FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426
July 20, 2018

OFFICE OF ENERGY PROJECTS

Project No. 14856-000 – Maine
Lower Mousam Project
America First Hydro, LLC

Mr. Ian Clark
America First Hydro, LLC
826 Scarsdale Ave
Scarsdale, NY 10583

Reference: Study Plan Determination for the Lower Mousam Project

Dear Mr. Clark:

Pursuant to 18 C.F.R. § 5.13(c) of the Commission's regulations, this contains the study plan determination for the Lower Mousam Project No. 14856 (project), located on the Mousam River in York County, 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 February 21, 2018, America First Hydro, LLC (America First Hydro) filed its proposed plan for studies related to water quality, fish and aquatic resources, recreation, and cultural resources. America First Hydro held a study plan meeting on March 23, 2018 to discuss the proposed study plan,[1] and filed revisions to the proposed study plan on June 21, 2018 (revised study plan). Comments on the studies were filed by: Mousam and Kennebunk River Alliance (MKRA) and Maine Rivers (filed jointly); Maine Department of Environmental Protection (DEP); National Marine Fisheries Service (NMFS); and Trout Unlimited, Sebago Chapter (Trout Unlimited).

General Comments

Trout Unlimited, Maine DEP, and MKRA and Maine Rivers state that the revised study plan does not follow the requirements of section 5.13(a) of the Commission's

[1] On June 18, 2018, America First Hydro also held an on-site meeting with staff from Maine DEP and the Maine Department of Inland Fisheries and Wildlife (Maine DIFW) to discuss the proposed study plan.

regulations because the submission lacks specificity and relies on unrecorded verbal communications that took place during the June 18, 2018 meeting. Trout Unlimited and MKRA and Maine Rivers state that the revised study plan does not explain why certain requested studies were not adopted. Trout Unlimited states that the revised study plan ignores certain stakeholder concerns. NMFS states that there is a general lack of clarity with respect to the timing, means, and methods that will be used to conduct the studies.

According to the section 5.13(a) of the Commission regulations, a revised study plan must include the comments that were submitted on the proposed study plan and a description of the efforts made to resolve differences over study requests. If the potential applicant does not adopt a requested study, it must explain why the request was not adopted.

America First Hydro's revised study plan references the studies that were submitted in the proposed study plan, and provides references to comments that were submitted on the proposed study plan (including written comments filed before the May 22, 2018 comment due date, and comments made by participants during the March 23, 2018 study plan meeting[2]). The revised study plan also includes a description of the efforts made to resolve differences over the study requests, including the March 23, 2018 study plan meeting that provided an opportunity for all participants to comment on the proposed study plan and America First Hydro's June 18, 2018 meeting with state resource agencies. In addition, the revised study plan includes responses to comments submitted by several participants, including Commission staff, Maine DEP, Maine DIFW, NMFS, U.S. Fish and Wildlife Service (FWS), and MKRA and Maine Rivers. Based on this information, the revised study plan complies with the Commission's regulations.

Section 5.13(b) of the Commission's regulations provides an opportunity for participants to file comments on the revised study plan, including study modification requests and requests for additional studies that were not adopted by the potential applicant. Commission staff's February 21, 2018 scoping document provided a May 22, 2018 filing date for any such comments to be filed. NMFS, Maine DEP, and MKRA and Maine Rivers each filed specific study modification requests; and MKRA and Maine Rivers filed requests for studies that were not adopted by America First Hydro. As provided by section 5.13(b) of the regulations, participants have been given an adequate opportunity during this pre-filing process to provide input on the study plan.

Altogether, the record includes a proposed study plan, comments on the proposed study plan, a revised study plan, and comments on the revised study plan. Consistent with section 5.13 of the Commission's regulations, this information is adequate for

[2] *See* Transcript of March 23, 2018 study plan meeting, filed by America First Hydro on May 7, 2018.

developing a determination on the study plan, including any modifications determined to be necessary in light of the record.

Study Plan Determination

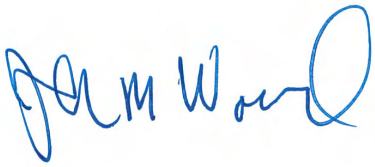
Of the eight studies[3] proposed by America First Hydro, six are approved with staff-recommended modifications, one is approved as filed by America First Hydro, and one is not required (see Appendix A). No additional studies are being required.

The specific modifications to the study plan, the basis for modifying America First Hydro's study plan, and the reasons for not adopting the additional studies are discussed in Appendix B. Commission staff reviewed all comments and considered all study plan criteria in section 5.9 of the Commission's regulations; however, only the specific study criteria particularly relevant to the determination are referenced in Appendix B. Staff's analysis does not address suggestions for minor changes to proposed studies that would not have a significant effect on the amount, quality, or type of data collected. Staff's analysis also does not address general comments that fail to identify specific study deficiencies, or that broadly reference studies undertaken in other proceedings and comments filed by other participants.

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. America First Hydro may choose to conduct any study not specifically required herein that it feels would add pertinent information to the record of this proceeding. 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 July 21, 2019.

If you have any questions, please contact Michael Watts at (202) 502-6123.

Sincerely,



Terry L. Turpin
Director
Office of Energy Projects

[3] Study 1 (*Water Quality Study*) includes two components that are described separately in the study plan (impoundment trophic state sampling and riverine sampling).

Enclosures: Appendix A – Summary of Determination on Proposed and Requested Studies

Appendix B-- Staff Recommendations on Requested Study Modifications and Proposed and Requested Studies

APPENDIX A

SUMMARY OF DETERMINATION ON PROPOSED AND REQUESTED STUDIES

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
1. Water Quality Study	America First Hydro, LLC		X	
2. Benthic Macroinvertebrate Study	America First Hydro, LLC		X	
3. Bypassed Reach Cross-Section Flow Study	America First Hydro, LLC			X
4. Fish Assemblage Study	America First Hydro, LLC		X	
5. Eel Passage Siting and Design Study	America First Hydro, LLC		X	
6. Downstream Passage and Fish Entrainment Study	America First Hydro, LLC	X		
7. Recreation Needs Study	America First Hydro, LLC		X	
8. Historic Assessment Study	America First Hydro, LLC		X	
9. Wetlands Inventory and Functional Assessment Study	Mousam and Kennebunk River Alliance and Maine Rivers			X

Study	Recommending Entity	Approved	Approved with Modifications	Not Required
10. Shoreline Assessment and Site Conditions Study	Mousam and Kennebunk River Alliance and Maine Rivers			X

APPENDIX B

STAFF RECOMMENDATIONS ON REQUESTED STUDY MODIFICATIONS AND PROPOSED AND REQUESTED STUDIES

The following discussion includes staff's recommendations on studies proposed by America First Hydro LLC (America First Hydro), and participants' requests for study modifications and additional studies. We base our recommendations on the study criteria outlined in the Commission's regulations [18 C.F.R. § 5.9(b)(1)-(7)]. Except as explained below, the revised study plan filed on June 21, 2018 adequately addresses all study needs at this time.

I. Requests for Study Modifications

Study 1: Water Quality Study

Applicant's Proposal

America First Hydro proposes to conduct a water quality study to collect baseline water quality information and assess whether Maine water quality standards are being met in project waters. The objectives of the study include assessing: (1) the effects of the impoundments on the designated use of "recreation in and on the water" (including swimming and other water contact recreation); (2) the effects of the project on the designated use of "habitat and aquatic life criteria;" and (3) the effects of the project on dissolved oxygen (DO) and temperature in the impoundments and river downstream of the project.

The study plan proposes sampling of the trophic state[4] of each of the impoundments twice a month from June through October 2018.[5] The study also includes DO and water temperature monitoring using two continuous data loggers programmed to record data at one-hour increments for approximately 45 days between July and August. The plan proposes four study areas, including one located approximately 1,000 feet below Kesslen Dam and one in each of the three impoundments (at the deepest point in each impoundment). America First Hydro states that the specific locations of the sampling points and transects will be identified by July 30, 2018.

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[4] Specifically, America First Hydro proposes to sample secchi disk transparency, temperature, DO, total phosphorus, chlorophyll *a*, color, pH, and total alkalinity.

[5] However, the study plan also states that water quality studies will be conducted in August, September, and October.

Comments on the Study

The Maine Department of Environmental Protection (Maine DEP) states that the trophic state sampling and DO and temperature monitoring must include five consecutive months of sampling during 2019 (June through October), and the sampling sites must be approved by Maine DEP.

Discussion and Staff Recommendation

To describe baseline water quality conditions, America First Hydro will need to sample the impoundment for indicators of the trophic state, and concentrations of DO and temperature. Conducting the water quality study for consecutive months from June through October will ensure that the water quality data accurately reflects the range of environmental conditions in the impoundment and downstream reach, including worst-case summer conditions [section 5.9(b)(6)]. Therefore, we recommend revising the study to include trophic state sampling and DO and temperature monitoring for consecutive months, from June through October.

Separately, the study plan states that America First Hydro will follow Maine DEP's 2014 "*Sampling Protocol for Hydropower Studies – Lakes, Ponds and Impoundments and Rivers and Streams*."[6] We recommend that the study use these generally accepted sampling procedures to collect baseline water quality information [section 5.9(b)(6)]. For additional guidance, we also recommend that the study use Maine DEP's *Instruction Manual for Baseline Water Quality Sampling* (Pearsall, 1997), which provides step-by-step instructions on generally accepted routine monitoring and sample techniques for the relevant water quality parameters.

Consistent with generally accepted water quality and trophic state sampling practices [section 5.9(b)(6)], water quality samples should be taken in the four study areas proposed in the study plan, including one located approximately 1,000 feet below Kesslen Dam and one in each of the three impoundments (at the deepest point in each impoundment). Trophic state sampling, including dissolved oxygen and temperature profile readings, should be conducted at the deepest point of each impoundment, and continuous data loggers for dissolved oxygen and temperature should be used in the 1,000-foot riverine stretch below Kesslen Dam.

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[6] Maine DEP's December 19, 2017 comment letter included the November 2014 *DEP Sampling Protocol for Hydropower Studies – Lakes, Ponds, and Impoundments*, which provides the sampling procedures for a trophic state study. Maine DEP's December 19, 2017 comment letter also included the November 2014 *DEP Sampling Protocol for Hydropower Studies – Rivers and Streams*, which provides the sampling procedures for temperature and dissolved oxygen monitoring.

Study 2: Benthic Macroinvertebrate Study

Applicant's Proposal

America First Hydro proposes to conduct a benthic macroinvertebrate study to assess whether the Mousam River in the vicinity of the project attains Maine's Class B water quality standards. The study plan proposal includes collecting samples of the benthic macroinvertebrate community to determine how the current operating regime and minimum flow requirements for the Lower Mousam Project are affecting the structure and function of the resident benthic macroinvertebrate community. As proposed, samples would be collected in the Mousam River downstream of each powerhouse for a period of 28 days during the low flow period between July 1 and September 30.

Comments on the Study

Maine DEP states that the benthic macroinvertebrate study should be conducted in a free-flowing river reach downstream of Kesslen Dam at a location approved by Maine DEP, and not in the project impoundments downstream of the Twine Mill and Dane Perkins Dams. Maine DEP also states that the study should be performed during the low-flow period of July 1 through September 30, and that the sample collecting apparatus must be deployed for 28 days.

Discussion and Staff Recommendation

Sampling for benthic macroinvertebrates for a 28-day period between July 1 and September 30 is appropriate and consistent with generally accepted practices [section 5.9(b)(6)], because this time period often presents conditions of maximal stress to the biological community due to increased stream water temperatures, low dissolved oxygen concentrations, and low flow conditions.

The proposed study plan references an outdated study methodology published by the Maine DEP in 2002. We recommend that America First Hydro use the methodology outlined in Maine DEP's *Methods for Biological Sampling and Analysis of Maine's Rivers and Streams* (Davies and Tsomides, 2014), which describes the field, laboratory, and data preparation methods required by Maine DEP to collect and analyze benthic macroinvertebrate samples for Maine's River and Stream Biological Monitoring Program, and is consistent with current, generally accepted practices [section 5.9(b)(6)]. To assess project effects on water quality in the riverine habitats of the Mousam River, we recommend that benthic macroinvertebrate sampling be conducted in representative riverine habitat, which occurs in the free-flowing stretch of the river downstream of Kesslen Dam and not in the project impoundments.

Study 3: Bypassed Reach Cross-Section Flow Study

Applicant's Proposal

America First Hydro proposes to conduct a flow study, but does not provide any information regarding the contents of the study, including the goals and objectives, existing information, nexus between project operation and effects, study methodology, or cost. America First Hydro only states the following: "As discussed at the June 18 meeting [with Maine DEP], the only [bypassed reach] required to be studied is that of the Kesslen Dam. The locations of the transect points will be provided by July 30, 2018. [Maine DEP's] protocol will be used."

Comments on the Study

Mousam and Kennebunk River Alliance (MKRA) and Maine Rivers request that America First Hydro sample instream flow conditions downstream of each dam. Maine DEP states that America First Hydro must provide Maine DEP with a description of the bypassed reach cross-section study plan for review and approval, including a figure showing the transect locations.

Discussion and Staff Recommendation

America First Hydro's proposed study and MKRA's and Maine Rivers' requests for instream flow conditions to be sampled downstream of the dams do not meet any of the study criteria in section 5.9 of the Commission's regulations. Because of this, the purpose, intent, and need for the study is unclear, as the powerhouses are integral to each of the three dams located at the project and the project has no bypassed reaches in which a flow study could be conducted. As a run-of-river project, outflow at each of the three dams approximates inflow to the three impoundments on a nearly instantaneous basis, and America First Hydro is proposing to continue operating the project in this manner. Further, there is no indication that any party to the proceeding is advocating that the project operate in a mode other than run-of-river, such as in a peaking or load-following mode where there would be periodic storage of inflow in the project reservoirs and a resulting cessation of all or some flow downstream of the dams. As a result, there is no clear connection between project operation and effects on flows downstream of any of the three dams, including Kesslen Dam [section 5.9(b)(5)]. Accordingly, staff does not recommend the Bypassed Reach Cross-Section Flow Study.

Study 4: Fish Assemblage Study

Applicant's Proposal

America First Hydro proposes to conduct a fish assemblage study to describe the fishery at the project. The study is designed to meet the following objectives: (1) determine relative abundance, species composition, distribution, and life stages of fish present in the project vicinity; and (2) determine the occurrence and timing of diadromous fish species in the project vicinity.

The study plan proposes nighttime boat electrofishing along the shorelines of all three impoundments and backpack electrofishing downstream of Kesslen Dam. According to the plan, sample sites will be located directly above and below each impoundment, and additional surveys will be conducted along each shoreline. The study would be conducted in late May.[7] However, America First Hydro states that it is still working with resource agencies to further define and clarify how the fish assemblage will be studied at Kesslen Dam.

Comments on the Study

The National Marine Fisheries Service (NMFS) states that the study methodology lacks clarity on the spatial extent of the study and specific locations for electrofishing; the range of flows for sampling; and the sampling dates, duration, and frequency. NMFS recommends sampling twice per week from late April to mid-July in order to capture the upstream runs of diadromous fish in the river. NMFS also recommends that the specific locations of electrofishing be selected in consultation with the agencies. NMFS requests that America First Hydro describe the methods it will use for counting individual alewives and American shad, and the methods it will use for determining species composition. NMFS states that it has observed large numbers of alewife just downstream from Kesslen Dam and it is not clear how they will all be counted during the survey, nor how other species such as shad will be enumerated. NMFS states that a draft report should be submitted for agency review, and that the report should include a summary of catch per unit effort for each species that is observed.

MKRA and Maine Rivers recommend that sampling occur below the Twine Mill and Dane Perkins Dams, and from Kesslen Dam to the mouth of the Mousam River. MKRA and Maine Rivers state that sampling should occur in the spring and fall to identify the timing and spatial extent of diadromous fish, including the presence of sea-

[7] The revised study plan also states that "the studies, or segments thereof, will be conducted in 2019 during the months of May and June (and possibly July), *e.g.*, fish and eel assemblage for upstream passage."

run brook trout and sea-run brown trout. MKRA and Maine Rivers also state that nighttime sampling should be conducted in March and April to document smelt spawning. Finally, MKRA and Maine Rivers request that America First Hydro use acoustic receivers to detect shortnose and Atlantic sturgeon

Discussion and Staff Recommendation

Sampling scope, duration, and methods in the project impoundments

Electrofishing at night in near-shore areas is a proven, effective technique for sampling fish species that are likely to occur in the project impoundments. The study plan provides that sampling will occur in each impoundment, as requested by MKRA and Maine Rivers. In addition, because Kesslen Dam currently blocks passage of migratory fish, only resident fish species occur in the impoundments. Accordingly, sampling for diadromous species from late April to mid-July is not necessary to characterize the species assemblage within the impoundments, and a sampling schedule limited to late May should be sufficient for the environmental analysis [section 5.9(b)(5)].

The proposed study does not identify how sampling locations will be chosen or how often sampling will occur [section 5.9(b)(6)]. To accurately characterize the fish assemblage in each impoundment, staff recommends revising the study to include randomly-selected sampling points that are representative of the aquatic habitats in each impoundment. Consistent with generally accepted practices [section 5.9(b)(6)], sampling segments should be randomly selected every 500 meters around the perimeter of each impoundment shoreline, while also ensuring adequate water depths and available access for the sampling equipment, as detailed in the revised study plan for the Wilder, Bellows Falls, and Vernon Hydroelectric Project Nos. 1892, 1855, and 1904, respectively.[8] Sampling each impoundment twice per week during the last two weeks of May should be sufficient to accurately estimate the relative abundance of fish, species composition, fish distribution, and life stages of fish present in the impoundments.

Sampling scope, duration, and methods downstream of Kesslen Dam

America First Hydro proposes to conduct the study in late May, but also indicates that the study could be conducted in June and July. If the survey period is limited to late May, America First Hydro will not be able to determine the occurrence and timing of diadromous fish species in the project vicinity (Study Objective 2). The proposed sampling schedule needs to be expanded to include other months (besides May) when migratory fish could be reaching Kesslen Dam [section 5.9(b)(6)]. Smelt run earlier in

[8] *See* TransCanada Hydro Northeast Inc.'s August 14, 2013 filing in FERC Docket Nos. P-1892-026, *et al.*, Study 10 (*Fish Assemblage Study*), at 123.

the year than May, juvenile American eels continue to run through the summer, and sea-run brook and brown trout run in the late summer and fall. Sampling dates of late April until mid-July, and twice per week sampling frequency, should be sufficient to document the presence of all the potential migratory fish except sea-run brook and brown trout.[9] Therefore, we recommend this sampling frequency and time period.

Unlike other diadromous fish that typically migrate in large numbers and high densities, and are easily visible when migrating through shallow water, sea-run brook or brown trout are usually less abundant and more difficult to identify. In addition, their presence is presumed to be likely because of the fact that landlocked freshwater brook and brown trout occur further upstream in the river basin and a portion of that population may have established migratory behavior, as occurs in other coastal Maine rivers. Habitat downstream of Kesslen Dam and in the estuary at the Gulf of Maine is similar to other Maine river systems where sea-run brook and brown trout are known to occur. Therefore, conclusively establishing their occurrence downstream of Kesslen Dam is not required to inform the environmental analysis [section 5.9(b)(4)]. Consequently, we do not recommend separate late summer or fall sampling for sea-run brook or brown trout, as suggested by MKRA and Maine Rivers.

Based on the potential for large numbers of alewife to occur below Kesslen Dam, we recommend revising the study plan to identify the methods proposed for counting and identifying fish during the electrofishing survey [section 5.9(b)(6)]. These methods will help ensure that the study provides information to determine relative abundance, species composition, distribution, and life stages of fish present in the project vicinity (Study Objective 1). Consistent with generally accepted practices [section 5.9(b)(6)], sampling should be conducted by anchoring a fine mesh seine at the downstream end of the sample station to actively net stunned individuals, as detailed in the revised study plan for the Wilder, Bellows Falls, and Vernon Hydroelectric Project Nos. 1892, 1855, and 1904, respectively.[10] All fish captured should be identified to species, enumerated, measured (total length), weighed, and carefully released in a manner that limits mortality. If large numbers of small fish are captured, they should be grouped, enumerated, and batch-weighed, and representative length samples should be taken from a small and large individual to be representative of the group.[11]

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[9] Smelt in Maine spawn from March to May. Beginning the sampling season in late April should be sufficiently early in the year to document whether smelt are reaching Kesslen Dam.

[10] *See* TransCanada Hydro Northeast Inc.'s August 14, 2013 filing in FERC Docket Nos. P-1892-026, *et al.*, Study 10 (*Fish Assemblage Study*), at 124.

[11] *See id* at 123.

Because the project is operated in a run-of-river mode, it is expected to have minimal to no effect on flows or habitat conditions beyond the area immediately downstream from Kesslen Dam. Therefore, sampling further downstream to the mouth of the Mousam River is not necessary for the purposes of establishing baseline environmental conditions. Similarly, because America First Hydro proposes to continue operating the project in a run-of-river mode and no stakeholders have raised the possibility of revising project operation to a store-and-release mode, sampling downstream to the mouth of the Mousam River is not necessary [section 5.9(b)(5)]. Effects on upstream migrating fish can be determined by documenting the presence and abundance of species at the base of Kesslen Dam. Accordingly, staff does not recommend that the fish assemblage study area be extended downstream of Kesslen Dam to the mouth of Mousam River.

With regard to MKRA's and Maine Rivers' request to monitor for shortnose and Atlantic sturgeon, we are unaware of any information suggesting that these species could be present in the reach immediately downstream from Kesslen Dam. As discussed above, sampling further downstream to the mouth of the Mousam River is unnecessary based on the existing/proposed run-of-river operation. However, because these species occur in other Maine rivers and are known to migrate long distances, there is a possibility that the species could be present below Kesslen Dam [section 5.9(b)(5)]. Accordingly, staff recommends revising the study plan to include the following provisions that are consistent with generally accepted practices: (1) prior to each electrofishing survey downstream of Kesslen Dam, at least two fish biologists should visually survey the width of the river to assess the potential presence of shortnose or Atlantic sturgeon in the reach immediately downstream of Kesslen Dam; (2) surveyors should not electrofish downstream of Kesslen Dam until confirming that no sturgeon are present in the sampling area; (3) if sturgeon are observed in the sampling area at any time after electrofishing commences, then electrofishing efforts should immediately cease; (4) in the event sturgeon are observed in the sampling area at any time during the survey, NMFS should be contacted to report the presence of sturgeon and consulted with to develop alternative study methodologies; and (5) America First Hydro should notify FERC if any study plan revisions are necessary to avoid potential harm to any sturgeon observed in the sampling area [section 5.9(b)(6)].

Study 5: Eel Passage Siting and Design Study

Applicant's Proposal

America First Hydro proposes to conduct a study to evaluate the migration behavior of juvenile and adult American eel at all three project dams, including an evaluation of upstream and downstream eel passage based on project design and operation. The study objectives are to: (1) determine the locations in which juvenile eels

congregate at all three dams; (2) evaluate upstream passage design at all three dams; and (3) prepare an initial evaluation of downstream eel passage.

The study includes nighttime surveys using spotlights, and the installation of temporary ramp traps to collect eels. Observation surveys and trap deployments would occur biweekly from mid-May through August.

Comments on the Study

NMFS requests that juvenile eel surveys be conducted at all three dams and that the study include one or two nighttime surveys per week between May 1 and August 31, depending on weather and spill conditions. NMFS recommends that surveys occur after a rain event to increase the likelihood of observing eels. NMFS also recommends that surveys begin one hour after sunset, using spotlights and binoculars. NMFS states that surveys should be conducted at the powerhouse tailraces, and the downstream face of the dams and spillways. NMFS states that the following information should be documented during each survey: (1) location of where eels congregate (including photographs of locations); (2) start date, start time, end time, weather, and flow/spill conditions; (3) approximate numbers of eels per location; (4) observations of eel behavior; (5) estimates of eel sizes/lengths; and (6) the presence of any predators.

MKRA and Maine Rivers request that the study includes nighttime surveys, temporary traps at each dam, and an evaluation of potential permanent upstream eel passage facilities.

Discussion and Staff Recommendation

The study is needed to evaluate the migration behavior of eels at the project, including any project effects on upstream and downstream eel passage. The study includes several of the elements requested by NMFS and MKRA and Maine Rivers, including nighttime surveys downstream of each dam and other project structures, installment of temporary traps, and an evaluation of potential upstream eel passage facility designs.

America First Hydro has not specified where it will deploy the temporary ramp traps [section 5.9(b)(6)]. Staff recommends that ramp traps be installed immediately downstream of each dam on opposite sides of the river to increase the chance of intercepting migrating eels. Consistent with generally accepted practices [section 5.9(b)(6)], traps should be designed to capture the eels as they use shallow water stream edge habitats to migrate upstream, as detailed in the revised study plan for the Turners

Falls Hydroelectric Project No. 1889 and Northfield Mountain Pumped Storage Project No. 2485.[12]

With regard to the timing of the surveys, NMFS requests that surveys begin two weeks earlier than proposed in the study plan (*i.e.*, at the beginning of May instead of mid-May) and that studies be conducted on a weekly basis (instead of biweekly). American eel upstream migration occurs throughout the spring, summer, and fall, and peaks between May and July, depending on location (Richkus and Whalen, 1999). Surveying for eels and installing ramp traps on a weekly basis from the beginning of May through August would help ensure that the study captures eel migration behavior at the project, including locations where juvenile eels congregate [section 5.9(b)(6)]. To increase the likelihood of observing eels, the surveys should be conducted after a rain event, if possible, and should employ the use of a spotlight and binoculars. Ramp traps should be checked every two to three days or after rain events to quantify the catch.

With regard to the data that should be collected during each survey, America First Hydro proposes to record the date of the survey, start and end time, weather and moon phase, river temperature, project discharges, and approximate number and size of eels observed. America First Hydro also proposes to develop a project map of the surveyed areas that identifies the areas and habitats where eels are observed. The additional elements requested by NMFS (including taking photos of eel locations, recording observations of eel behavior, and indicating the presence of any predators on the field data sheets), would help meet the study goal of evaluating migration behavior [section 5.9(b)(6)]. Consistent with generally accepted practices, recorded data for the eel ramp traps should include the location, trapping interval, numbers of eels trapped, relative eel sizes, and hydraulic and environmental conditions during the trapping period, as described in the revised study plan for the Turners Falls Hydroelectric Project No. 1889 and Northfield Mountain Pumped Storage Project No. 2485 [section 5.9(b)(6)].[13]

Based on the discussion above, we recommend revising the study plan to include: (1) weekly eel surveys and ramp trap installations from May 1 to August 31 (to be conducted after a rain event, if possible); (2) the use of a spotlight and binoculars during the survey to assist in locating eels; (3) documenting eel locations with photos, recording observations of eel behavior, and indicating the presence of any predators; (4) placing eel ramp traps immediately downstream of each dam on opposite sides of the river; (5) designing eel traps in a manner that is consistent with the design described in the revised

[12] *See* FirstLight Hydro Generating Company's August 14, 2013 filing in FERC Docket Nos. P-1889-081 and P-2485-063, Study 3.3.4 (*Evaluate Upstream Passage of American Eel at the Turners Falls Project*), at 3-191.

[13] *See id.*

study plan for the Turners Falls Hydroelectric Project No. 1889 and Northfield Mountain Pumped Storage Project No. 2485; and (6) checking eel traps every two to three days or after rain events to quantify the catch, and documenting the location of the eel trap, trapping interval, numbers of eels trapped, relative eel sizes, and hydraulic and environmental conditions during the trapping period.

Study 6: Downstream Passage and Fish Entrainment Study

Applicant's Proposal

America First Hydro proposes a study to evaluate the downstream passage of diadromous and resident fish species at the project,[14] including the potential for entrainment, impingement, and turbine-induced mortality at all three powerhouses, and whole-project survival. The study objectives are to: (1) ensure that protection, mitigation, and enhancement measures at the project are commensurate with the project's effects and contribute to meeting state and federal fish and wildlife agencies' objectives; and (2) explore opportunities for potential protection, mitigation, and enhancement measures for threatened and endangered species, and species that are proposed to be listed under the Endangered Species Act.

To assess the risk of turbine entrainment, America First Hydro proposes to conduct a desktop analysis using published entrainment and mortality data. America First Hydro proposes to qualitatively evaluate whether target fish species have a low, moderate, or high risk of entrainment based on published data from comparable hydropower facilities. America First Hydro states that it will consider the physical and operational characteristics of the project that influence fish entrainment, survival, and passage, including but not limited to: (1) number, type, orientation, and hydraulic capacities of the turbines; (2) depth, size, and clear spacing of the trashracks; and (3) surface area, volume, average depth, and retention time of the impoundment. America First Hydro proposes to estimate turbine entrainment mortality by using the blade strike probability model developed by Franke, *et al.* (1997) for the key species listed above.[15]

In addition, America First Hydro proposes to estimate whole station survival rates for diadromous species by using: (1) hydrologic data to determine flow routing through the project facilities; (2) scientific literature to evaluate fish routing based on flows; (3)

[14] At a minimum, the study will assess downstream passage of adult and juvenile American shad, blueback herring, and alewife; adult American eel; and juvenile sea lamprey.

[15] The model uses several factors to assess the probability of blade strike, including the number of runner blades, fish length, runner blade speed, turbine type, runner diameter, turbine efficiency, and total discharge.

scientific literature to estimate spillway and bypass survival rates; and (4) data from the desktop entrainment assessment discussed above.

Comments on the Study

NMFS requests that the analysis include an overall downstream survival estimate for the species listed above that: (1) considers the percent of flow used for generation versus spillage; (2) combines the mortality estimates for fish that pass through the powerhouses at all three dams; and (3) accounts for the percent of fish that survive passage via spillage. NMFS states that America First Hydro should develop a draft report for review and comment by the agencies prior to submitting a final report.

MKRA and Maine Rivers state that the study should include individual powerhouse and whole project survival estimates for American eel.

Discussion and Staff Recommendation

America First Hydro's study appears to already include the elements requested by NMFS and MKRA and Maine Rivers, including an analysis of flow routes, fish survival over the spillway, and whole station survival rates for several diadromous fish species, including American eel. NMFS appears to be concerned about how the information collected by America First Hydro will be presented in the study report and whether NMFS will have an opportunity to review the draft report. The study report states that it will present the results of the study and include a discussion of project effects. Therefore, America First Hydro's proposed study 6, which we recommend as described herein, already provides that the study report will include NMFS's requested information, including: (1) the percent of flow used for generation versus spillage (referred to as "flow routing" in the study plan); and (2) combined mortality estimates at all three powerhouses (referred to as "whole station survival rates" in the study plan), and the percent of fish surviving passage via spillage (referred to as "spillway and bypass survival rates"). In addition, America First Hydro proposes to prepare a draft and final study report, and states that it will file the draft report with FERC and provide notice of the filing to the resource agencies. As stated in the study plan, each draft report will request written comments within 45 days of filing.

The study plan should provide sufficient information for the environmental analysis and is consistent with NMFS's request [section 5.9(b)(5)].

Study 7: Recreation Needs Study

Applicant's Proposal

America First Hydro proposes to conduct a recreation study to evaluate recreation use and demand at the project. The study objectives include: (1) inventorying and documenting existing recreation facilities in the vicinity of the project; (2) determining the existing recreation use at the project; (3) evaluating recreation opportunities within the project area; and (4) identifying opportunities for improving existing recreation access sites or providing additional access within the project vicinity.

The proposed study includes: (1) an inventory with photo documentation and mapping of the existing recreation facility locations, amenities, and site conditions; (2) a review of recreation use at the project based on FERC Form 80 data, reports, and studies on recreational use; and (3) an on-site assessment and photo documentation of the recreation opportunities in the impoundment, including fishing and boating.

Comments on the Study

MKRA and Maine Rivers recommend that the study include: (1) a recreation inventory and "use and needs" assessment during all four seasons of the year; (2) a geographical scope that extends from the Dane Perkins impoundment to the estuary of the Mousam River; and (3) a creel survey with a geographical scope that extends from the Dane Perkins impoundment to the estuary of the Mousam River.

Discussion and Staff Recommendation

Recreation Site Inventory and Assessment

The Recreation Needs Study will provide information on existing recreation use in the vicinity of the project and identify whether additional recreation opportunities exist. However, the study plan does not include an adequate description of the duration, frequency, and methodology for collecting the information [section 5.9(b)(6)].

To ensure an accurate characterization of recreation use, access sites, features, and conditions, we recommend that America First Hydro conduct the site inventory and on-site assessment of recreation opportunities during each of the four seasons of the year, for at least two full weekdays and two full weekend days during each season.

The study includes the use of FERC Form 80 information for evaluating the existing recreation use at the project, but the last FERC Form 80 report for the project was filed with the Commission on March 25, 1997. Because the information is now more than 20 years old, updated data on recreation use in the project vicinity is necessary [section 5.9(b)(5)]. As part of the site inventory and on-site assessment, staff recommend that America First Hydro use a standardized inventory form to collect data [section

5.9(b)(6)]. The inventory form should be based on accepted protocols, as described in English *et al.*, 2001, National Visitor Use Monitoring Program, 2007, and Visitor Services Project, 2007. These protocols should be used for site surveys at all publicly-accessible sites to document existing facilities and recreation uses.

The geographical scope of the study is not specifically identified in the study plan [section 5.9(b)(6)]. Because recreation may occur in each of the project impoundments and downstream of Kesslen Dam, accurate counts of recreation facilities and recreation opportunities should be made from the Dane Perkins impoundment to the area immediately downstream of Kesslen Dam. The inventory should account for all types of recreation users on the river and shoreline areas, including kayakers, canoeists, tubers, hikers, *etc*.

MKRA's and Maine Rivers' comments on the revised study plan do not identify a connection between the project and recreation use downstream of Kesslen Dam, or how information on recreation in the downstream reach would contribute to the environmental analysis [section 5.9(b)(5)]. In addition, MKRA and Maine Rivers do not explain why the level of effort and cost associated with a recreation study that extends to the estuary of the Mousam River is warranted [section 5.9(b)(7)]. Accordingly, we recommend that the geographical scope of the study only extend from the Dane Perkins impoundment to the area immediately downstream of Kesslen Dam.

MKRA's and Maine Rivers' recommendation for a creel survey does not specify the purpose of the creel survey, or identify the specific information that would be gathered as part of the survey [section 5.9(b)(1)]. In addition, MKRA and Maine Rivers do not describe considerations of the level of effort or cost that would be associated with conducting a creel survey [section 5.9(b)(7)]. Because the Recreation Needs Survey already includes a survey of recreation use at the project, including fishing, and the study plan includes a Fish Assemblage Study that will document the existing fish community in the project vicinity, we have no basis for recommending a separate creel survey at the project [sections 5.9(b)(4) and (5)].

Future Use Assessment

As discussed above, the study will be used to identify opportunities for improving existing recreation access sites or providing additional access within the project vicinity. However, the study does not identify how America First Hydro will assess opportunities for improving access, including whether or not there is a demand for additional recreation access [section 5.9(b)(6)]. To assist with the environmental analysis of project effects on recreation demand and use [section 5.9(b)(5)], we recommend that future use estimates be calculated by assessing future demand for recreation activities and population trends through the year 2060 using published recreation guidelines, such as: *Outdoor Recreation Participation in the United States* (Bowker et al., 2012) and *Outdoor Recreation Trends and Futures* (Cordell, 2012). Current use estimates that are derived

from the on-site survey and assessment should be projected for each of the recreation activities at the project to estimate future recreation use in 10-year increments out to the year 2060.

Study 8: Historic Assessment Study

Applicant's Proposal

America First Hydro proposes to conduct a Historic Assessment to identify, locate, and evaluate historic architectural resources within the project area. The proposed study would identify potential sites that are either listed on or eligible for listing on the National Register of Historic Places (NRHP), and evaluate the potential adverse effects of the proposed project on historic properties.

The proposed study would include a Phase I History/Architecture survey to identify and evaluate the NRHP eligibility of above-ground resources within the vicinity of the project (confined to Kesslen, Dane, and Twine Dams and their associated facilities). The survey would include a literature review of the dams and associated facilities, and a field reconnaissance survey to document the existing condition of the resources. America First Hydro states that once potential adverse effects are determined, the information that is developed during the course of the survey would be used as a basis for preparing a historic properties management plan for the project, in consultation with the Maine Historic Preservation Commission.

Comments on the Study

No comments were filed on the Historical Assessment Study. However, during the March 23, 2018 study plan meeting, Commission staff stated that the study should include a provision for consulting with the state historic preservation officer on any field work done as part of the study. America First Hydro's revised study plan did not reference any revisions to the Historic Assessment to address Commission staff's comments.

Discussion and Staff Recommendation

The study does not explicitly provide for consultation with the Maine Historic Preservation Commission prior to conducting the cultural resource survey.[16] We

[16] Although America First Hydro has not requested to be designated as the Commission's non-federal representative for purposes of consultation under section 7 of the Endangered Species Act or requested authorization to initiate consultation under section 106 of the NHPA, America First Hydro is still required to gather information on resources that are potentially affected by the project, and consult with the appropriate

recommend that America First Hydro consult with the Maine Historic Preservation Commission on: (a) the delineation of the area of potential effects (APE); and (b) whether any historic properties that are identified in the APE could be potentially affected by project operation and maintenance.

In the January 15, 2018 cultural resources study request, Commission staff noted that several properties listed on the NRHP occur within York County, and that the project area has been documented as being historically inhabited by the Abenaki tribe. Due to the possibility of historic properties around the impoundments and downstream of the project, staff stated that a cultural resources survey of the project's APE is needed. However, the proposed Historic Assessment is limited to the identification and evaluation of above-ground architectural resources (specifically, the Kesslen, Dane, and Twine Dams and their associated facilities). Based on the possible occurrence of historically significant properties around the impoundments and downstream of the project that may be affected by project operation and maintenance, staff recommends revising the study to also include a Phase I archaeological survey of the APE and an evaluation of potential project effects on any historic properties identified in the APE [section 5.9(b)(5)].

II. Studies Requested but not Adopted by America First Hydro

Study 9: Wetlands Inventory and Functional Assessment Study

Study Request

MKRA and Maine Rivers request that America First Hydro conduct a Wetlands Inventory and Functional Assessment Study (Wetlands Study) to establish a baseline inventory of wetlands within the project vicinity and assess the functions and values of these wetlands.[17] The proposed study would include a field-based wetland delineation of the project vicinity using the Corps of Engineers Wetlands Delineation Manual (Corps, 1987). The proposed study would also include an assessment of the environmental

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resource agencies when gathering that information. America First Hydro can also submit a request to be designated as the Commission's non-federal representative anytime to assist in the preparation of a license application for the project.

[17] In their July 3, 2018 comments on the revised study plan, MKRA and Maine Rivers state that the revised study plan does not address their requested Wetlands Study. MKRA's and Maine Rivers' May 18, 2018 comments on the proposed study plan specifically requested that the Wetlands Study be included in the study plan. The study request was included as an attachment to their May 18, 2018 filing. Accordingly, staff addresses this study request as an outstanding issue that was not addressed by America First Hydro in the revised study plan.

benefits of the wetlands based on 13 functions and values, including: groundwater recharge/discharge; floodwater alteration (storage and desynchronization); fish and shellfish habitat; sediment/toxicant retention; nutrient removal/retention/transformation; product export (nutrient) and nutrient recycling; sediment and shoreline stabilization; wildlife habitat (including turtle surveys, wading bird and waterfowl surveys, stream salamander surveys, piscivores surveys, and habitat connectivity); recreation; education/scientific value; uniqueness/heritage; visual quality/aesthetics; and threated or endangered species habitat. The study area would include the Mousam River from the head-of-tide to the Dane Perkins impoundment.

Comments on the Study

America First Hydro states that it is not proposing to change project operation and does not believe additional information is needed to characterize existing wetlands at the project.

Discussion and Staff Recommendation

FWS's National Wetland Inventory (NWI) maps[18] and Maine DIFW's Beginning with Habitat maps[19] for the town of Kennebunk, Maine provide information on the location of wetlands and their functions and values in the project vicinity. These maps will likely be sufficient for an environmental analysis of the proposed project, provided that the project is operated in a run-of-river mode and America First Hydro is not proposing to change project operation. Generally speaking, operating a project in run-of-river mode provides minimal-to-no disruption to wetlands that are within or downstream of an existing impoundment. Accordingly, a full wetland delineation and functional assessment are not needed to adequately describe existing conditions and support our analysis of project effects [sections 5.9(b)(4) and (5)]. Given the existing project configuration and operation (600-kilowatt run-of-river facility), MKRA and Maine Rivers have also not justified the level of cost and effort that would be associated with an

[18] U.S. Fish and Wildlife Service, *National Wetlands Inventory- Wetlands Mapper*, located at https://www.fws.gov/wetlands/Data/Mapper.html. Last accessed by staff on July 13, 2018.

[19] Maine DIFW's Beginning with Habitat is a collaborative program of federal, state, and local agencies and non-governmental organizations that provides habitat maps in a geographic information system (GIS). *See* Maine Department of Inland Fisheries and Wildlife, *Beginning with Habitat*, located at http://www.beginningwithhabitat.org/. Last accessed by staff on July 13, 2018.

approximately 8-mile-long wetland survey and functional assessment [section 5.9(b)(7)]. Therefore, we do not recommend revising the study plan to include the Wetland Study.

Study 10: Shoreline Assessment and Site Conditions Study

Study Request

MKRA and Maine Rivers request that America First Hydro conduct a Shoreline Assessment and Site Conditions Study (Shoreline Study) to establish baseline conditions of the shoreline within the project vicinity, including the impounded and free-flowing sections of the Mousam River.[20] The objective of the study would be to collect both quantitative and qualitative information using common and accepted scientific methods by performing a series of natural feature surveys and assessments.

The requested study would include aquatic habitat characterizations, vegetation and riparian habitat characterizations (including plant species abundance and community composition), a wildlife reconnaissance survey (including for turtles, wading birds, waterfowl, freshwater mussels, and piscivores), a habitat connectivity assessment, and a sediment survey.

Comments on the Study

American First Hydro states that information requested by this study would be collected in other studies such as study 4 (*Fish Assemblage Study*), study 7 (*Recreation Needs Study*), and study 8 (*Historic Assessment Study*).

Discussion and Staff Recommendation

According to the revised study plan, the information requested by MKRA and Maine Rivers in the Shoreline Study would not be collected as part of studies 4, 7, or 8. Nonetheless, Maine DIFW's Beginning with Habitat maps for the town of Kennebunk, Maine provide information on wetland and riparian habitat, wildlife habitat, rare plants and animals, and habitat connectivity in the project vicinity. Information on federally

[20] In their July 3, 2018 comments on the revised study plan, MKRA and Maine Rivers state that the revised study plan does not address their requested Shoreline Study. MKRA's and Maine Rivers' May 18, 2018 comments on the proposed study plan specifically requested that the Shoreline Study be included in the study plan. The study request was included as an attachment to their May 18, 2018 filing. Accordingly, staff addresses this study request as an outstanding issue that was not addressed by America First Hydro in the revised study plan.

listed threatened and endangered species and migratory birds is available from FWS's Information for Planning and Consultation database.[21] This information should be adequate to describe existing conditions and support our environmental analysis, including our analysis of project effects on wildlife resources [sections 5.9(b)(4) and (5)]. Therefore, we do not recommend revising the study plan to include a Shoreline Study.

[21] U.S. Fish and Wildlife Service, Information for Planning and Consultation, located at: https://ecos.fws.gov/ipac/. Last accessed by staff on July 13, 2018.

LITERATURE CITED

Bowker, J.M., A.E. Askew, H.K. Cordell, C.J. Betz, S.J. Zarnoch, and L. Seymour. 2012. Outdoor Recreation Participation in the United States – Projects to 2060.

Cordell, H.K. 2012. Outdoor Recreation Trends and Futures: A Technical Document Supporting the Forest Service 2010 RPA Assessment.

Davies, S.P., L. Tsomides. 2014. Methods for Biological Sampling and Analysis of Maine's Rivers and Streams. State of Maine, Department of Environmental Protection. Available online at: https://www.maine.gov/dep/water/monitoring/biomonitoring/materials/sop_stream_macro_methods_manual.pdf.

English, D.; Kocis, S., Zarnoch, S.; and Arnold, J. 2001. Forest Service National Visitor use Monitoring Process: Research Method Documentation. United States Department of Agriculture Forest Service Southern Research Station; Athens, Georgia. 40pp. Available online at http://www.fs.fed.us/recreation/programs/nvum/methods/methods052001.rtf.

Franke, G. F., D. R. Webb, R. K. Fisher, D. Mathur, P. N. Hopping, P. A. March, M. R. Headrick, I. T. Laczo, Y. Ventikos, and F. Sotiropoulis. 1997. Development of Environmentally Advanced Hydropower Turbine System Concepts. Prepared for the U.S. Department of Energy, Voith Hydro, Inc. Report No. 2677-0141.

National Visitor Use Monitoring Program. 2007. National Visitor Use Monitoring Handbook. United States Department of Agriculture Forest Service; Washington, D.C. Available online at http://www.fs.fed.us/recreation/programs/nvum.

Pearsall, W. 1997. Instruction Manual for Baseline Water Quality Sampling. State of Maine, Department of Environmental Protection. Available online at: https://www.maine.gov/dep/water/monitoring/lake/baselinb.pdf.

Richkus, W. A., and K. G. Whalen. 1999. American Eel (*Anguilla rostrata*) Scoping Study Report. Final Report, March 1999 by Versar, Inc., prepared for Electric Power Research Institute, Palo Alto, California.

Visitor Services Project. 2007. Ebey's Landing National Historical Reserve Visitor Study. Park Studies Unit, College of Natural Resources, University of Idaho; Moscow, Idaho. 17pp. Available online at http://psu.uidaho.edu/files/vsp/questionnaires/193_EBLA_Q.pdf.

U.S. Army Corps of Engineers (Corps). 1987. Corps of Engineers Wetlands Delineation Manual. Wetlands Research Program Technical Report Y-87-1 (on-line edition). Available online at:

https://www.lrh.usace.army.mil/Portals/38/docs/USACE%2087%20Wetland%20Delineation%20Manual.pdf.

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