployment at each location so that the equipment remains fixed for the duration of the monitoring period. Additionally, BWPH states that they would need an 8 to 10-week lead time to procure any JSATs receivers required to conduct this study; therefore, the fish tagging portion the study could only be conducted as described in the RSP during spring 2026.

In comments on the RSP, Maine DMR states that it is disappointed that BWPH did not proactively attempt to adjust the timing of the study to align the tagging component (Phase II) of the study to the 2025 fish passage season, and that a lead-time of 8 to 10 weeks to procure any JSAT receivers required in excess of those currently available to its contractors should not be a reason to delay the Phase 2 study until spring 2026. In comments on the RSP, FWS reiterates its prior comments on the PSP.

Discussion and Staff Recommendation

While we understand Maine DMR and FWS's desire to have the results of both phases of this study available in the Initial Study report in January of 2026, it does not appear to be possible for BWPH to conduct Phases 1 and 2 of this study during the 2025 fish passage season, especially considering that the number of receivers that are available or necessary to test the system are currently unknown and there is limited time available to test the receivers before the migration season begins in May. The proposed phased approach and timing is reasonable considering that the information obtained during Phase 1 will help design Phase 2, including identifying the number and location of receivers needed to ensure an adequate coverage of the study area. Therefore, we do not recommend modifying the study to require BWPH to implement both phases of the study during the 2025 passage season as recommended by FWS and Maine DMR.

Visual Surveys of Upstream American Eel Movements

Proposed Study

BWPH proposes to conduct nighttime visual surveys to investigate upstream

migration movements of American eel at the project to determine the presence and abundance of American eel at the project and evaluate the need for and potential locations of a permanent eel trap/passage structure. The nighttime surveys would be conducted once per week for twelve weeks from early-June through late-August to identify where eels concentrate when staging in pools or attempt to ascend wetted structures. The surveys would be conducted during low flow conditions (i.e., non-spill) following or during light rain events (when possible), at least 30 minutes following sunset, and last approximately 1 to 2 hours. To avoid having personnel positioned downstream of the project dam and spillway during the evening hours, surveys would be conducted from safely accessible locations along existing project structures (e.g., walkways, behind railings). Identified vantage points include: 1) the entrance and lower section of the existing upstream fishway up through the 180-degree turn pool, 2) the area overlooking the ogee overflow spillway adjacent to the powerhouse, and 3) the deck structure on the Topsham side of the river overlooking the Tainter gate structures. BWPH states that high flows and the presence of spill may limit or prevent effective searching of some or all areas downstream of the project on any given night. Field personnel would be equipped with spotlights and binoculars for the surveys. The survey crew would utilize red lights during each survey event to aid in spotting eels.

Comments on the Study

In its comments of the PSP, the FWS and Maine DMR expressed concerns with the ability of observers to obtain useful information from the proposed vantage points because the vantage points are distant from the areas where eels would likely congregate. FWS recommended that BWPH investigate the feasibility of lowering the project headpond to reduce safety risks associated with sudden water level fluctuations due to inflows into the project. If feasible, this approach could allow staff to safely place temporary eel ramps and traps in various locations below the project dam. If this approach is not feasible, FWS states that BWPH should investigate other alternative approaches that would provide information necessary to evaluate the project's effects on upstream eel migration and develop any protection, mitigation, and enhancement measures. As proposed, FWS contends that the proposed study methods consisting solely of visual observations from distant vantage points are unlikely to yield adequate data that could inform Commission staff's environmental analysis of the effects of the project on upstream American eel migration.

In the RSP, BWPH declined to adopt the FWS's recommended changes. BWPH stated that its safety concerns go beyond those related to a sudden spill event and that its primary safety concern is having field staff traversing the spillway reach area at night. BWPH points out that the combination of the rugged terrain, poor visibility, and frequency of survey events (i.e., 12 events) increases the risk of a safety incident. BWPH states that the study results would be available in the ISR, and in accordance with the

ILP, relicensing participants could propose new studies or modifications to the study based on the study results.

In response to the RSP, the FWS and Maine DMR reiterate their PSP comments. They note that Commission licensees have conducted on-foot visual observations of upstream American eel movement at projects throughout the species' entire range and that this is a standard method for this work. FWS states that it is not aware of any reason why the Brunswick Project poses a unique safety hazard. Maine DMR states that proper eel surveys at this project are particularly important, as Brunswick is the first dam on the Androscoggin River, is only a short distance from the ocean, and thus most eels are likely to be tiny elvers and will be extremely difficult if not impossible to see from a distance. Maine DMR acknowledges the importance of safety at the project but believes that occasional poor visibility and rugged terrain are normal conditions during fieldwork activities and should not be a reason to severely limit the scope of a necessary study.

Discussion and Staff Recommendation

In consideration of the potential for sudden, unexpected spills and the rugged terrain downstream of the spillway, BWPH's concern for personnel safety is reasonable. However, we share the agencies concerns that the proposed observation points are too distant, particularly along the 250-foot-long section of the spillway in the middle of the river, to observe congregating eels and to document presence/absence, abundance, behavior, and distribution among size classes as set out in BWPH's proposed study goals and methods. As FWS notes, elvers could be hiding in crevasses in the pools that would only be visible up close on foot.

As FWS points out, there are other passive techniques such as installing several temporary eel traps during the day at likely congregating spots and checking them the next day that would avoid having the field crew traverse the spillway at night. Traps would also provide a catch per unit effort that would serve as a surrogate for abundance and provide insights on size classes. BWPH could also install temporary eel ramps during the day for eels to climb at night. Observers could stand at their observation points at night with a red light and binoculars and observe eels climbing the ramps. The ramps should provide greater visibility than eels hiding in the pools. Therefore, we recommend modifying BWPH's proposal to solely observe eels in the river habitat and replacing it with a requirement for BWPH to select, in consultation with FWS and Maine DMR, at least 3 locations to install temporary eel traps, ramps, or combinations thereof. The traps would be checked once daily and the ramps would be observed at night from safe vantage points that would reasonably allow eels to be observed climbing the ramps. If there are no reasonable locations to observe the ramps at night sufficient to detect eels and estimate abundance of various size classes, traps must be used in place of ramps. Traps and/or ramps would be run once per week for twelve weeks from early-June

through late-August as proposed by BWPH.

Invasive Plant Survey

FWS's Study Request

The FWS requests that that BWPH conduct an invasive plants survey within the currently licensed project boundary and downstream to the vicinity of 250th Anniversary Park. The goals of the study are to: "(1) identify, map, and determine the abundance of all invasive plant species occurring in the study area, and assess the risk these species present to native fish and wildlife habitats; (2) identify vectors for invasive species dispersal within the project's area of influence; (3) provide information about the need and methods of long-term invasive species control; and (4) develop a report to determine the potential project operation and maintenance, vegetation management, or recreational activities that may directly or indirectly impact the establishment and dispersal of invasive species."

FWS states there is currently no known site-specific data for invasive plants occurring at the project, and baseline conditions are necessary to inform the development of measures to address potential project effects. FWS notes that continued project operations such as water level fluctuations, land management and maintenance activities, and project-related recreation provide conducive conditions and vectors for the spread and establishment of invasive aquatic plant species, and the study will inform the need to develop an invasive plant management plan that will minimize the existing and future occurrence of such plants during the new license term.

FWS's proposed methods would require BWPH to utilize any existing information (e.g., existing maps or aerial photos that depict the area; remote detection methods) in conjunction with field surveys designed to (a) maximize detection of invasive species and (b) ensure they can be conclusively identified to species. Surveys would be conducted by a qualified botanist at the lowest water level under low-flow conditions for terrestrial, riparian, and shallow littoral species. Field methods would need to include several approaches to ensure plants can be detected (e.g., visual while walking or boating, rake-toss, snorkel/scuba). FWS states that in addition to standard botanical information to confirm taxonomic identification, the study would also collect data on: (a) phenology of any local infestation (e.g., vegetative, bud, flower, immature fruit, mature fruit, seed-dispersing); (b) woody growth (e.g., seedling, sapling, mature); (c) the location and mapping (points and polygons, as appropriate) of all invasive plants; (d) estimated area of local infestation; (e) estimated abundance (stem count/percent cover); (f) vegetation classes; (g) land use(s) associated with any potential vectors of spread (e.g., recreational use, cutting and leaving in place); and (h) hydrology (e.g., upland, riparian, perennial

stream/river, intermittent stream/river, wetland, streambed). FWS also requests the study include recommendations for control, management, and monitoring; of invasive plants.

Comments on the Requested Study

BWPH objects to conducting an invasive species survey as requested by FWS. In the RSP, BWPH asserts that there are many pathways related to the propagation of invasive plant species at the project, many of which are unrelated to project operation or maintenance and out of the project's ability to control. BWPH further states that an invasive plant survey would only represent a snapshot in time that would not be useful for informing conditions associated with normal operations. They suggest that FWS failed to describe an existing problem or establish a direct link between project effects and invasive plants. BWPH plans to provide a description of vegetation management practices in its draft license application and propose changes if needed.

In its comments on the RSP, FWS reiterates that the project's continued presence and operation will provide suitable conditions for invasive species to establish and expand during the license term and that the need to establish baseline information is supported in the Commission's publication entitled *A Guide to Understanding and Applying the Integrated Licensing Process Study Criteria.* FWS states that BWPH currently proposes no measures to address invasive plants. Therefore, FWS again requests that the applicant develop and implement a detailed study plan consistent with their request for an invasive plant survey.

Discussion and Staff Recommendation

Commission staff will need to characterize the existing environment and evaluate the effects of project operation and maintenance on aquatic and terrestrial invasive plants within the project boundary. There is little information on the presence of invasive species at the project (section 5.9(b)(4)). Anecdotal observations of three common invasive plant species (Asiatic bittersweet, purple loosestrife, and bouncing-bet) have been documented within the project boundary according to an invasive species mapping website referenced in the PAD[3]. The PAD also states that aquatic invasives are not likely to occur, possibly due to a preference for still or slow flowing water; however, purple loosestrife can grow in shallow water near shorelines and can be considered a semi-

[3] Maine Natural Areas Program – iMapInvasives (MNAP). 2021. IMapInvasives3.0. https://www.imapinvasives.org/. Accessed September 2023.

aquatic invasive. As noted by FWS, reservoir fluctuations from project operation can create conditions that could promote the spread of this species as well as others.

Because the project's terrestrial environment is limited to narrow shorelines and a small patch of land near the dam, these areas area could be quickly surveyed on foot and by boat with minimal effort for the presence or absence of invasive species. Visual surveys of the impoundment and river shoreline would take less than two days to complete. Aquatic invasive plants are most likely to be found in shallow water or adjacent to the shoreline and documenting their presence or absence should not require snorkel or dive surveys. The information obtained from the surveys would assist staff in characterizing the affected environment at the project, evaluating project effects on invasive plants, and evaluating any potential measures to control invasive plants that BWPH may propose in the license application. Therefore, we recommend that BWPH conduct a survey for invasive plants within the project boundary and downstream to 250th Anniversary Park as recommended by FWS. The 250th Anniversary Park overlaps the downstream edge of the project boundary and since invasive species are often introduced and spread at recreation sites, it should be included in the survey. We recommend BWPH document and report the occurrence of all invasive plants observed during a survey effort. Data should be collected by a field biologist/technician capable of identifying all invasive terrestrial and aquatic plant species in the State of Maine, compiled into an Invasive Plants Study report, and filed with the Commission.

The report should include: (1) the date each study area was visited; (2) map(s) the location of any observed invasive plants; and (3) a description of the distribution of each identified invasive plant species within the study area. We estimate that the cost to collect the additional invasive plant species data and prepare the report would be approximately $50,000 and conclude that the level of effort would be worth the cost.

II. Studies Not Required

Temperature and Dissolved Oxygen Profile in the Project Area Upstream of the Dam

Proposed Study

As a part of its proposed Water Quality Assessment, BWPH intends to complete an impoundment trophic state study at the deepest area of the Brunswick impoundment in accordance with Maine DEP's 2022 Sampling Protocol for Hydropower Studies. BWPH proposes to sample impoundment water quality from the deepest, safely accessible spot in the impoundment upstream of the boat barrier twice per month for five consecutive months (June through October). BWPH proposes to collect Secchi disk transparency, water temperature and DO vertical profiles at 1-meter intervals.

Friends of Merrymeeting Bay (FOMB) requested that BWPH conduct a temperature and dissolved oxygen (DO) profile study upstream of the dam. FOMB states that it has been monitoring three sites upstream of Brunswick Dam in the project area monthly (May-October) for temperature and DO since 1999. FOMB asserts that assuming the Brunswick dam remains in place, flows will need to be maintained at high levels to keep the impoundment temperature and DO levels low and high enough respectively for fish to survive. Therefore, FOMB requests, without further elaboration, that "a more comprehensive spatial and temporal temperature and DO profile using data loggers be performed to allow for better flow management in the future."

Comments on the Study

BWPH did not adopt FOMB's study request because in its view, there is sufficient existing information concerning temperature and DO from Maine Department of Environmental Protection's (Maine DEP's) Volunteer River Monitoring Program to demonstrate compliance with DO standards. Additionally, BWPH points out that Maine DEP is the regulating agency responsible for certifying attainment with water quality standards and that Maine DEP only requested the collection of vertical profiles of temperature and DO at the deep spot in the impoundment and the monitoring of temperature and DO downstream of the tailwater. BWPH states it is proposing to complete the impoundment and downstream studies as requested by Maine DEP and would follow Maine DEP protocols.

Discussion and Staff Recommendation

BWPH's PAD includes temperature and DO data collected in the project impoundment from various years between 2010 and 2022. The sources of these data include: a 2010 water quality study conducted by Maine DEP, 2018 and 2021 benthic macroinvertebrate sampling conducted by Maine DEP, and annual water temperature and DO data from 2018-2022 taken from three spots in the impoundment as a part of the Volunteer River Monitoring Program. This data combined with the temperature and DO data that would be collected as a part of BWPH's Water Quality Study will adequately characterize the temperature and DO conditions in the project impoundment (section 5.9(b)(4)). Consequently, we do not recommend that BWPH be required to conduct additional temperature and DO monitoring in the project impoundment as requested by FOMB.

Downstream Fish Passage Effectiveness for Adult and Juvenile Alosines and American Eels

NMFS, FWS, and Maine DMR request a downstream fish passage effectiveness study for alosines and FWS requested a downstream fish passage effectiveness study for

American eels. The basis and methods for the requested studies for alosines and eels are essentially identical and BWHP's reasons for rejecting the studies are the same. Therefore, we address both requested studies below.

Proposed Studies

NMFS, FWS, and Maine DMR request that BWPH conduct a site-specific, field study to assess the effectiveness of the project's downstream fishway, turbines, and spillway at passing adult and juvenile alosines (American shad, blueback herring, and alewife) during their migration seasons under a range of flow conditions. NMFS states that 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 during 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.

NMFS, USFWS and MDMR recommended several possible methodologies that BWPH could use including acoustic and/or radio telemetry, "hi-z" tagging, and split beam hydroacoustics. The agencies state that these methods would be used to determine routes of passage, effectiveness of the existing downstream fishway, and survival through the project turbines, spillway, and other routes of passage for adult and juvenile alosines. Cost estimates ranged from NMFS's estimate of $500,000 to FWS's estimate of $1,200,000).

FWS also requested BWPH assess the behavior, approach and passage routes, passage success, survival (immediate and latent), and injury (external and internal) of American eel as they encounter the Brunswick Project during downstream migration. The objective of the study would be to assess the need for improvements to the project's downstream fish passage facilities at facilitating "effective and timely downstream passage" and improve survival and injury rates. The study would consist of tagging adult American eels and tracking their downstream passage routes at Brunswick Dam via radiotelemetry. FWS also requested the test eels be balloon-tagged so that they may be recovered after downstream passage to assess eel injury and mortality. FWS estimates that this study would cost between $250,000 and $350,000 to complete.

Comments on the Study

In its proposed study plan filed on August 2, 2024, BWPH did not adopt the requested studies. BWPH states that it sees no benefit in conducting extensive and costly studies on a potentially outdated downstream passage system that may end up being dramatically changed as a result of this licensing proceeding. In lieu of conducting the

requested studies, BWPH instead proposes to conduct a Computational Fluid Dynamics (CFD) Modeling – Upstream and Downstream Passage Study and an Upstream and Downstream Passage Alternatives Study. The downstream passage alternatives study would consist of a literature review to identify downstream passage alternatives that have been utilized at similar hydroelectric projects for Atlantic salmon, American shad, river herring, and American eel and an evaluation of previously conducted studies at Brunswick and other projects in the region with similar configurations. The study would include a comparison of the existing downstream fishway with current agency-recommended fishway design criteria, a desktop evaluation of entrainment potential, and an evaluation of downstream passage alternatives conducted in consultation with the resource agencies. The downstream computational fluid dynamics modeling would assess flow field conditions upstream of the project powerhouse that may affect fish passage and behavior. BWPH states that the results of these studies, would be used to identify, in consultation with the resource agencies, measures for improving downstream fish passage at the project. BWPH estimates that the CFD modeling study would cost $161,000 and the Upstream and Downstream Alternatives Study would cost $125,000.

In comments on the proposed study plan and again in response to the RSP, NMFS, FWS, and Maine DMR re-iterate their request for the downstream alosine and eel passage studies. NMFS and Maine DMR state that other than for juvenile Atlantic salmon, there is no site-specific information including differential distribution of passage, differential survival/injury information through the various downstream passage routes, or whole-station passage effectiveness for other sea-run species. NMFS contends that BWPH's proposed study plan does not indicate how a CFD flow-modeling study, or a study on various passage alternatives would fill these critical information gaps necessary to assess project effects.

NMFS, FWS, and Maine DMR also state that BWPH implies that it will substantially modify the project, such that any contemporary study of existing downstream passage conditions will become outmoded post-relicensing. However, the agencies point out that BWPH's PAD includes no proposal to modify downstream passage at the project nor does the proposed Passage Alternatives Study specify which alternatives will and will not be considered. They believe that this leaves open the possibility that BWPH could propose to continue operating the passage facilities as they do now (no-action alternative) or propose to utilize some existing downstream passage routes. If this were to occur, the agencies state they would not have adequate information regarding how project facilities and operations affect downstream migrating fish. NMFS points out that BWPH's concern about conducting costly studies for an outdated downstream passage system that will be substantially modified or replaced because of the relicensing ignores the possibility that its requested studies could demonstrate that, due to site-specific characteristics, elements of the existing downstream passage system are reasonably effective. NMFS states that without the information it is requesting, BWPH

could propose, or stakeholders, including Commission staff, could recommend or require substantial, costly, and ultimately unnecessary alternatives. Similarly, Maine DMR adds that without site-specific information related to route of passage and mortality, the agencies have no baseline data to which to compare alternatives and to determine the extent of any downstream passage problems.

The agencies state that the information gathered from its study requests are necessary for any assessment of behavior, passage success, immediate and latent survival, and internal and external injury of target species as they encounter the project during downstream migrations through all downstream passage routes. Therefore, they request that BWPH either 1) provide a specific, detailed proposal for protection, mitigation, and enhancement measures to address the project's effects on downstream passage of alosines and eels, or 2) adopt the requests for field studies of downstream passage for alosines and eels.

Discussion and Staff Recommendation

There is a substantial amount of existing information on the effects of entrainment, turbine mortality, and impingement at hydroelectric projects (EPRI, 1997). It is a reasonable and common approach to use data from similar hydroelectric projects with similar configurations and conditions to estimate passage survival at a project under evaluation (sections 5.9(b)(5) and 5.9(b)(6)). Desktop entrainment studies are also much less expensive to conduct than field studies section (5.9(b)(7)). Because BWPH proposes to use the results from hydroelectric projects and site conditions similar to that of the Brunswick Project, we expect the proposed study to produce data that would be applicable to the Brunswick Project and to evaluate project effects on downstream passage and alternatives to improve downstream passage.

Additionally, the PAD includes the results of *in situ* downstream tagging studies completed in 2013, 2014, 2015, and 2018 for salmon smolts. The results of these studies include estimates of baseline whole station survival, adjusted whole station survival, spill survival, turbine passage survival, passage route selection, and approach and residence time. While we understand the agencies desire for species specific data for alosines, juvenile alosines, like Atlantic salmon smolts, are surface-oriented migrators; therefore, the results from the past salmon tagging studies can provide understanding of route selection, possible delay, and estimated mortality for alosines (sections 5.9(b)(4)).

BWPH's proposed CFD modeling and Upstream and Downstream Fish Passage Alternatives Study would provide information that can be used to identify potential problems with existing downstream passage, compare existing conditions against agency design criteria, and evaluate possible alternatives to improve downstream passage. The results of the CFD modeling would demonstrate velocities and flow orientations in the

vicinity of the project's downstream fish passage facility entrances, the project's intakes, and the spillway. These velocity and orientation data can be used to estimate likely routes of downstream passage at various operating scenarios. Collectively, BWPH's proposed studies would achieve the NMFS study objectives for estimating: 1) injury and mortality through all routes of passage at the facility; 2) the proportion of migrants that utilize the routes of passage during the range of environmental and operational conditions present during their migration season; 3) forebay residence time; 4) temporal rate of arrival at the dam; and 5) transit time through the headpond, past the project, and through defined reaches downstream.

For these reasons, we recommend the CFD modeling and Upstream and Downstream Fish Passage Alternatives studies proposed by BWPH rather than agencies' requested Downstream Fish Passage Effectiveness for Adult and Juvenile Alosines and eels survival study.

Dam Decommissioning and Removal with Site Restoration

Proposed Study

FOMB requests that BWPH conduct a dam decommissioning and removal with site restoration study. FOMB states that any dam creates a host of environmental problems from fish passage to nutrient flows to water quality and production of potent greenhouse gases from impoundments. FOMB asserts that the ecosystem benefits of removing the Brunswick dam are enormous and that the electrical production of the Brunswick project is small. FOMB states that dam removal needs to be seriously evaluated as a realistic option and alternative to modifying or replacing the existing fishway which will only be a "band-aid" approach. Therefore, FOMB requests a comprehensive cost/benefit analysis of decommissioning, removal, and restoration. FOMB contends that it is important that mutually agreed upon (by the various stakeholders) third party consultants be hired rather than a "typical industry consulting firm" to conduct this study.

Comments on the Study

BWPH opposes a dam decommissioning and removal with site restoration study because it is not a reasonable alternative for the reasons outlined by Commission staff in its scoping document. Pointing to the scoping document, BWPH notes that it is not proposing to decommission the project, no entity has expressed interest in assuming regulatory control and supervision of the project facilities, and there is no evidence of an unavoidable, serious resource concern that cannot be mitigated with appropriate protection, mitigation, and enhancement measures developed through the relicensing process. BWPH states that decommissioning the project would eliminate a viable, safe,

and clean renewable source of power to the region and that there would be significant costs involved with decommissioning the project and/or removing project facilities.

In its comments on the proposed study plan, FOMB states that the cost and benefits of suitable fish passage can't be evaluated unless all alternatives are first studied, including dam removal. FOMB asserts that this type of analysis should be done by Commission staff as part of its evaluation.

Discussion and Staff Recommendation

As the Commission has previously held, and as explained in the scoping document, decommissioning is not a reasonable alternative to relicensing in most cases.[4] Decommissioning can be accomplished in different ways depending on the project, its environment, and the particular resource needs.[5] For these reasons, the Commission does not speculate about possible decommissioning measures at the time of relicensing, but waits until an applicant actually proposes to decommission a project, or a participant in a relicensing proceeding demonstrates that there are serious resource concerns that cannot be addressed with appropriate license measures and that make decommissioning a reasonable alternative and proposes a substantive, detailed decommissioning proposal that can be studied.[6]

BWPH does not propose decommissioning, nor does the project record demonstrate that there are serious resource concerns that cannot be mitigated if the

[4] *See, e.g., Eagle Crest Energy Co.,* 153 FERC ¶ 61,058, at P 67 (2015); *Public Utility District No. 1 of Pend Oreille County*, 112 FERC ¶ 61,055, at P 82 (2005); *Midwest Hydro, Inc., 111* FERC ¶ 61,327, at PP 35-38 (2005).

[5] In the unlikely event that the Commission denies relicensing a project or a licensee decides to surrender an existing project, the Commission must approve a surrender "upon such conditions with respect to the disposition of such works as may be determined by the Commission." 18 C.F.R. § 6.2. This can include simply shutting down the power operations, removing all or parts of the project (including the dam), or restoring the site to its pre-project condition.

[6] *See* generally *Project Decommissioning at Relicensing; Policy Statement*, FERC Stats. & Regs., Regulations Preambles (1991-1996), ¶ 31,011 (1994); *see also City of Tacoma, Washington*, 110 FERC ¶ 61,140 (2005) (finding that unless and until the Commission has a specific decommissioning proposal, any further environmental analysis of the effects of project decommissioning would be both premature and speculative).

project is relicensed with appropriate resource protection measures. Information from other studies (Computational Fluid Dynamics Modeling; Upstream and Downstream Fish Passage Alternatives Study; Visual Surveys of Upstream American Eel Movements; Diadromous Fish Behavior, Movement, and Project Interaction Study; and the Evaluation of Stranding Risk/Bathymetry Study) should provide the information needed to identify potential passage improvements. Therefore, because decommissioning has been eliminated as a reasonable alternative to relicensing, there is no justification for recommending a study of decommissioning the Brunswick Dam.

Benthic Macroinvertebrate Profile in the Project Area Upstream of the Dam

Proposed Study

FOMB requested that BWPH conduct a benthic macroinvertebrate (BMI) study upstream of the Brunswick Dam because BMIs provide a good indicator of water quality. FOMB states that is has conducted BMI studies designed to Maine DEP standards upstream of the project area for Brunswick; however, they believe that a more comprehensive spatial BMI study profile will allow for better flow management in the future assuming the dam stays in place.

Comments on the Study

BWPH opposes conducting the BMI study as requested because the study request is not likely to inform the development of license conditions and existing information is sufficient to describe the BMI community. As described and presented in the PAD, BMI monitoring was recently completed in 2021 downstream of the Pejepscot dam (the upper end of Brunswick impoundment) and at two sites in the Brunswick impoundment. Thus, BWPH asserts that existing information is adequate to characterize the BMI community upstream of the dam.

Additionally, BWPH points out that Maine DEP is the regulating agency responsible for certifying attainment with water quality standards and Maine DEP's study requests include conducting a BMI study downstream of the dam, but not upstream. BWPH states that it intends to complete the downstream BMI study as requested by Maine DEP and to follow Maine DEP protocols.

Discussion and Staff Recommendation

BWPH's PAD includes BMI data collected as a part of Maine DEP's Biological Monitoring Program from three sites in the project impoundment between 2010 and 2021. This data adequately characterizes the BMI in the project impoundment (section 5.9(b)(4)). The BMI data included in the PAD along with the data to be collected as a

part of the approved Water Quality Assessment and Tailwater Benthic Macroinvertebrate Study would allow for an assessment of the project's effects on water quality in the project area. Consequently, we do not recommend that BWPH be required to conduct the BMI study requested by FOMB.

Literature Cited

Electric Power Research Institute (EPRI). 1997. Turbine entrainment and survival database-field tests. Prepared by Alden Research Laboratory, Inc. EPRI Report No. TR-108630. 13 pp. (plus two 3.5" diskettes), Palo Alto, CA.