Brookfield
Renewable

April 29, 2022

Sent via email to the Stakeholder Distribution List

Subject: **Lewiston Falls Hydroelectric Project (FERC No. 2302)**
Final Relicensing Study Plan

Stakeholder Distribution List,

Brookfield White Pine Hydro LLC (BWPH) is relicensing the Lewiston Falls Hydroelectric Project (Project or FERC No. 2302) with the Federal Energy Regulatory Commission (FERC). The current FERC license for the Project expires August 31, 2026.

On August 4, 2021, BWPH initiated the relicensing process with the filing of its Notice of Intent (NOI) and Pre-Application Document (PAD). BWPH requested approval from FERC to use the Traditional Licensing Process (TLP). FERC approved the use of the TLP on September 15, 2021. Following the filing of the PAD, BWPH held a Joint Meeting on November 4, 2021. The Joint Meeting and the site visit were held virtually on November 4, 2021 (due to COVID-19 travel and health related concerns). The Joint Meeting summary was filed with FERC on December 3, 2021. Following the Joint Meeting, the Licensee received comments and study requests from agencies and stakeholders, and a draft Study Plan was developed and distributed to the Project distribution list on February 14, 2022.

Comments were received for the draft Study Plan, by April 14, 2022, from the following agencies and stakeholders: the Maine Department of Inland Fisheries and Wildlife (MDIFW), the Maine Department of Marine Resources (MDMR), the Maine Historic Preservation Commission (MHPC), the National Marine Fisheries Service (NMFS), the Houlton Band of Maliseet Indians and, collective comments were received from the Cities of Lewiston and Auburn, Grow L+A, American Whitewater (AW), Appalachian Mountain Club (AMC), and Trout Unlimited (TU).

Attached is the Final Study Plan developed for the relicensing of the Project. The Final Study Plan was developed based on comments and study request information from the above listed agencies and stakeholders, as well as BWPH's background research. Copies of comment letters and responses to comments are provided as part of the attached Final Study Plan (Attachments 1 & 2). A copy of this Final Study Plan is being provided to those on the attached distribution list for the Project.

Please send any questions/comments to Luke Anderson, Licensing Manager at Luke.Anderson@brookfieldrenewable.com.

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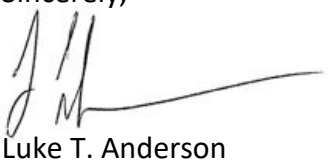
If you would like to be removed from this distribution list or have updated contact information, please contact Fatima Oswald at Fatima.Oswald@kleinschmidtgroup.com.

Sincerely,



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FINAL STUDY PLAN

LEWISTON FALLS PROJECT
FERC NO. 2302

Prepared by Kleinschmidt Associates on behalf of:

Brookfield White Pine Hydro LLC
Lewiston, Maine

April 2022

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ATTACHMENTS

DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

A	
ACDP	Acoustic Dopplar Current Profiler
ADA	Americans with Disabilities Act
AIC	Akaike's Information Criterion
AMC	Appalachian Mountain Club
APE	Area of Potential Effect
AVCOG	Androscoggin Valley Council of Governments
AW	American Whitewater
B	
BIA	Bureau of Indian Affairs
BWPH	Brookfield White Pine Hydro LLC
C	
CFD	computational fluid dynamics
cfs	cubic feet per second
CJS	Cormack-Jolly Seber model
D	
DO	dissolved oxygen
E	
El.	Elevation
F	
FERC	Federal Energy Regulatory Commission
H	
HPMP	historic properties management plan
HOBOware	manufacturer's software
K	
KOPs	key observation points
M	
MBPL	Maine Bureau of Parks and Lands
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDEP	Maine Department of Environmental Protection
MDMR	Maine Department of Marine Resources
mg/L	milligrams per liter
MHPC	Maine Historic Preservation Commission

N

NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NPS	National Park Service
NRHP	National Register of Historic Places

P

Project or P-2302	Lewiston Falls Project
PAD	Pre-Application Document
PIT	Passive Integrated Transponder

Q

QA/QC	quality assurance/quality control

R

RTK	Real Time Kinematic unit

S

SHPO	State Historic Preservation Officer

T

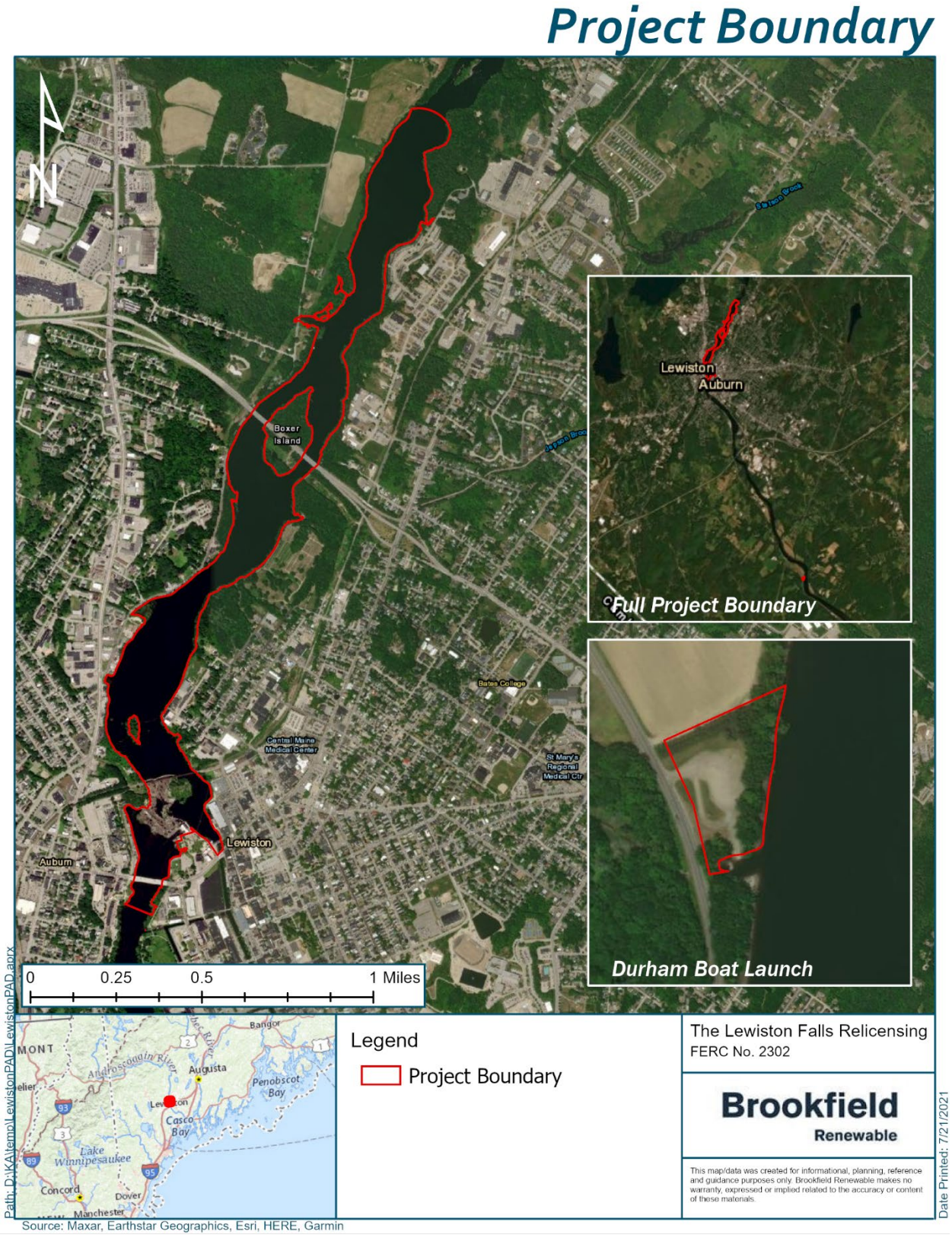
TLP	Traditional Licensing Process
TU	Trout Unlimited

1.0 BACKGROUND

Brookfield White Pine Hydro LLC (BWPH) is relicensing the Lewiston Falls Project (Project or FERC No. 2302) with the Federal Energy Regulatory Commission (FERC). The current FERC license for the Project expires August 31, 2026. On August 4, 2021, BWPH initiated the relicensing process with the filing of its Notice of Intent (NOI) and Pre-Application Document (PAD). At the same time, BWPH requested approval from FERC to use the Traditional Licensing Process (TLP). FERC approved the use of the TLP on September 15, 2021, and in accordance with FERC regulations, BWPH held a Joint Meeting on November 4, 2021. Following the meeting, state and federal resource agencies, and other stakeholders were afforded the opportunity to comment on the PAD and to request resource studies that they deemed were needed to evaluate Project impacts on natural, cultural and recreational resources. Consistent with FERC's policies, study requests should meet seven (7) criteria to demonstrate that the requested study is reasonable, necessary, and has a nexus to the Project or its operation. As BWPH is utilizing the TLP, there is no regulatory requirement to prepare a formal study plan, and therefore, there is no subsequent study plan determination by FERC. Nonetheless, BWPH has prepared this study plan to document and share with resource agencies and stakeholders its plans for conducting resource studies at the Lewiston Falls Project. Studies requested but not proposed at this time are also discussed.

The Lewiston Falls Project is located on the Androscoggin River in the Cities of Lewiston and Auburn in Maine. The Lewiston Falls Project is a single development project. The Project generally consists of a dam, an impoundment, and a powerhouse. The Project is operated in accordance with the current FERC license which requires a continuous minimum flow of 1,430 cubic feet per second (cfs), or inflow, whichever is less and which restricts impoundment fluctuations to 4 feet, or less. BWPH is proposing no changes to the operation of the Project. The FERC Project boundary for the Project generally follows the normal full pool elevation of the impoundment and includes the dam and powerhouse area and a short stretch of mainstem river downstream of the Project. The FERC Project boundary also exclusively encompasses the Durham Boat Launch, one of the Project recreation sites located downstream from the Project. A Project boundary map for the Project is provided in Figure 1-1.

Figure 1-1 Lewiston Falls Hydroelectric Project Boundary



In response to the PAD filing, the Joint Meeting (held virtually November 4, 2021) and the site visit (also held virtually November 4, 2021), the Licensee received comments and study requests from the Maine Department of Environmental Protection (MDEP), the Maine Department of Inland Fisheries and Wildlife (MDIFW), the Maine Bureau of Parks and Lands (MBPL), Maine Department of Marine Resources (MDMR), the Maine Historic Preservation Commission (MHPC), the National Marine Fisheries Service (NMFS), the National Park Service (NPS), the Androscoggin Valley Council of Governments (AVCOG), the Bureau of Indian Affairs (BIA), and collective comments from the Cities of Lewiston and Auburn, Grow L+A, American Whitewater (AW), Appalachian Mountain Club (AMC), and Trout Unlimited (TU). Based on the initial study requests, BWPH prepared a draft study plan which was distributed to the relicensing stakeholders via email on February 14, 2022. Study requests, comments, and comments on the draft study plan are provided in Attachment 1. A summary of draft study plan comments and BWPH's response to comments is provided in Attachment 2.

A total of thirteen studies were requested, of which eight are proposed or proposed with limited modification, and three study requests may be appropriate once the initial set of studies have been completed and the study results are known, but are not proposed as part of the first study season. Two study requests are not being proposed because either the study request is being addressed as part of one of the other studies or there is sufficient existing information with which to fully analyze Project effects on the resource.

Based on the comments received to date, BWPH is proposing the following studies to be conducted at the Project.

2.0 STUDY REQUESTS AND PROPOSED STUDIES

2.1 Water Quality Study

Summary of Study Request

In their study request letter dated January 3, 2022, the MDEP requested that BWPH conduct a water quality study comprised of five individual study components, summarized as follows:

- Impoundment trophic state study;
- Impoundment aquatic habitat study;
- Temperature and dissolved oxygen (DO) study;
- Benthic macroinvertebrate study; and
- Downstream habitat and aquatic life cross section study.

The impoundment trophic state study will investigate impoundment water quality. The temperature and DO study will investigate water quality below the Project dam. The benthic macroinvertebrate study will investigate the status of the macroinvertebrate community downstream of the Project dam. Finally, the impoundment and downstream aquatic habitat study components will examine the availability of aquatic habitat both in the impoundment and downstream under existing Project operations. Together, the results of these component studies will be used to determine if numeric and narrative water quality and aquatic life standards for Class C waters are being met at the Project. A complete copy of the comment letter can be found in Attachment A.

Study Goals and Objectives

BWPH's goal for the Water Quality Study is to determine if the Project meets State of Maine water quality standards, including applicable numeric and narrative standards, as well as designated uses.

The goal of the impoundment trophic state study is to determine if the Project impoundment meets Maine numeric water quality standards. The objective of the study is to collect periodic water quality data in the Project impoundment during low flow, warm water temperature conditions, along with periods of generation.

The goal of the Impoundment aquatic habitat study is to determine if the Project meets the aquatic life standards for Class C waters. The study objective is to use impoundment bathymetry data to evaluate the portion of the littoral zone that is maintained over the range of allowable Project operation, which is licensed for impoundment fluctuations of up to 4 feet.

The goal of the temperature and downstream DO study is to determine if the Project meets Maine water quality standards for DO and temperature, in the river reach downstream of the Project dam. The objective of the study is to use water temperature and DO data collected in the tailwater area downstream of the Project dam during low flow, warm water temperature conditions, consistent with MDEP protocols, to determine if Class C water quality standards are being met. In addition, DO and temperature will be collected in the large pool located in the falls reach downstream of the dam, to evaluate existing pool water quality conditions.

The goal of the benthic macroinvertebrate study is to determine if Class C habitat and aquatic life criteria are being met in the river reach below the Project dam. The study objectives are to determine the composition of the benthic macroinvertebrate community in the tailwater area. In addition, macroinvertebrate sampling will be conducted in the large pool located in the falls reach downstream of the dam, to evaluate existing pool aquatic habitat conditions.

The goal of the downstream habitat and aquatic life cross section study is to use existing cross section information of the mainstem river, downstream of the Project, to determine whether existing minimum flows at the Project meet MDEP's aquatic life habitat and zone-of passage criteria. This portion of the Water Quality Study will also evaluate aquatic habitat conditions in the large ledge pool in the falls reach.

Study Scope and Methods:

2.1.1 Impoundment Trophic State Study

This study will be performed per the MDEP Sampling Protocol for Hydropower Studies.

Field Methodology

Impoundment trophic state data collection will be performed twice per month at approximately 2-week intervals currently planned from June through October 2022 at the deepest location of the impoundment, and which can safely be accessed. The deepest location will be identified by traversing the impoundment with a boat and sonar. The sampling location will be marked with an anchored buoy and georeferenced with a GPS. Figure 2-1 shows the Project boundary and impoundment. An arbitrary point (LF-1) has been selected to represent the approximate location of the impoundment monitoring station. The exact location of trophic state data collection will be determined based on field reconnaissance and will be confirmed with MDEP.

Sampling will involve the collection of: (1) Secchi disk transparency depth, (2) vertical profiles for temperature and DO, and (3) water samples for laboratory analysis (i.e., total phosphorus, chlorophyll a, color, pH and total alkalinity, and potentially others if the impoundment stratifies). Field notes will be recorded each day with weather conditions, personnel present, operations (e.g.,

impoundment water surface elevation) and any other pertinent observations made during field work. Water quality parameter sampling procedures are discussed in more detail below.

Water clarity will be measured at the impoundment sampling location during each field visit using a Secchi disk and an Aquascope. The depth at which the Secchi disk is no longer visible through the Aquascope will be recorded. The Secchi depth will be measured and recorded twice. The average of the two measurements will be considered the final measurement.

A vertical profile will be collected at the impoundment sampling locations during each field visit. DO and water temperature will be collected every meter up to 15 meters, every two meters between 15 and 25 meters, and in five-meter increments for waters deeper than 25 meters. One replicate profile measurement will be made for every profile collected. Replicates will be obtained outside of the metalimnion (i.e., thermocline, if applicable) to avoid remeasuring parameters when they are in a transitional state. A profile will be remeasured if replicate values are not within 0.3 milligrams per liter (mg/L) and 0.3 °C or within water quality meter instrumentation error value (see Table 2-1 for instrument specifications). Water levels recorded at the Project dam will be used to standardize each profile to a standard elevation datum to account for water level changes.

Water samples for laboratory analysis will be collected each visit (twice a month) from the epilimnion using a 10-m long integrated core sampler. If thermal stratification (defined in MDEP protocol as no change in temperature greater than or equal to 1℃ per m below a depth of 2 m from the water surface) does not occur, the core sample will be collected to 1 m above the bottom, or as deep as the 10-m core sampler, whichever is less. If DO is ≤ 2 mg/L, the core sample will be collected to the meter above that depth. If thermal stratification does occur during warmer times of the year (mid to late August, possibly into September), the DO/temperature profile will be examined to determine the depth of the true seasonal epilimnion using the rule of 1℃ change over 1 m of depth below a depth of 2 m. The core sample will be taken to 1-meter below the bottom of the true epilimnion. If elevated DO is seen lower in the profile, the core will be adjusted to a deeper depth to capture the algae responsible for the oxygen spike. Water samples collected from the core samples will be sent to a qualified laboratory and tested for uncorrected chlorophyll-a by the trichromatic method, total phosphorus, color, pH, and alkalinity.

Analysis and Reporting

Core samples collected during one of the sampling events in August (a late summer sample in mid to late August) will be analyzed for the aforementioned analytes, along with nitrate, TKN, DOC, iron, calcium, magnesium, total and dissolved aluminum, sodium, potassium, silica, specific conductance, chloride, and sulfate. If the impoundment is not stratified, no additional grab samples are needed for the late summer sample. However, if the impoundment is stratified, additional grab samples will be collected that each require the full suite of analytes, except for

chlorophyll-a. If the impoundment stratifies into two layers, grab samples will be obtained with a Kemmerer or Van Dorn sampler 1 m above the bottom of the impoundment. If the impoundment stratifies into three layers, grabs will be obtained from the metalimnion (1 m below the depth to which the core sample was taken) and hypolimnion (1 m above the bottom of the impoundment).

Bottles and preservatives for all samples will be obtained under a chain of custody from an approved analytical laboratory. Detection limits required for each parameter are listed in Table 2-2.

Data will be reviewed for quality assurance/quality control (QA/QC) upon completion of the field monitoring portion of the study. Field spot checks will be used to determine if data need to be flagged for accuracy and/or removed from the analysis. Any erroneous data will be identified in the final dataset and an explanation will be provided for the reason the data was not considered e.g. equipment malfunction, laboratory error or testing interference.

A study report will be prepared, describing monitoring methods and presenting the results. Quality assurance procedures will be detailed, and an explanation will be provided for deviations from the study plan.

Table 2-1 Water Quality Instrument Specification

Parameter	Range	Accuracy	Resolution
Handheld YSI ProODO Meter[1]			
Dissolved Oxygen (% Saturation)	0 to 500% air saturation	0 to 200% air saturation ± 1% of the reading or ± 1% air saturation, whichever is greater; 200 to 500% air saturation ± 10% of the reading	0.1% air saturation
Dissolved Oxygen (mg/L)	0 to 50 mg/L	0 to 20 mg/L ± 0.1 mg/L or ± 1% of reading, whichever is greater; 20 to 50 mg/L ± 10% of the reading	0.01 or 0.1 mg/L (auto-scaling)
Temperature	-5 to 70°C	± 0.2°C	0.1°C
Barometer	375 to 825 mmHg	± 1.5 mmHg from 0 to 50°C	0.1 mmHg

[1] Subject to change based on instrument availability at time of field work to similar instrument. Any unlisted instrumentation specifications will be included in the final report.

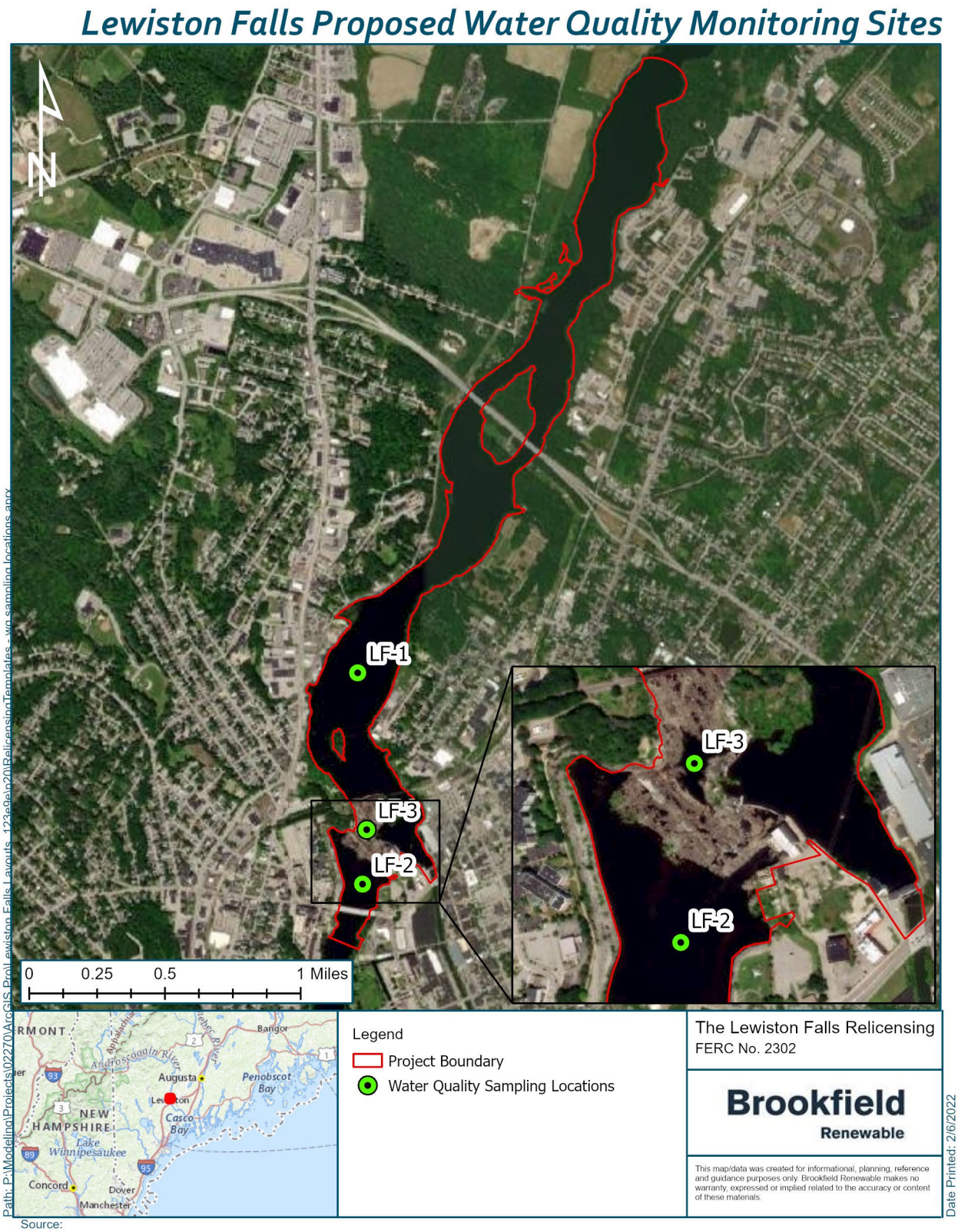
Table 2-2 MDEP Trophic State Water Quality Parameter Detection Limits

PARAMETER	DETECTION LIMIT
Field Parameters	
Secchi disk transparency	0.1 m
Temperature	0.1°C
Dissolved Oxygen	0.2 mg/L
Twice Monthly Lab Analytes	
Total phosphorus	0.001 mg/L
Chlorophyll a (uncorrected)	0.001 mg/L
Color	5.0 SPU
pH	0.1 pH Units
Total alkalinity	1.0 mg/L
One-Time Late Summer Sample Analytes	
Total phosphorus	0.001 mg/L
Chlorophyll a (uncorrected*)	0.001 mg/L
Color	5.0 SPU
pH	0.1 SU
Total alkalinity	1.0 mg/L
Nitrate	0.01 mg/L
Dissolved Organic Carbon	1.0 mg/L
Total iron	0.005 mg/L
Total and dissolved aluminum	0.002 mg/L
Total calcium	0.05 mg/L
Total magnesium	0.05 mg/L
Total sodium	0.05 mg/L
Total potassium	0.05 mg/L
Total silica	0.05 mg/L

PARAMETER	DETECTION LIMIT
Specific conductance	2 mS/cm
Chloride	0.5 mg/L
Sulfate	1 mg/L

* Chlorophyll a is not needed in stratification samples below the epilimnion. Uncorrected "chlorophyll a" will be tested via trichromatic determination

Figure 2-1 Proposed Water Quality Monitoring Locations



2.1.2 Impoundment Aquatic Habitat Study

Bathymetric data will be used to estimate the volume and surface area of the Project impoundment between full pond and a fluctuation of 4 ft to determine if at least 75 percent of the littoral zone remains watered during normal Project operations. Volume and area tables will include information in increments from full pond (Elevation (El.) 168.17 ft) down to the licensed drawdown limit (El. 164.17 ft).

Field Methodology

BWPH will determine if there is existing bathymetry data, suitable for this analysis, available for the Project impoundment. If bathymetric data of sufficient resolution is not readily available for the Project impoundment, a bathymetric survey will be conducted as part of this study. The bathymetric survey will be conducted using an Acoustic Dopplar Current Profiler (ACDP) coupled with an RTK GPS. A small boat will be used to traverse the impoundment. The resulting bathymetry data will be post-processed and analyzed in GIS to determine elevations of the impoundment channel bottom.

The depth of the littoral zone will be calculated by taking the average of secchi depth readings collected during the impoundment trophic state study and multiplying that value by two. Based on the tables and the depth of the littoral zone, the volume and area of the littoral zone will be calculated for the range of existing Project operations; up to a 4 ft impoundment fluctuation.

Analysis and Reporting

A study report will be prepared, describing the methods and analysis, and presenting the results.

2.1.3 Temperature and DO Study

This study will be performed per the MDEP Sampling Protocol for Hydropower Studies. Under MDEP's protocol, two options are available for conducting DO and temperature monitoring; discrete sampling that is conducted periodically under certain flow and temperature conditions; and continuous monitoring using data loggers that record DO and temperature conditions on an hourly basis.

Field Methodology

Downstream data collection will be performed per the MDEP Sampling Protocol for Hydropower Studies. DO and temperature monitoring will occur at two stations, as recommended by MDEP; one station located in the Project tailwater area downstream of the powerhouse (LF-2), and a second station located in the large ledge pool (LF-3) downstream of the Project dam (See

Figure 2-1). At both stations, DO and temperature will be continuously monitored during July and August.

For the tailwater station, DO and temperature measurements will initially be made at the proposed monitoring location along a cross-section across the stream using a handheld water quality meter, at the first, second and third quarter points, to determine an appropriate monitoring location. If there are no violations of DO criteria and no significant (<0.4 mg/l) differences in concentrations among the quarter points, subsequent measurements will be made at the location shown to be representative of the main flow.

For the ledge pool site, DO and temperature measurements will initially be made in several locations in the pool in order to determine an appropriate continuous monitoring location that is likely to remain watered throughout the study season, that is generally representative of pool conditions, and that can be safely accessed.

The final location of the continuous monitoring sites will be confirmed with MDEP.

Continuous water quality monitors will be installed to approximately mid-depth or less in the water column and record data in 15-minute intervals. Meter(s) will be hung from a buoy anchored to the river bottom if depths are greater than approximately 1 meter, or to a cinder block in waters less than approximately 1 meter to keep meters directly off the river bottom, as this could affect parameter results.

An air logger (HOBO U-20) will also be deployed to record barometric pressure concurrent to the continuous DO meters within the Project vicinity. This will enable DO % saturation to be calculated along with the DO concentration measurements through the use of the manufacturer's software (HOBOware).

The water quality monitors will be visited at least once every two weeks after installation until retrieval. Spot check measurements of DO and temperature will be recorded using an independent handheld water quality meter prior to offloading data from continuous monitors. Spot checks will be taken during deployment, periodic site visits, and upon retrieval to verify monitor accuracy. Continuous monitors(s) will be field calibrated as necessary if a measurement drift occurs, causing the logger to perform outside of its measurement error (see Table 2-1 for instrument specifications). A handheld meter will be calibrated each day prior to use. The air logger data will be offloaded concurrently with the DO loggers.

Monitoring locations will be geo-referenced, and weather, flow and Project operations will be recorded during each site visit.

Analysis and Reporting

Data will be reviewed for QA/QC upon completion of the field monitoring portion of the study. A study report will be prepared, describing monitoring methods and presenting the results. BWPH will provide flow data for the water quality monitoring study period. Quality assurance procedures will be detailed, and an explanation will be provided for deviations from the study plan.

2.1.4 Benthic Macroinvertebrate Study

The proposed benthic macroinvertebrate study will be conducted following MDEP's Methods for Biological Sampling and Analysis of Maine's Rivers and Streams (MDEP, 2014). This includes deployment, retrieval, laboratory processing of rock samplers, and completion of a study report.

Field Methodology

Benthic macroinvertebrate sampling will be conducted at two proposed locations: 1) in the river downstream of the Project, below where the discharge from the powerhouse joins the main river (LF-2), and in the large ledge pool downstream of the Project dam (LF-3). MDEP will be consulted regarding the sampling locations. The exact locations will be determined during installation based on substrate and velocity conditions. Figure 2-1 shows the proposed sampling locations. Samplers used to collect benthic macroinvertebrates will consist of either closing introduced substrate cones or rock baskets filled with clean, washed, bank-run cobble, graded to uniform diameter range of 3.8 to 7.6 cm. A field determination of which sampler type will be used will be made based on site conditions.

A total of six sampling devices will be prepared for deployment, with three replicates deployed in representative habitats at each of the two downstream locations. If the ledge pool or the river downstream of the Project tailrace are found to be unwadable or not flowing, substrate cones will be used. If these sites are found to be wadable and free flowing, rock baskets will be used. Field conditions can be assessed during field visits associated with other studies earlier in the season. The rock baskets or substrate cones will be installed following the protocols outlined in MDEP's "Methods for Biological Sampling and Analysis of Maines' River and Streams" (2014).

The sampling devices will be deployed at each location for 28 days (+4 days), starting ideally at the end of July but no later than mid-August to ensure targeted conditions (low flow, warm temperature) are met for the sampling period. Samplers will be marked, secured and positioned appropriately. Field data sheets provided by MDEP will be completed for each of the locations the day of deployment.

Rock Basket Samplers

Samplers will be retrieved by approaching sample locations from downstream. A 600-micron mesh aquatic net will be positioned downstream of a sampler prior to collection. The sampler will then be placed quickly into the net. The basket will be opened and all contents will carefully be transferred into a 600-micron sieve bucket, along with the contents of the net. The wire cages will be rinsed and hand washed into the sieve bucket, and all rocks will be hand washed and inspected into the sieve bucket before placing each rock back into the basket.

Substrate cones, should they be used, will be retrieved using a boat anchored directly upstream of the samplers. The cone and funnel will be retrieved quickly and smoothly from the bottom and released directly into a sieve bucket. Field processing will then proceed as described for the rock baskets.

All sieve bucket contents will be transferred into sample jars and preserved with approximately 70% ethyl alcohol. Samples will be labeled in the field immediately upon collection to include the date of retrieval, waterbody, and replicate (i.e., rock sampler) number. A slip of "rite-in-the-rain" paper with the same information (written in pencil) will also be placed into each sample jar. Each sample will be treated consistently. Predatory invertebrates, such as crayfish will be placed in separate jars until ethanol is added to prevent predation.

Analysis and Reporting

Sample jars will be submitted to an MDEP approved laboratory. The numeric results from the taxonomy laboratory will be provided to MDEP for analysis using the Department's linear discriminant analysis to assess the attainment of aquatic life standards.

A study report will be prepared, describing macroinvertebrate community sampling results, along with a summary of the Project operations that occurred during the deployment period. The resulting Aquatic Life Classification Attainment Report generated by MDEP will be included as an appendix to the study report. Laboratory quality assurance procedures will be detailed if applicable and an explanation will be provided for deviations from the study plan.

2.1.5 Aquatic Habitat Cross-Section Flow Study

This study will be designed to demonstrate that existing minimum flows for the Project (1,430 cfs or inflow, whichever is less) are adequate to provide habitat for fish and other aquatic species. A cross-section flow study that measures width and depth at various river flows to determine the flow at which at least 75% of the bankfull cross-sectional area of the river is continuously wetted will be conducted at two transects downstream of the Project tailrace.

Aquatic habitat will also be evaluated in the large ledge pool located in the falls reach downstream of the Project dam. However, because the ledge pool does not lend itself to MDEP's standard evaluation of wetted width, based on bank-full conditions, the ledge pool evaluation will be conducted using an alternative approach.

Downstream

Field Methodology

BWPH conducted an instream flow study in 2014 to evaluate the relationship between Project flows and aquatic habitat conditions, including velocities, water depth and wetted width at four transects located within one mile downstream of the Lewiston Falls Project (Figure 2-2). Data collected at Transects 1 and 2 will be utilized for the 75% analysis. Additional field data will be collected at these transects as needed for the required analyses, including surveying the bankfull elevation and water surface elevation information at various flow rates. HOBO U-20 pressure sensors will be installed and surveyed at each of the transects to record water level. A separate U-20 sensor will be installed in the air to record barometric pressure. The water level recorders will be programmed to record measurements every 15 minutes and will remain in place long enough to capture a variety of flow rates for the study, including the Project minimum flow of 1,430 cfs.

Analysis and Reporting

Various water levels will be plotted on figures showing each of the river cross-sections. For each transect, a relationship between flow and wetted width will be developed. Average channel depths will also be provided. Relationships between flow, wetted width, and water level will be used to determine the flow at which 75% of the cross-section remains wetted relative to the bankfull level and contains sufficient depth. A report will be developed, which will include the results of the cross-sectional area assessment.

Ledge Pool

Background

The falls reach downstream of the Lewiston Falls dam consists mostly of bedrock ledge. Water spills into the falls reach when river flow exceeds the capacity of the Project's generating units (approximate 6,600 cfs). During periods of no spill, flow into the reach is provided by leakage. Due to the steep gradient and complex nature of this area, it will be difficult to determine a bankfull elevation in the field as the falls reach does not exhibit typical characteristics of a river channel. Additionally, developing a relationship between water level and discharge in this ledge pool may be difficult since water flows from various angles over the multiple Project dams.

Because the ledge pool does not lend itself to being evaluated using MDEP's standard 75% wetted width or cross-sectional area analysis for evaluating aquatic habitat conditions, BWPH is proposing to conduct a separate aquatic habitat evaluation of the ledge pool to characterize existing habitat conditions during non-spill conditions.

Field Methodology

Field personnel will visit the ledge pool sometime between June 1 and August 31, 2022 to collect habitat data. During field data collection, all flow will be passed through Monty Station and only leakage will be present in the falls reach. To evaluate aquatic habitat, dominant substrate will be characterized, pool bathymetry will be measured, available cover for aquatic organisms will be assessed, wetted pool width and wetted pool length will be measured, and aquatic biota will be documented at the site visit.

Flow in the falls reach through the ledge pool will be measured during the study to characterize the quantity of leakage present at the Project during typical operating conditions. Additionally, to the extent feasible, flow connectivity above and below the large ledge pool within the falls reach will be assessed. Safety and access will be assessed with regard to the extent of all field work in and around the ledge pool. .If the proposed work cannot be conducted safely, BWPH will consult with MDEP regarding other possible methods for evaluating ledge pool aquatic habitat conditions.

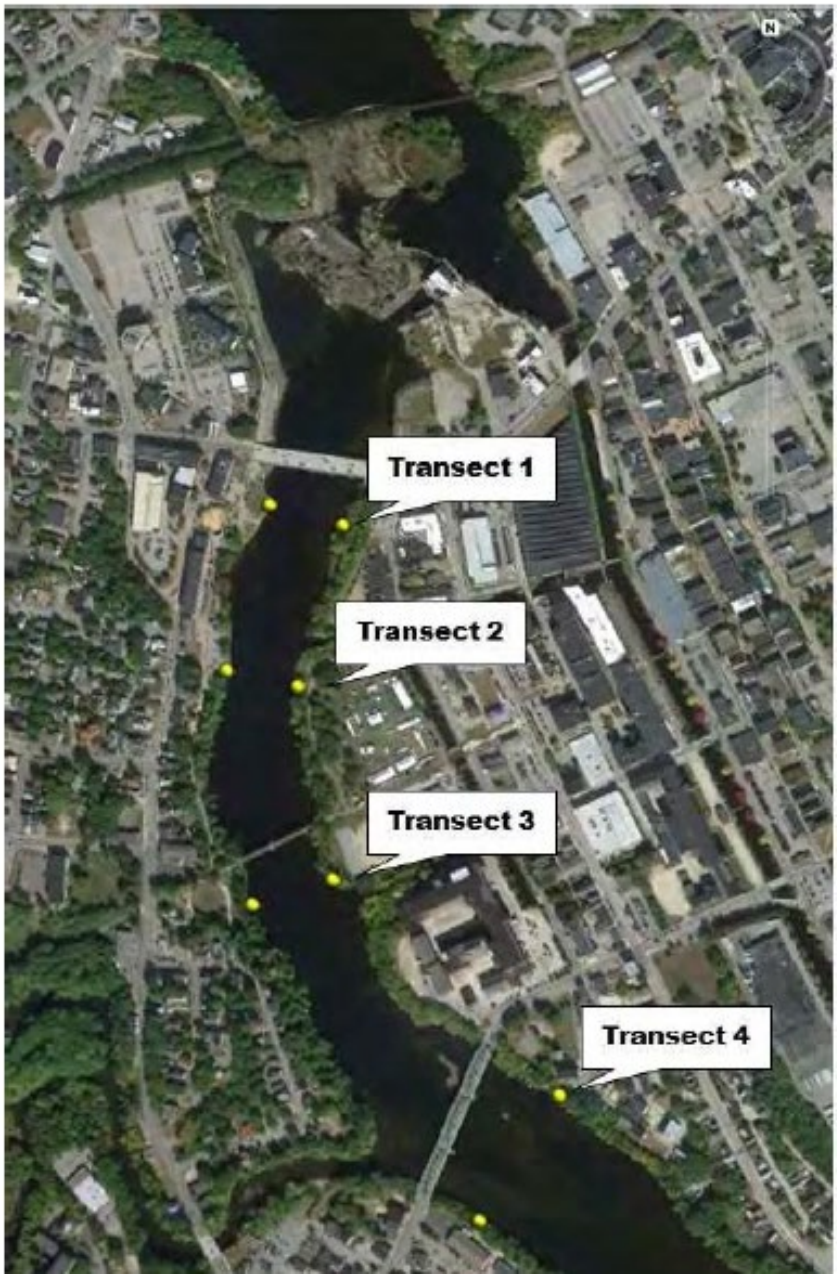
Analysis and Reporting

The maximum pool depth, average width, average length, and pool volume will be computed based on field measurements collected during the site visit. In addition to the physical habitat data, as discussed previously, continuous samples of temperature and DO will be made in the ledge pool for a minimum of 10 weeks currently planned between June 1 and August 31, 2022 in support of the temperature and DO study. These data will be analyzed within the context of available aquatic habitat in the ledge pool. Operational data during this time period from the Project as well as USGS gage data will be reviewed to estimate the frequency, magnitude, and duration of spill and non-spill conditions in the falls reach. Availability of aquatic habitat based on data collected in the field will be discussed in the report.

Study Schedule

The proposed Water Quality Study components are currently planned to be conducted during the period May-September, 2022, with a draft study report anticipated in early 2023.

Figure 2-2 Existing Cross-Sections Downstream of the Lewiston Falls Project



2.2 Upstream American Eel Study

In their study request letters respectively dated December 22, 2021 and January 5, 2022 (and received via email on January 13, 2022), NMFS and MDMR requested a study to assess potential locations for dedicated upstream passage for American Eel at Lewiston Falls. In summary, NMFS and MDMR (collectively referred to as the "resource agencies") identify two objectives for the study; to understand the distribution and relative abundance of juvenile eels downstream of the Project dam, and to assist in future placement of an upstream eel passage structure.

In their study requests, the resource agencies suggested that BWPH conduct systematic surveys of eel presence/abundance at several locations below the Project dams, powerhouse and gatehouses. They also recommended that eels be collected with temporary trap/pass devices at areas identified from surveys as potential location of eel concentrations to assess whether eels can be collected/passed in substantial numbers, and whether locations are viable sites for permanent eel trap/pass structures. The intent of the suggested study approach is the identification of areas of concentration of eels staging in pools or attempting to ascend wetted structures that would potentially establish the most effective location to place upstream eel passage facilities.

BWPH reviewed and considered the suggested geographical bounds and sampling methodologies with which to evaluate juvenile eel presence downstream of Lewiston Falls. The primary consideration during review of these requests was access and safety of survey personnel in the reaches immediately downstream of the four stone masonry sections, the concrete dam section, and the island spillway. Access and safety will be assessed as part of the study and will include consideration of head pond elevation and the potential for station trips. Complete copies of the study request letters can be found in Attachment A.

Study Goals and Objectives

BWPH's goal for this study is to understand the distribution and relative abundance of juvenile eels downstream of the Project dam to assist in future placement of an upstream passage structure within the Project boundary. Objectives include:

1. Conduct systematic backpack electrofish surveys in the reaches immediately downstream of the four stone masonry sections, the concrete dam section, and the island spillway to identify where eels appear to be staging prior to upstream passage attempts.
2. Conduct a series of systematic nighttime visual surveys at locations that cannot be sampled via backpack electrofishing (e.g., powerhouse tailrace).
3. Collect information regarding the timing of movements, behavior, and approximate size of juvenile American Eel observed/captured at the Lewiston Falls Project.

Study Scope and Methods

BWPH will conduct upstream eel surveys during the period from June through mid-September. Survey timing was also based on the current seasonal operations window for the downstream Worumbo Project (FERC No. 3428) which operates annually from the recession of high flows in the spring until August 31 each year.

Field Methodology:

Systematic Electrofishing Surveys:

Daytime back pack electrofish surveys will be conducted in the reaches downstream of the four stone masonry dam sections, the concrete dam section, and the island spillway to identify 1) the presence of juvenile American eels within the Lewiston Falls reach, 2) areas where juvenile American eels appear to be congregating in those reaches, 3) the approximate size classes represented, and 4) the timing and seasonality of presence within those reaches. BWPH will conduct a total of fourteen back pack electrofish surveys during the survey period. Surveys will take place once per week assuming river conditions allow for safe access to the reach.

Prior to back pack electrofish sampling, BWPH will survey the falls reach and identify discrete zones or electrofishing areas downstream of the four stone masonry sections, the concrete dam section, and the island spillway (see example in Figure 2-2). Each zone will be photographed and mapped to identify flow sources and wetted areas present under the survey conditions (i.e., with Project impoundment drawn down to permit safe access). On each survey date, each zone will be sampled by two biologists using a back pack electrofishing unit. Stunned eels will be netted and held in buckets of freshwater until sampling within the particular zone is completed. Back pack electrofishing surveys will occur in each zone and on each sample date using consistent methods (i.e., electrofish unit settings, seconds sampled) to facilitate the calculation of a catch-per-unit-of-effort to permit comparison among zones.

At the completion of each sample, the sampling time will be recorded, and eels captured will be processed. All eels captured would be enumerated into an estimated size class (0-6 inches, 6-12 inches, etc.). Detailed notes taken immediately after each electrofishing sample will provide insight on the location eels were concentrated within each zone. Collection locations of juvenile eels will be geo-referenced using a GPS unit and the approximate number of eels associated with each point will be recorded. Juvenile eels will be released at a location upstream of the dam to be determined prior to electrofishing surveys.

Systematic Nighttime Surveys:

Nighttime surveys are a common method utilized in Maine and elsewhere to document the presence of juvenile American eels and has been successfully used to identify the 1) the presence of eels downstream of dams, 2) if eels are congregating at the base of dams, 3) approximate size classes presence and distribution, and 4) the timing and seasonality of upstream movement. BWPH will conduct a total of fourteen nighttime surveys during the period from June through mid-September. Each nighttime visual survey will focus on the tailrace area immediately downstream of the powerhouse. During each nighttime survey, field biologists will utilize red lights and binoculars to search for juvenile American eels. All observations will be made from safe locations (i.e. walkways or piers with adequate safety barriers).

During each survey, biologists will record the location of juvenile eels (either marked by GPS or on a map depending on GPS accuracy and viewing location), the approximate number of juvenile eels at each location, the approximate size classes of eels at each location, and weather conditions. Each survey will likely last approximately 1.0 to 1.5 hours and will take place approximately one hour after sunset. Nighttime surveys will be scheduled to occur once per week for the 14-week period of June-mid-September.

Study Schedule

The upstream eel study (14 events) are currently planned to be conducted during a 14-week period from June through mid-September, 2022 with a draft study report anticipated in March of 2023. Following completion of the systematic back pack electrofish and nighttime surveys during 2022, BWPH will consult with the resource agencies on the potential need for deployment of interim trap structures as a follow up for identification of an appropriate location for the future placement of an upstream passage structure.

Figure 2-3 Preliminary Juvenile American Eel Backpack Electrofishing Zones and Nighttime Visual Survey Locations for June through August 2022

2.3 Downstream American Eel Study

In summary, NMFS in their study request letter dated December 22, 2021 and MDMR in their letter dated January 5, 2022 (and received via email on January 13, 2022) requested that BWPH conduct a downstream adult American eel passage assessment. Complete copies of the comment letters can be found in Attachment A. NMFS and MDMR (collectively referred to as the "resource agencies") identify two objectives study to understand the downstream passage of outmigrating silver eels at the Project.

Requested objective #1 consists of a radio-telemetry study to assess general routes of downstream passage. The resource agencies indicate that test eels should be active downstream migrants and can be obtained from in- or out-of-basin sources. A minimum sample size of 150 tagged eels is suggested for release upstream of the Project and should be supplemented with 25 dead and 20 live tagged eels released directly into the tailrace to allow for comparison of movement rates and passage success with test eels. The resource agencies suggest stationary telemetry receivers be located upstream and downstream of the dam to permit assessment of passage via various routes including the four stone masonry sections (Dams No. 1, 2, 3, and 4), the concrete dam section (Dam No. 5), the Island Spillway, the Powerhouse, and the Main Gatehouse. The resource agencies also recommended receivers be located at the lower gatehouses on the canal or other identified obstructions to passage in the Lewiston Canal system.

Requested objective #2 consists of mortality/injury studies for eel passage among the spill, gatehouse/canal, and turbine passage routes. The resource agencies recommend a balloon-tag approach to evaluate latent survival and injury of passed eels. A minimum number of 70 tagged eels is recommended to assess impact of relevant Project facilities: one group of 30 eels to assess passage via spill, a separate group of 20 eels to assess the Main Gatehouse and canal system, and a final group of 20 eels to assess turbine passage at the Project. The resource agencies suggest eels be held for a 96-hour period following testing prior to visual and x-ray examination following the hold period.

The study request provided by MDMR suggested the use of Passive Integrated Transponder (PIT) tags to aid in the evaluation of general routes of downstream passage. The methodology described herein does not include the use of PIT tags, as they would provide little additional information for determining downstream passage route selection or passage survival. The antennas associated with PIT readers offer limited range (particularly as antenna size increases) and available downstream routes at Lewiston Falls (i.e., spillways, turbines) are impractical for coverage using PIT antennas when considering access, size, velocities, and capabilities of the monitoring equipment. Downstream passage can be readily identified for radio-tagged eels using a series of stationary radio-telemetry receivers.

With regards to the resource agency request for the utilization of balloon-tag studies to assess passage mortality/injury at all potential passage routes, BWPH does not believe that study component is warranted at this time. The radio-telemetry study proposed here will allow for identification of downstream passage routes as well as a subsequent estimate of total Project passage survival. For passage routes with a sufficient sample size (i.e., those used most frequently by eels passing downstream at Lewiston Falls), route-specific estimates of survival will be developed based on telemetry detections. As recommended by the resource agencies, BWPH has incorporated the use of both live and freshly-dead eels released in the Project tailrace to help inform on the magnitude and duration of downstream movement for eels following passage at the Project. This information will be used to help inform on potential latent effects from downstream passage.

Study Goals and Objectives

BWPH's goals and objectives for this study are to:

1. Evaluate upstream residence duration (or delay) as measured for each eel from their arrival at the Project dam until downstream passage;
2. Quantify downstream passage route selection under normal Project operations and available inflow conditions; and
3. Generate an estimate of total Project survival for outmigrating eels.

Study Scope and Methods

BWPH will conduct a downstream radio-telemetry evaluation of outmigrating adult American eels at the Project.

Field Methodology:

Radio Telemetry Equipment:

Downstream passage of radio-tagged adult American eels at Lewiston Falls will be assessed via a series of stationary radio-telemetry receivers. Installed radio-telemetry equipment will include Orion receivers, manufactured by Sigma Eight, as well as SRX receivers manufactured by Lotek. Receivers will be installed following consideration of the detection requirements for the specific area of coverage, as well as the attributes of the receiver model (i.e., broadband vs. single frequency capability). Antenna types used during this evaluation will be determined in the field but may include aerial Yagi antennas and custom-made underwater antennas (dropper antennas).

Adult silver-phase eels will be tagged using transmitters manufactured by Sigma-Eight (model TX-PSC-I-450, or equivalent). The TX-PSC-I-450 measures approximately 12 x 46 mm, weighs 8.5 g, and has an estimated battery life over 400 days when set at a 5.0 second burst rate (at 20°C).

Monitoring Stations:

Stationary telemetry receivers will be established at a number of predefined locations at Lewiston Falls, as well as at points downstream of the Project. Each monitoring station will consist of a data-logging receiver, one or more antennas, and a power source. Each will be configured to receive transmitter signals from a designated area continuously throughout the study period. During installation of each station, range testing will be conducted to configure the antennas and receivers in a manner which maximizes detection efficiency at each location. The operation of the system as a whole will be confirmed during installation and throughout the study period by using beacon tags. These beacon tags will be stationed at strategic locations within the detection range of either multiple or single antennas and will emit a signal at a programmed time interval. These signals will be detected and logged by the receivers and used to record the functionality of the system throughout the study period. Although each monitoring station will be installed in a manner which limits the ability to detect transmitters from unwanted areas, the possibility of such detections does still exist. As a result, behavioral data collected in this study (i.e., duration at a specific location or passage route) will be inferred based on the signal strength and the duration and pattern of contacts documented across the entire detection array.

The locations of proposed monitoring stations for downstream passage of adult American eels at the Project are outlined below and presented visually in Figures 2-3 and 2-4. As with any telemetry study, monitoring station locations described here will be evaluated in the field prior to initialization of the study and, if necessary, may be modified to enhance the collection of passage information.

Station 1: Station 1 will consist of aerial coverage and will be installed in a manner which detects radio-tagged eels as they approach Lewiston Falls. Pending final logistics Station 1 will be placed in the vicinity of the boat barrier, approximately 500 m upstream of the powerhouse intake. Detections from this location will be used to determine when eels arrive at the Project and will be a component of the determination of residence time upstream of the dam and prior to passage.

Station 2: Station 2 will consist of a single receiver and aerial coverage and will be installed in a manner which detects radio-tagged eels as they approach and are present on the upstream side of Dam 1 and Dam 2. Detections from this location, combined with those from Station 3 and reported gate operations data, will be used to help inform on downstream passage via these two dam sections.

Station 3: This station will consist of a single receiver and aerial coverage and will be installed in a manner which detects radio-tagged eels on the downstream side of Dam 1 and Dam 2. Detections from this location, combined with those from Station 2 and reported gate operations data, will be used to help inform on downstream passage via these two dam sections.

Station 4: This station will consist of a single receiver and aerial coverage and will be installed in a manner which detects radio-tagged eels as they approach and are present on the upstream side of Dams 3, 4, or 5. Detections from this location, combined with those from Station 5 and reported gate operations data, will be used to help inform on downstream passage via these three dam sections.

Station 5: Station 5 will consist of a single receiver and aerial coverage and will be installed in a manner which detects radio-tagged eels on the downstream side of Dams 3, 4, and 5. Detections from this location, combined with those from Station 4 and reported gate operations data, will be used to help inform on downstream passage via these three dam sections.

Station 6*:* This station will consist of a single receiver and aerial coverage and will be installed in a manner which detects radio-tagged eels as they enter the powerhouse intake area. Detections from this location will be used to help inform on downstream passage via the turbine units.

Station 7: Station 7 will consist of a single receiver and aerial coverage and will be installed in a manner which detects radio-tagged eels within the powerhouse tailrace. Detections from this location will be used to help inform on downstream passage via the turbine units.

Station 8: Radio-tagged eels may pass through the Main Gatehouse, located southeast of the powerhouse and enter into the Lewiston Canal system. Station 8 will consist of a single receiver and aerial coverage and be installed in a manner which provides detection information for eels

on the upstream side of the gatehouse structure. Detections at this location, when combined with detections from Station 9, will be used to inform on entry into the canal system.

Station 9: This station will consist of a single receiver and aerial coverage and will be installed in a manner which detects radio-tagged eels on the immediate downstream side of the Main Gatehouse within the Project Boundary and when combined with detections from Station 8 will be used to confirm possible entry into the Lewiston Canal System.

Station 10: Station 10 will consist of aerial, cross-river coverage at a point downstream of Lewiston Falls. Detections from Station 10 will be used to assess passage survival of radio-tagged eels following downstream passage at all potential routes (e.g., spill, turbine, canal system). The exact location of this receiver will be determined in the field during site installation and will be a function of available access and river width.

Station 11: Station 11 will serve as a second downstream detection location to assess passage survival of radio-tagged eels at Lewiston Falls. This station will consist of a single receiver and antenna to provide full coverage of the river (bank to bank). Station 11 will be installed at a location close to the Worumbo Dam (approximately 23.2 km downstream of Lewiston Falls).

Tagging and Release Procedures:

BWPH proposes to obtain adult silver-phase American eels from a commercial trapping operation on the St. Croix River, Maine. Upon notification from the vendor on availability, eels will be trucked from the St. Croix River to a temporary tank facility established at the Project. Transported eels will be held for at least 24 hours prior to any tagging. In advance of tagging, eels will be visually examined; healthy eels suitable for tagging will then be anesthetized in a clove oil and ethanol solution. Eels will be held and visually monitored in the anesthesia bath until sufficiently sedated. Once sedated, eels will be removed from the bath and placed in a specially designed restraining holder (Figure 2-5). The total length and eye diameter (horizontal and vertical; nearest 0.1 mm) will be measured. A previously described correlation between eye size, body length, and gonad development will be used to confirm whether individuals are mature and can be considered as active outmigrants (Pankhurst, 1982). Silver-phase American eels typically have an eye index between 6.0 and 13.5, with a bronze coloration along the lateral line that separates the dark, silver back from the white belly. Although eels collected from the St. Croix have a high probability of being silver based on the weir methodology used to collect them, eye measurements will be recorded regardless.

For tagging, an incision will be made off-center on the ventral surface of the individual. A hollow needle will be inserted into the incision and pushed through the body wall just off the ventral mid-line and at a point posterior to the incision. The antenna will be fed through the needle and

gently pulled so that the transmitter enters the body cavity. The needle will then be pulled through the body wall and removed from the antenna. The transmitter will be positioned by pulling the antenna so that it lies directly under the incision. The incision will then be closed with two or three interrupted sutures. A small amount of an antibacterial ointment will be applied to the incision site to prevent infection. Following tagging, each individual will be transferred to a second holding tank supplied with ambient river water for an additional 24-hour observation/recovery period.

A total of 60 radio-tagged adult American eels will be transported via stocking truck from the tagging location and released into the Androscoggin River at a point near to the upstream end of the Lewiston Falls Project boundary (i.e., downstream of Gulf Island/Deer Rips (FERC No. 2283). A minimum of three separate release events will be conducted during the September - October time period, with each event consisting of approximately 20 radio-tagged individuals. Releases will be conducted during the evening hours. In addition to eels released upstream of the Project a total of 12 freshly dead and 12 live adult American eels will be radio-tagged and released downstream of Lewiston Falls during the study period. At the time of each upstream release of live eels (three events proposed), a total of four freshly dead and four live individuals will be radio-tagged and placed in the tailrace. The downstream progression of the tailrace released individuals will be recorded via the downstream stationary receivers (i.e., Stations 10 and 11). A summary of downstream drift/travel distances will be provided in the study report and will be considered during development of passage survival estimates at the Project.

Data Collection:

Stationary Telemetry Data:

Data will be off-loaded from receivers using a laptop computer and will be stored on removable memory sticks. Data downloads will occur weekly during the period from the initial tag and release date until eel movements through the Project area have ceased, or until the end of November, whichever is later. Backup copies of all telemetry data will be made prior to receiver initialization. Field tests to ensure data integrity and receiver performance will include confirmation of file integrity, confirmation that the last record is consistent with the downloaded data (beacon tags will be critical to this step), and lastly, to confirm that the receiver is operational upon restart and actively collecting data post download. The field data collection procedures will form part of the overall Project QA/QC standards. Within a data file, transmitter detections will be stored as a single event (i.e., single data line). Each event will include the date and time of detection, frequency, ID code, and signal strength.

Stationary Telemetry Data:

In addition to the stationary telemetry data, river and Project operations information will be collected and reported for the study period. River temperature will be recorded at for the Androscoggin River at a location in the Project headpond. Generation discharge and the extent and location of spill will be obtained from BWPH at the completion of the study period. The Project will be operated under its normal "baseline" conditions for the study period (i.e., units in operation spill flows present when river conditions warrant following the current gate prioritization sequence).

Analytical Methodology:

Data Processing:

Tag detections in each downloaded stationary telemetry data file will be validated through a series of site-specific and logical criteria: These criteria will include:

1. Signal strength threshold level of the detection,
2. Frequency of the radio tag signals per unit of time, and
3. Spatial and temporal characteristics of each individual detection with respect to the full series of detections at monitoring stations within the entire detection array.

To determine the signal strength threshold for a valid tag signal, power levels associated with background noise will be recorded at each monitoring station prior to the release of radio-tagged fish. These "false" signals are typically received at relatively low power levels, and they will be removed from the analysis using a series of data filters. The frequency of the signal detections for an individual radio tag will be examined at each monitoring station, such that over a set period of time, there are an adequate number of detections to rule out an isolated false detection (e.g. at least 3 detections within 1 minute). Finally, the spatial and temporal distribution of detections across multiple monitoring stations will be examined to verify that the pattern of detections is not occurring in a manner that is unreasonable (i.e., time for a fish to have relocated within the time between the detections).

Data Analysis:

A complete record of all valid detections for each uniquely coded radio-tagged silver eel will be generated, and the pattern and timing of detections in these individual records will be reviewed. For the full set of radio-tagged eels released into the Androscoggin River upstream of Lewiston Falls, the arrival and passage times and downstream route of passage (i.e., turbine, spill, or Lewiston Canal System) will be determined. In instances where a specific passage route is not

clearly defined by the available data, the passage route for that individual will be classified as unknown.

The stationary telemetry dataset collected using the monitoring stations described above will also permit the evaluation of residence time for radio-tagged silver eels between any two adjacent monitoring stations both prior to and following downstream passage. Passage duration through any defined river reach will be calculated as the duration from initial detection at the stationary receiver on the upstream end of the reach until initial detection at the stationary receiver on the downstream end of the reach. For radio-tagged eels which approach Lewiston Falls, a 'Project residence duration' will be defined as the duration of time from initial detection at the dam (i.e., detection at Station 1) until successful downstream passage at the Project.

Survivorship (*Phi*) and detection (*p*) probabilities will be estimated for eel passage at Lewiston Falls using a Cormack-Jolly Seber model (CJS) constructed in Program MARK (White and Burnham 1999). Parameter estimates for *Phi* and *p* will be obtained using the encounter histories constructed for each radio-tagged individual indicating their presence or absence at detection locations from the approach receiver (i.e., ~500 m upstream of the dam) through the receiver located the furthest downstream of the Project (i.e., Station 11). The CJS model approach will generate reach-specific survival estimates for radio-tagged eels from:

a) the point 500 m upstream of the dam until passage downstream (i.e., Station 1); and

b) from passage by the dam until the first downstream receiver (i.e., Station 10).

The joint probability of the two reach-specific survival estimates will be used as the estimate of total Project survival. This approach assumes that the background mortality (i.e., natural mortality such as predation) is negligible for adult eels in the 500 m reach upstream of the dam, as well as the reach downstream of the dam to Station 10, and that the observed losses are attributable solely to Project effects. This use of this assumption will result in a minimum estimate of total Project survival for adult American eels passing downstream of the Lewiston Falls.

To evaluate survival using Program MARK, a suite of candidate models will be developed based on whether survival, recapture (i.e., detection), or both vary or are constant among stations. Models will include:

- *Phi*(t)*p*(t): survival and recapture may vary between receiver stations;
- *Phi*(t)*p*(.): survival may vary between stations; recapture is constant between stations;
- *Phi*(.)*p*(t): survival is constant between stations; recapture may vary between stations;
- *Phi*(.)*p*(.): survival and recapture are constant between stations;

Where;

- *Phi* = probability of survival
- *p* = probability of detection
- (t) = parameter varies
- (.) = parameter is constant

Prior to comparison among models, goodness of fit testing will be conducted for the "starting model" (i.e., the fully parameterized model) using the function RELEASE within Program MARK.

Akaike's Information Criterion (AIC) will be used to rank the models as to how well they fit the observed mark-recapture data. Lower AIC values denote a more explanatory yet parsimonious fit than higher AIC values.

Drift information collected from live and freshly-dead eels intentionally released downstream of Lewiston Falls will be reviewed during the compilation of encounter histories. Modified encounter histories will be developed for test eels reaching Station 10 in a duration of time longer than the median duration recorded for dead individuals released directly in the tailrace. The full series of encounter histories will be used to develop a suite of CJS models to inform on downstream passage survival at Lewiston Falls. Models prepared will evaluate the downstream passage success of adult eels at Lewiston Falls for:

- All eels – based on detection of individuals from upstream release groups at Stations 1, 10;
- All eels – adjusted for median "travel time" for freshly dead eels released in the Lewiston Falls tailrace to reach Station 10 (i.e., test eels with downstream travel times in excess of median drift duration manually adjusted to reflect a mortality at the Project); and
- All eels – based on detection of individuals from upstream release groups at Stations 1, 10 and by downstream passage route (where sample size is determined adequate).

Study Schedule

The downstream eel study is currently planned to be conducted during the period of September-November 2022, with a draft study report anticipated in the middle of 2023.

Figure 2-4 Proposed Release Site and Main Stem Androscoggin Stationary Telemetry Receiver Locations Installed for Evaluation of Downstream Passage of Adult American Eels at Lewiston Falls

Figure 2-5 Proposed Approximate Locations and Coverage Areas for Telemetry Receivers Installed for Evaluation of Downstream Passage of Adult American Eels at Lewiston Falls

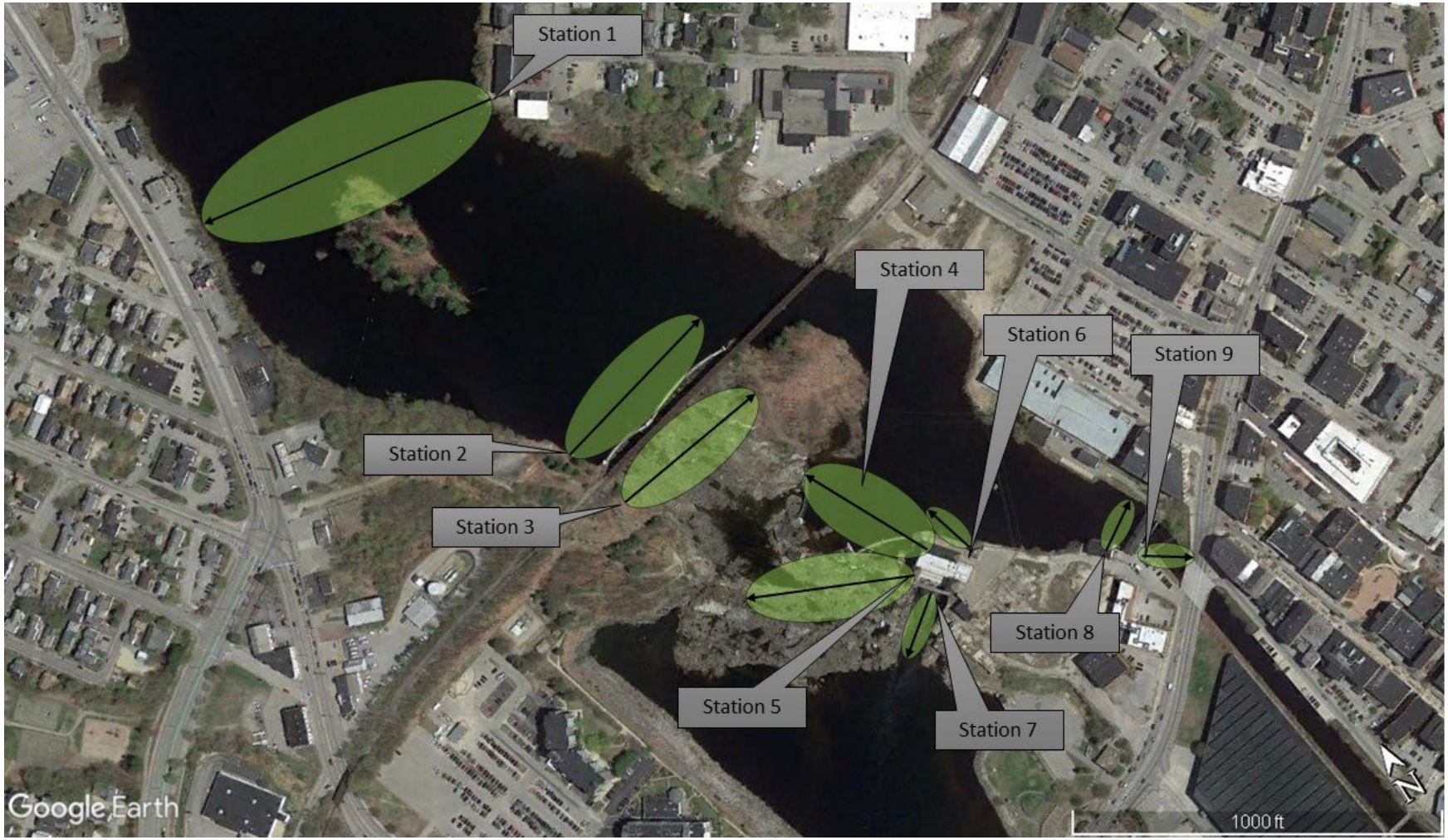


Figure 2-6 Restraint Device for Holding and Positioning Adult Silver Eels during Radio-Tagging*

*** Example photo**

2.4 Fish Assemblage Study

In their study request letter dated January 3, 2022, MDIFW requested that BWPH conduct a fish assemblage study within the Project impoundment. In summary, the requested study would document changes within the fish community which have occurred in this section of the Androscoggin River since the last comprehensive sampling event (i.e., 2003 sampling conducted by Yoder et al.). MDIFW suggested an electrofish survey, similar to that conducted during 2003, may be appropriate and would provide comparable data to previous sampling efforts. Additional methods such as gillnetting and/or shallow water seine netting may aid in collection of fish species that are often difficult to capture via electrofish sampling. A complete copy of the MDIFW letter is provided in Attachment A.

Study Goals and Objectives

BWPH's goal for this study are to assess relative changes to the fish community resident within the Project impoundment which have occurred since the previous comprehensive study in 2003. Specific objectives include:

- Documentation of fish species occurrence and relative abundance within the Project impoundment;
- Provide a comparison of species presence and relative abundance between the current fish community and that present during the previous comprehensive study (2003); and
- Collection of scale samples from largemouth and smallmouth bass species to inform on the age distribution of the current impoundment populations of those two species to address MDIFWs request incorporated into the *Bass Spawning Study*.

Study Scope and Methods

BWPH will assess the current Lewiston Falls impoundment fish community using a combination of boat electrofish and beach seine sampling.

The boat electrofish sampling methodology proposed here was adapted from Yoder et al. (2006) to provide consistency with the previously conducted impoundment assemblage sampling. The boat electrofishing crew will consist of three individuals, a boat driver and two netters. Sampling will take place along the shoreline. Electric current to the water will be generated by a Smith-Root generator/pulsator combination controlled by a pedal switch operated by one of the two netters positioned on the bow of the boat. The boat driver will have immediate access to an emergency cut off switch. Specific settings on the electrofish unit will be dependent on water conductivity with a higher voltage level required in lower conductivity water. The pulse frequency will be set to

120 Hz which Yoder et al. (2006) identified as the most effective pulse setting for effectiveness in stunning fishes in Maine rivers.

A total of two 1-km reaches within the Lewiston Falls impoundment will be sampled by boat electrofishing during July or August, 2022. Sampling of the two reaches will be conducted during the daytime hours, following the approach taken by Yoder et al. during the 2003 Androscoggin River sampling. Fish netted during sampling will immediately be placed in an aerated live well for processing. Upon completion of the sample, each fish will be identified to species, weighed (nearest gram), and measured (nearest mm). Species which occur in large numbers will be subsampled and weight-length information will be collected from a minimum of 15 large adults and 50 smaller (Age 1 or young-of-year) individuals. Immature or post-larval fish less than 20 mm will not be included in the sample. To provide information to inform on the age structure of the black bass populations in the Project impoundment (see the plan for the *Bass Spawning Study*), scale samples will be collected from both smallmouth and largemouth bass collected during sampling. Samples from up to 100 largemouth and 100 smallmouth bass among five size classes (up to 20 samples each from fish measuring $\leq$100 mm, 101-200 mm, 201-300 mm, 301-400 mm and >400 mm) will be archived for future age determination. Following processing, fish will be returned to the Lewiston Falls impoundment.

During fish sampling field staff will also record:

- date/time of sampling,
- start and end coordinates for the sampling reach,
- pedal time (as measured in seconds),
- water temperature (^{o}C),
- dissolved oxygen (mg/L & % saturation),
- relative conductivity (µS/cm^{2}),
- dominant substrate (following the Wentworth scale),
- relative abundance of woody debris,
- approximate percentage of transect with aquatic vegetation, and
- approximate percentage of transect with overhanging shoreline cover.

Boat electrofish sampling may be less effective for areas of habitat characterized as shallow, flat, and featuring limited cover. To ensure fish species from these areas are characterized as part of the current fish community, a seine net will be used. Field staff will collect a total of six to eight seine samples from areas of appropriate habitat within the Lewiston Falls impoundment. Seine sampling will be conducted by anchoring one end of the net on the shoreline and extending the

second end of the net out and away from the shoreline then back to the starting point in a circular manner. Care will be taken to ensure that the lead line maintains contact with the bottom substrate to avoid fish moving under the net. Seine sampling will be conducted during the daylight hours. Field crews will record the positional coordinates for each seine sample. In addition, the date, time, water depth, water quality (parameters described above), and dominant substrate will be recorded. The total fish catch will be processed following the same methods as described above for boat electrofish samples.

To ensure a robust characterization of the fish community in the Lewiston Falls impoundment, boat electrofish and seine sampling will be supplemented with a number of overnight gill net sets. These sets will deploy experimental monofilament gill nets constructed of five panels of 25 feet per panel with an overall length of 125 feet and an 8-foot depth. Panel mesh sizes will include 1, 1.5, 2, 2.5, and 3 inches. BWPH will conduct a total of 12 overnight gill net sets in the Project impoundment and will consult with MDIFW on preferred locations to conduct this sampling. Gill nets will be set during the evening hours and allowed to soak overnight. Deployment will occur perpendicular to the shoreline with the smaller mesh panel of each experimental net positioned closest to the bank. Net sets will occur in areas where water depths are greater than the net height such that the capture area of the gear is maximized. The set and pull times, water quality, and coordinates for each net set will be recorded. Upon retrieval, fish will be removed from the net and processed following the same methods as described above for boat electrofish samples.

Analysis and Reporting

The study report will provide both graphical and tabular presentation of fish assemblage data to characterize the species composition, relative abundance, and collected information on length and weight of abundant fish species. Abundance data in the form of catch standardized by unit of effort (e.g., seconds of electrofishing) will be calculated for each species, sampling station, and sampling method. The report will also include a comparison with available historical records for the Project impoundment (i.e., Yoder et al. 2006).

Study Schedule

The fish assemblage study will be conducted during the period of July through August 2022, with a draft study report anticipated in March of 2023.

2.5 Bass Spawning Study

In their study request letter dated January 3, 2022, MDIFW requested that BWPH conduct a bass spawning survey of the Project impoundment. In summary, the study would evaluate the potential influence of water level fluctuations on the reproductive success of black bass species (i.e., largemouth and smallmouth bass). MDIFW suggested that due to the proclivity of black bass to establish nests in relatively shallow water, visual analysis is an effective tool for identifying and quantifying reproductive effort for the two bass species. Netting or electrofish methodologies were identified as useful tools for the collection of scale samples for use in establishing an age structure of bass species in the Lewiston Falls impoundment. A complete copy of the comment letter can be found in Attachment A.

Study Goals and Objectives

In summary, BWPH's goal for this study is to evaluate whether Project operations (specifically changes in the impoundment water surface elevation) are influencing the reproductive success of black bass species. Specific objectives of this study are to:

1. Conduct field surveys to document the relative abundance, depth, and spatial extent of black bass nests during the spawning season (approximately May 15 to June 30);
2. Provide context for the frequency and extent of water surface fluctuations within the Lewiston Falls impoundment during the spawning season; and
3. Describe the age structure of the current Lewiston Falls impoundment black bass populations.

Study Scope and Methods

Objective 1: Field Surveys

BWPH will conduct a total of six once-weekly surveys during the black bass nesting season (May 15 to June 30) to visually scan littoral habitat for the purpose of identifying black bass nests or spawning areas. The study area will encompass the portion of the Project impoundment from the boat barrier upstream of Lewiston Falls to the upper extent of boatable water and within the Lewiston Falls impoundment. The survey area will focus on the littoral zone from the normal full pond elevation of 168.17 feet msl down to the extent of visible bottom substrate. Observable characteristics of littoral zone habitat will vary with water clarity, impoundment elevation, time of day, and weather conditions.

Sampling will be conducted by systematically traversing the littoral zone by boat to visually identify nests or spawning areas (i.e., a group of nests in close proximity to one another). At the

start of each sampling date, field staff will record the survey start time, general weather condition, water temperature, water clarity (as measured via secchi disk), impoundment elevation (obtained from BWPH operations), and Project inflow (obtained from BWPH operations). Nest observations will be made using polarized glasses and an aquatic view tube. Upon identification of nests or spawning areas the location will be marked using a Real Time Kinematic unit (RTK) to provide geo-referenced x-y coordinates as well as the associated water surface elevation (z). The depth of the nest will be determined using the boats depth finder or stadia rod and recorded. For each recorded nest or spawning area field staff will record the dominant substrate type, approximate nest diameter, presence of bass or other fish species in the vicinity of the nest, relative abundance of submerged aquatic vegetation, and whether the nest substrate appears clean or sedimented.

All data will be recorded on standardized field data sheets. The study report will provide a summary of the site parameters for each nest as well as geo-referenced map(s) detailing their relative position within the impoundment. Dependent upon MDIFWs needs, the geo-referenced locations will be made available in electronic format (i.e., kmz or ArcGIS format).

Objective 2: Impoundment Elevation Review

The Lewiston Falls impoundment has a full pond elevation of 168.17 feet msl. Although the Project is licensed to operate with up to four feet of impoundment fluctuation, it is normally operated as run-of-river, with impoundment fluctuations of one foot or less. To describe how changes in impoundment elevation may influence bass nesting, BWPH will conduct a review of headpond elevation data for the period of bass spawning from May 15 to June 30, 2022. This exercise will assess the frequency and extent of time for which the upper four feet within the current operating range are dewatered. The recorded seasonal timing and elevation within the littoral zone recorded for bass nests observed during the 2022 field surveys will be assessed relative to the pattern of impoundment fluctuation observed during the study year.

Objective 3: Age Structure Review

In addition, the age structure of the black bass community will be analyzed. Age will be determined for a subsample of largemouth and smallmouth bass captured by boat electrofisher from the Lewiston Falls impoundment. BWPH will rely on boat electrofish sampling proposed as part of the *Fish Assemblage Study* to provide the necessary scale samples by which to determine age.

BWPH will obtain and age up to 100 largemouth and 100 smallmouth bass scales among five size classes (up to 20 samples each for size classes $\leq$100 mm, 101-200 mm, 201-300 mm, 301-400 mm and >400 mm) from the Lewiston Falls impoundment. Upon return to the laboratory, scale samples will be placed in a well dish and gently cleaned with 2% KOH (potassium hydroxide) and

a soft brush. Scales will be examined under a low-power scope, and 5-6 non-regenerated, symmetrical scales will be selected. Selected scales will be arranged on a glass slide in a single row with all scales oriented in the same direction and the sculpted (convex) side of the scale facing up. A second glass slide will be gently laid over the first (directly on the scales), sandwiching the scales.

The scale slide will be examined with a microfiche reader at approximately 46x magnification to determine the location of each annulus. All scale samples will be examined by two independent scale readers, resulting in a 100% QC. For all occasions where there is disagreement between readers one and two, an independent third party will examine the disputed sample and produce a third age estimate. If the third age estimate is in agreement with readers one or two, then the age will be accepted. In the case where there is disagreement among all three independent readers, the sample will be discarded.

Following completion of scale sample processing, BWPH will summarize the resulting age-frequency distributions for both bass species to provide MDIFW with an understanding of the current age structure within the Project impoundment.

Study Schedule

The bass spawning study is currently planned for the period between May through June 2022, with a draft study report anticipated in March of 2023.

2.6 Recreation Study

In a joint study request letter dated December 30, 2021, the Cities of Auburn and Lewiston, AW, AMC, TU, and Grow L+A requested that BWPH conduct a comprehensive recreation study. In summary, the Cities of Auburn and Lewiston, AW, AMC, TU, and Grow L+A requested that the study evaluate existing public recreation sites, facilities and opportunities at the Project, consider if the existing sites and facilities are adequate to meet existing recreation needs and future demand, assess the effects of continued Project operations, on existing and future recreational use at the Project, and consider if recreation improvements are needed to make the Project more accessible. AVCOG and NPS both support the study as requested. Complete copies of the comment letters can be found in Attachment A.

It was also requested that the study methods include a land-based assessment to identify usage, suitability, and the condition of existing Project facilities; identification of access points via a walk-through with stakeholders to identify access points and evaluate their suitability and improvement potential; and an evaluation of portage and trail connectivity options around the Project facility. Finally, it was requested that the study include a boating flow assessment of the reach from just below the Project dam through Dressers Rips to a recently completed boating access approximately 4.8 miles below the Project dam.

MBPL requested in their letter dated December 23, 2021 that BWPH conduct the recreation study, as proposed in the PAD, but modified to collect data through focus groups or interviews; to include all recreation sites in the Project vicinity that provide physical or visual access to the Project, including each site's scenic and aesthetic value; and to consider means of establishing a portage route around the Project dam.

Study Goals and Objectives

In summary, BWPH is proposing to conduct the requested study with limited modifications to address the study request objectives, as summarized above, that have a nexus to the Project and its operation. The primary goal of the proposed study is to assess recreational access, opportunities, use, and needs at public recreation sites that are located within the Project boundary or that provide direct visual or physical access to Project lands and waters, and to evaluate potential effects of Project operations on recreation sites, facilities and use. Figure 2-6 depicts Project and non-Project recreation sites in the study area. Study objectives are as follows:

- Assess the use, adequacy, and condition of the FERC-approved Project recreation sites;
- Inventory formal public recreation sites providing direct visual or physical access to Project lands and waters;

- Assess whether there is a need to enhance recreation opportunities and access at the existing Project recreation sites;
- Consider the need for additional recreation opportunities, sites, and facilities to meet existing and future demand, including options to establish a portage route around the Project dam and/or make enhancements to improve recreation access at the Project; and
- Evaluate Project effects on flow-dependent downstream recreational boating activities and consider potential impacts on public safety and other recreation activities downstream

The proposed study does not include assessment of recreation use of, or sites and facilities associated with, the Lewiston Canal system, as the canal is no longer owned and operated by BWPH (currently owned and operated by the City of Lewiston) and is no longer part of the FERC-licensed Project.

Study Scope and Methods

Recreation Site Inventory and Condition Assessment

BWPH will conduct a field inventory of existing Project recreation sites and formal public (non-commercial) non-Project recreation sites that provide direct visual or physical recreation access to Project lands and waters. Recreation sites to be included in the inventory are identified in Figure 2-6. BWPH will record the following information at each site:

- A description of the site, including estimated parking capacity (if applicable), site aesthetics, and any associated amenities (including signage)
- The type of recreational activities supported by the site (e.g., boating access, picnicking, sightseeing, etc.)
- Photographic documentation of the site, facilities, amenities, and any views of the Project available from the site
- Site and facility location relative to the Project boundary
- Site ownership and entity responsible for site operation
- Hours and seasons of site operation

At Project recreation sites, BWPH will also assess the condition of the site and associated amenities and note any evidence of erosion and impacts to vegetation due to recreational use.

Recreation Use Assessment

BWPH will assess use at the FERC-approved Project recreation sites during the peak recreation season (Memorial Day weekend through Labor Day weekend) by conducting point-in-time use

observations at Project recreation sites. Use observations will be recorded on a total of 16 days throughout the study season (Memorial Day through Labor Day). During the months of June, July, and August, use observations will be recorded on two random weekdays and two random weekend days per month. During the months of May and September, use observations will be recorded on two days, both of which will fall on holiday weekends[2]. For months with holidays (Memorial Day, Fourth of July, and Labor Day), use observations will occur on the holiday and one day during the holiday weekend, which will count towards the required survey days for the associated month. Observations will be recorded once per sample day during daylight hours on a rotating schedule to capture differing times of day throughout the study season. During each use observation, a field technician will record the following information on a standardized form:

- Date and time
- Weather conditions
- Number of people observed at the site for recreational purposes
- Number of motor vehicles observed at the site for recreational purposes (where applicable)
- Number of non-motorized vehicles observed at the site for recreational purposes
- Recreation activities observed

Use observations will be used to estimate monthly and seasonal recreation use at the Project recreation sites.

Recreation User Survey

BWPH will solicit information on recreational use and user perceptions of Project recreation sites via voluntary user surveys. User surveys will be collected at each Project recreation site using in-person surveys (conducted for one hour during the use observations discussed above), at each Project recreation site and two non-Project recreation sites: Veterans Memorial Park and the Riverwalk between Court Street Bridge and West Pitch Park. In addition to the administered user surveys, BWPH will develop an online version of the survey that will allow respondents to provide survey responses electronically. The online survey will allow BWPH to capture information on recreational use from individuals who do not wish to complete an interview or survey in the field. Signage with information on how to complete the online survey will be posted at the recreational sites listed above.

[2] In 2022, Memorial Day falls on May 30 and Labor Day falls on September 5.

The user survey will solicit information on user characteristics, use patterns, and user perceptions of the recreational sites, facilities, and opportunities, including the following:

- Distance traveled to site
- Mode of transportation used to travel to site
- Group size
- Duration of visit
- Frequency and seasonality of visits
- Activities engaged in
- Ratings of various characteristics of the site and associated facilities and amenities, including:
    - Access to the Androscoggin River or Project impoundment
    - Adequacy of site and facility condition
    - Adequacy of site amenities and the recreation opportunities provided

Recreation Facility Needs Review

Following completion of the recreation site inventory, use assessment and user surveys, BWPH will convene a focus group comprised of interested parties (including, to the extent that they are willing and able to participate, representatives from the local municipalities, NGOs, resource agencies, and members of the public) to evaluate any needs to enhance recreation opportunities at the Project identified during the study (including, but not limited to a canoe portage) and to discuss potential options for meeting those needs. As a first step, BWPH will meet with the focus group virtually to review the recreation facility and use information collected by BWPH and to identify potential recreation site and facility needs. The virtual meeting will be followed by a site visit with the focus group to Project recreation sites and key non-Project recreation sites, as previously identified. The site visit will be used to further discuss and assess the potential for recreation site and facility enhancements. The results of the site visit and focus group discussions will be documented in the Recreation Study report.

Flow Effects on Downstream Recreational Boating

BWPH will conduct a desktop analysis to assess the impact of Project operations and flows on recreational boating opportunities and activities on the Androscoggin River downstream from the Project dam. The approach used will be in general accordance with the methodology for a Level 1 assessment set forth in Whittaker et al. (2005) *Flows and Recreation: A Guide for River Professionals*. The analysis will identify recreational boating opportunities, characterize their flow-dependent attributes, and evaluate whether Project operations are likely to impact those

opportunities. Methods to obtain this information will include a literature review, a review of hydrologic and hydraulic conditions based on existing information, and interviews with representatives of boating groups. Where possible, BWPH will coordinate this task with other tasks and studies, and will utilize existing information where possible, including previous instream flow studies, if appropriate.

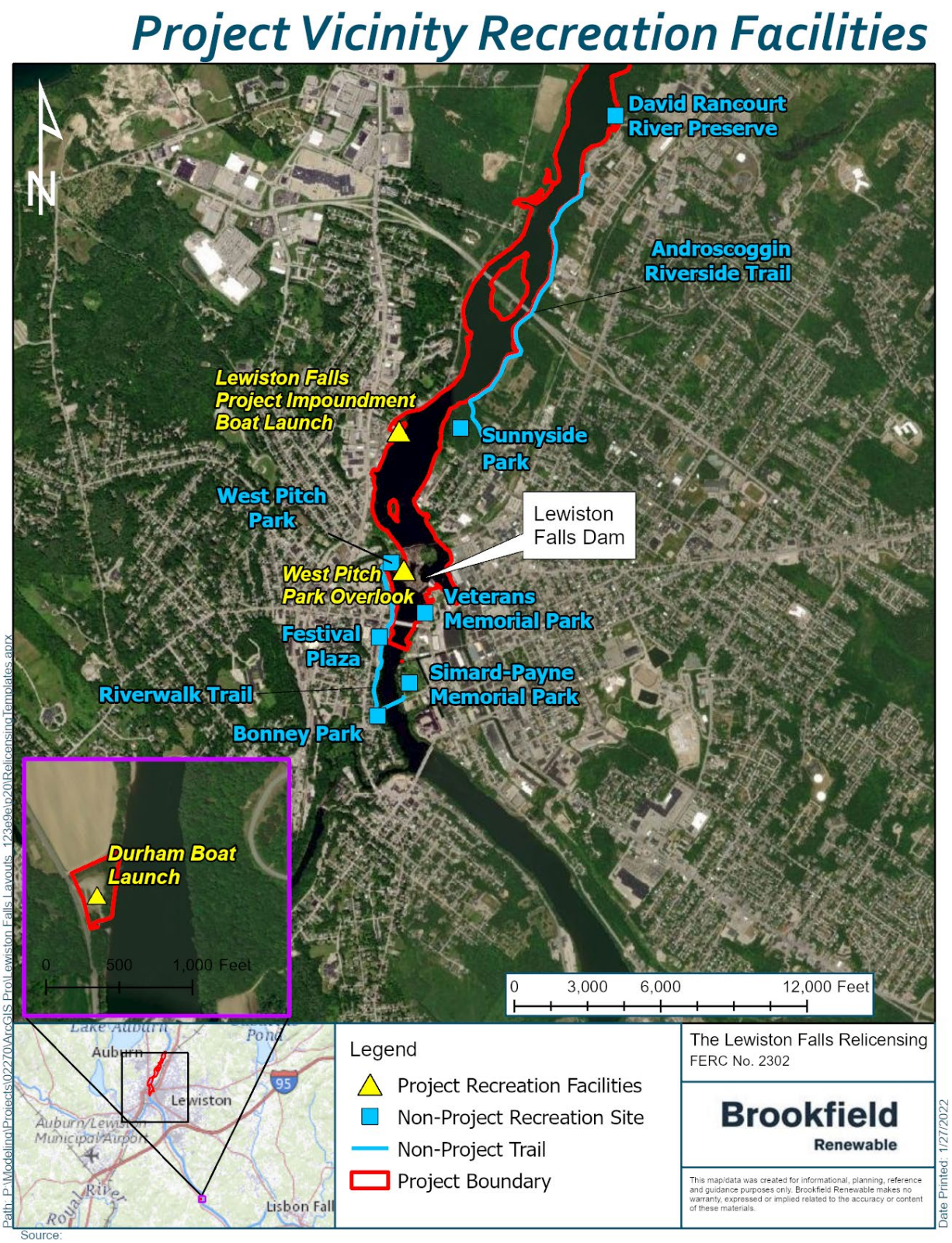
BWPH will include the results of the Level 1 analysis in a study report to be shared with stakeholders at the conclusion of the Recreation Study. The study report will serve as a starting point for consultation with the interested parties to determine whether further assessment, including subsequent levels of the Whittaker et al. (2005) methodology (e.g., land-based or on-water assessments), are necessary to characterize the effects of Project operations and flows on downstream boating use.

Study Schedule

The Recreation Study is currently planned to begin during the 2022 field season and extend into the 2023 field season, with a draft study report anticipated in early 2023 and an updated study report anticipated in December 2023. The anticipated schedule by task is as follows:

- Field Inventory and Condition Assessment – Summer 2022
- Field Use Assessment – May 30 (Memorial Day) through September 5 (Labor Day), 2022
- User Survey – May 30 (Memorial Day) through September 5 (Labor Day), 2022
- Flow Effects on Downstream Recreational Boating Assessment – 2022 to 2023
- Recreation Needs Review – Spring/Summer 2023

Figure 2-7 Project Area Recreation Sites included in Recreation Study



2.7 Aesthetics Study

In a joint study request letter dated December 30, 2021, the Cities of Auburn and Lewiston, AW, AMC, TU, and Grow L+A, requested that BWPH conduct an aesthetics study. In summary, the Cities of Auburn and Lewiston, AW, AMC, TU, and Grow L+A, requested that BWPH evaluate the effects of the Project operations and flows on the aesthetics of the Androscoggin River, the falls (Great Falls), and the Lewiston Canal system, and identify potential measures to mitigate those effects. AVCOG and NPS both support the study as requested. Complete copies of the comment letters can be found in Attachment A.

In MBPL's study request letter dated December, 23, 2021, MBPL did not request an aesthetics study as described above, but did, however, request that BWPH provide and assess additional information on 1) the timing and magnitude of flows at the falls, prior to the development of the Monty powerhouse, and more recently (e.g., past 10 years), 2) how river flows greater than the capacity of the powerhouse affect flows over the falls, and 3) how operation of the inflatable dams and flashboards on the Project dam sections affect flows over the falls. Complete copies of the comment letters can be found in Attachment A.

Study Goals and Objectives

BWPH is proposing to conduct the requested study with modifications to satisfy the above-mentioned goals and objectives that have a nexus to Project operations. BWPH anticipates that the study results will also provide the additional information assessment requested by MBPL. The proposed Recreation Study will supply information on the aesthetic quality of Project area public recreation sites.

BWPH's goal of the proposed Aesthetics Study is to obtain information on the aesthetic character of water flowing over the falls and aesthetic viewing opportunities of the falls. The objectives of the study include the following:

- Document the existing aesthetic character and condition of the falls;
- Identify key observation points (KOPs) to be used to evaluate the aesthetics of various flows;
- Collect photo documentation of the falls under various flow conditions.
- Use river flow and Project operational data to examine the frequency, timing and magnitude of flows over the falls;
- Summarize the timing and range of historical flows to characterize existing flow conditions as they relate to the aesthetic character of the falls;

- Convene a focus group to assess the aesthetic condition of the falls provided at different flows based on photo documentation and, if needed, an assessment of controlled flow conditions at KOPs;
- Determine the operational feasibility, effects on generation, and cost of providing aesthetic flow releases over the falls.
- Consider potential impacts on public safety and other recreation activities downstream of the falls

The proposed study does not include an aesthetic assessment of the Lewiston Canal system, as the canal is no longer owned and operated by BWPH (currently owned by the City of Lewiston) and is no longer part of the FERC-licensed Project.

Study Scope and Methods

The proposed aesthetics study will be conducted in general accordance with the methods outlined in *Flows and Aesthetics: A Guide to Concepts and Methods* (Whittaker and Shelby 2017), as appropriate and feasible. The proposed study will be conducted in three phases. Phase 1 will include a desktop exercise to develop a summary analysis of historic flows and to collect existing photo-documentation of flows over the falls. Phase 2 will include establishment of a focus group and collaboration with that group to identify KOPs, key viewing characteristics (e.g., key features/structures, waterfalls, vegetation, in-channel geologic features), and to develop an aesthetic evaluation form. The focus group will assist BWPH in evaluating the aesthetic character of the falls from photo documentation. The focus group will also help to plan an onsite controlled flow assessment including the establishment of target flows. Phase 3 will include an onsite controlled flow assessment to evaluate the aesthetic conditions provided by the targeted flows. An Aesthetics Study report will summarize the methodologies and results of the assessment. be

Phase 1 - Desktop Analysis

BWPH will assess and summarize the timing and ranges of historic flows to characterize existing flow conditions as they relate to the aesthetic character of the falls. The analysis will provide a summary of the flows that occur over the falls based on the Project's existing FERC license, dam configuration, spillway operations, and river hydrology. This phase will also include the collection of existing photo documentation of flows over the falls and, to the extent possible, correlation of photo documentation with flow estimates.

Phase 2 - Assembly of Focus Group and Establishment of Onsite Assessment Logistics

BWPH will assemble a focus group to participate in the Aesthetics Study. The focus group will include, to the extent that they are willing and able to participate, representatives from agencies, NGOs, and local municipalities. BWPH will work with the focus group to identify key observation

points (KOPs), key viewing characteristics (e.g., key features/structures, waterfalls, vegetation, in-channel geologic features), and to develop an aesthetic evaluation form. A summary of results from Phase 1 will be provided to the group to inform discussion. The focus group will initially assist BWPH in evaluating the aesthetic character of the falls from existing photo documentation. The focus group will also coordinate on the logistics of the Phase 3 controlled flow assessment, discussed below.

Key Observation Points and Viewing Characteristics

BWPH, in consultation with the focus group, will select KOPs that are accessible and representative of the range of publicly available views of the falls. Once the KOPs are selected, BWPH will characterize and photo document each site during leaf-on and leaf-off periods and identify key viewing characteristics and viewpoints.

Evaluation Form

BWPH will draft an evaluation form to be used during the controlled flow assessment. The form will be refined in coordination with the focus group.

Photo Documentation Evaluation

BWPH will engage the focus group in evaluating photo documentation of the falls under a variety of flow conditions, as collected by BWPH as part of Phase 1. To the extent possible, the focus group will utilize the flow evaluation form to rate the aesthetic character of the falls under the flows documented in the available photos. The results of this evaluation will be used to help inform the Phase 3 controlled flow evaluation.

Target Flows

In consultation with the focus group, BWPH will determine the number of releases and appropriate flow levels for conducting a controlled flow assessment. BWPH anticipates that up to four flows will be evaluated consisting of leakage flow (exiting low flow condition) and three other flows (low, medium, and high, within a defined range). The range of flow will be determined based on information obtained during Phases I and II and in consultation with the focus group.

Phase 3 - Controlled Flow Assessment and Focus Group Consultation

BWPH and the focus group will conduct an onsite controlled flow assessment of the falls. BWPH will coordinate with the focus group to schedule the controlled flow assessment, establish assessment protocols, and address any necessary logistics and safety considerations. BWPH will photo document each flow from each KOP during the assessment. Focus group participants will

complete an evaluation form based on views from established KOPs for each of the controlled flow releases. After all flows have been evaluated at each KOP, the Licensee will lead a focus group discussion to review the results.

Data Analysis and Reporting

BWPH will compile a report to summarize study methodology, analysis, and results from the Aesthetics Study. The report will include the results of all three phases of the study. The report will also include an assessment of the potential effects of providing aesthetic flows on other resources, such as recreation opportunities (including public safety), aquatic resources, and Project operations (e.g., operational feasibility, effects on Project generation, and cost of providing aesthetic flow releases).

Study Schedule

Timing of the Aesthetics Study will be dependent on several factors, including the availability of flows necessary to conduct the controlled flow assessment. BWPH plans to conduct Phases 1 and 2 in 2022. The timing of Phase 3 will be dependent on completion of Phases 1 and 2, and also on the availability of water for the controlled flow releases. BWPH anticipates Phase 3 will likely occur in late 2022 or in spring 2023.

2.8 Archaeology Study

The MHPC and BIA requested that BWPH conduct historic and prehistoric archaeology surveys of the Project Area of Potential Effect (APE). MHPC provided their study requests in letters dated June 29, 2021, December 8, 2021, and in an email dated February 1, 2022; and BIA provided a study request in their letter dated December 10, 2021.

In summary, the Project PAD identified prior archaeological work that had been completed on this Project in the past (Clark and Mack 2011). The MHPC is currently reviewing past work on the Project to identify what additional survey work in the Project APE is required for relicensing of this Project. The Project APE is considered"…*the lands enclosed by the project's boundary and lands or properties outside of the project's boundary where project construction and operation or project-related recreational development or other enhancements may cause changes in the character or use of historic properties, if any historic properties exist.*" For the purposes of this study plan, the APE will include lands enclosed within the Project boundaries and/or lands located within 50 feet (15 m) of the edge of the riverbank, whichever is the greater of the two areas. The study area extends from the Project dam that spans the Androscoggin River between the cities of Lewiston and Auburn. The current Project boundary extends approximately 0.28, miles downstream of the Project powerhouse (Monty Station) and 2.5 miles upstream of the dam. The Project boundary encompasses the Project dam, powerhouse, impoundment, two gatehouse buildings, and the tailwater area. Complete copies of the study request letters can be found in Attachment A.

Study Goals and Objectives

The goal of the archaeological study is to assist FERC in meeting its compliance requirements under Section 106 of the National Historic Preservation Act (NHPA) (1966), as amended, by determining whether historic properties are present within the Project's APE. One objective of this study is to evaluate areas in the Project's APE that have not been previously surveyed for Precontact and Historic period archaeological resources, and to make recommendations about whether any additional archaeological sites that may be found are eligible for listing to the National Register of Historic Places (NRHP). A second objective is to evaluate whether previously identified archaeological sites that may extend into the APE meet eligibility criteria for listing to the NRHP. These objectives were defined in consultation with Dr. Arthur Spiess and Dr. Leith Smith at the MHPC.

The NHPA requires that federal agencies, licensees, and those receiving federal assistance take into account the effects of proposed undertakings on any resource that is listed on or is eligible for the NRHP. If NRHP-eligible properties are present in the APE, consultation on ways to avoid, minimize, or mitigate adverse project effects must take place. One possible option for addressing adverse effects to such properties involves preparing a Programmatic Agreement (PA) and

drafting a historic properties management plan (HPMP) that identifies how adverse project effects on NRHP listed or eligible properties will be addressed. As the lead agency, FERC is responsible for fulfilling the requirements of Section 106 in its decision to issue a new license to the Project.

As stipulated by the regulations that implement Section 106 (36 CFR 800), the Maine State Historic Preservation Officer (SHPO) represents the interests of the State of Maine and its citizens and advises and assists FERC in determining the significance of cultural resources within the APE. The SHPO administers cultural resource management reviews under the National Historic Preservation Act (Section 106), which involves providing technical guidance and professional advice on the potential impact of licensed projects, such as the Lewiston Falls Project, on the state's historic, architectural, and archaeological resources.

Study Scope and Methods

All the field investigation methods used will follow all applicable Federal and Maine guidelines, including those contained in the Maine Historic Preservation's website (http://www.state.me.us/MHPC). All methods used to conduct surveys for archaeological sites or for the NRHP-eligibility evaluation of sites will conform to MHPC guidelines (http://www.state.me.us/mhpc/archaeology/professional/rules.html and http://www.state.me.us/mhpc/archaeology/professinal/context.html).

Prehistoric Archaeology Survey

BWPH will conduct a phased survey of prehistoric archaeology sites within the Project APE. This survey will include the follow 5 tasks.

Development of a Sensitivity Model

The first task will include background research that includes the examination of archaeological site files, cultural resources reports, soil maps, geologic maps, and topographic maps in order to develop a Precontact period archaeological sensitivity model. Models of Precontact human occupation in Maine suggest that people utilized a variety of environments and ecotones to procure food and other resources and show that some areas were more attractive than others to establish camps and villages. Environmental settings typically associated with Precontact-period occupation include major rivers or creek valleys, rock shelters, springheads, stream confluences, well-drained lands along secondary streams, and bedrock outcrops for lithic resource procurement. Other factors include elevation, slope gradient, aspect, stream order, distance from fresh water, landform, soil type, and soil drainage. The sensitivity model will aid in identifying the probable locations of Precontact period archaeological sites within the APE.

Field Reconnaissance

Field reconnaissance of the Project APE will be conducted to confirm the sensitivity model and eliminate areas from further study as warranted. The field reconnaissance will consist of visual examination of selected portions of the Project areas, focusing primarily on landforms that have the greatest potential to contain archaeological resources, and that may be subject to erosion, as well as confirming areas of disturbance, steep slope, and wetlands, which would have little potential to contain in situ buried archaeological resources.

Phase IA Report Development

A Phase IA report that contains a record of consultation with the MHPC, a summary of background research, Precontact period contexts for the Project environs, a description of the sensitivity model, the methods and results of Phase IA reconnaissance, maps of the APE, and recommendations to conduct additional investigations will be completed and sent to the SHPO and tribes (if applicable) for comment. The Phase IB archaeological survey would be conducted in accordance with the results and recommendation of the Phase IA study and after consultation and concurrence with the SHPO.

Phase IB Fieldwork

Phase IB testing will be undertaken in locations within the Project APE that are sensitive for archaeological resources and that are experiencing erosion or that may be subject to erosion over the term of the license. The methods used to sample these areas are those approved by the MHPC and include excavation of 50 x 50 cm shovel test pits and 1 x 1 m square test units in those contexts where alluvial sediments are present and where deeper excavation is necessary to samples sediment for archaeological materials below 1.0 m below the ground surface.

Any artifacts discovered during field work will be cleaned, cataloged, and analyzed to determine age and archaeological cultural affiliation. All materials and records will be deposited in an MHPC-approved facility within the state of Maine.

Phase IB Report Development

The Phase IB report will document all excavation undertaken within the Project's APE. It will describe methods and results including all Precontact period archaeological site finds made during excavation. All testing areas will be GIS located with a Tablet and Geode Antenna and documented with maps suitable for review by the MHPC. The report will also make recommendations regarding whether any of the sites discovered should receive additional archaeological investigation to determine whether they are potentially eligible for eligible for

listing in the NRHP. The completed report will be sent to the SHPO and tribes (if applicable) for comment.

Historic Archaeology Survey

BWPH will conduct a phased survey of prehistoric archaeology sites within the Project APE. This survey will include the follow 5 tasks.

Development of a Sensitivity Model

The first task will be based mainly on cartographic evidence gathered from historic maps. These cartographic resources pinpoint the location of dwellings, schools, mills, churches, cemeteries, roads, and railroads providing the archaeologist with a ready point of comparison between past and present landscapes. Historical archaeologists can also review secondary sources such as town histories, photographs, and newspapers to provide a larger historical context for a Project APE. The sensitivity assessment also includes a site file search for known archaeological sites near the Project. There are no known Historic period archaeological sites within the Project APE. Locations that are considered sensitive for Historic resources are associated with the following variables:

- documented existence of sites (e.g., homesteads, farmsteads, schools, churches, town halls, cemeteries) through primary, secondary, or cartographic resources
- presence of known sites (whether extant, aboveground representations of early architecture, or documented archaeological site)
- proximity to transportation systems (roads, railroads, major rivers and streams) and potable water sources
- linkage to other resources (such as stone for quarrying, clay sources for brick or ceramics, or metal ores)

Historic archaeological resources typically exist along transportation corridors, specifically roads and rivers. Environmental conditions, such as waterpower and land suitable for agriculture, also affect site location.

Field Reconnaissance

Field reconnaissance of the Project APE will be conducted to confirm the sensitivity model and eliminate areas from further study as warranted. The field reconnaissance will consist of visual examination of selected portions of the Project areas, focusing primarily on landforms that have the greatest potential to contain archaeological resources, and as well as confirming areas of disturbance, steep slope, and wetlands, which would have little potential to contain in situ buried

archaeological resources. The field reconnaissance will document through photographs and GIS mapping the location of any aboveground historic features indicative of Historic period sites.

Phase IA Report Development

A Phase IA report that contains a record of consultation with the MHPC, a summary of background research, Historic period contexts for the Project environs, a description of the sensitivity model, the methods and results of Phase IA reconnaissance, maps of the APE, and recommendations to conduct additional investigations will be completed and sent to the SHPO for comment. The Phase IB archaeological survey would be conducted in accordance with the results and recommendation of the Phase IA study and after consultation and concurrence with the SHPO.

Phase IB Fieldwork

Phase IB testing will be undertaken in locations within the Project APE that are sensitive for Historic period archaeological resources and that are experiencing erosion or that may be subject to erosion over the term of the license. The methods used to sample these areas are those approved by the MHPC and include excavation of 50 x 50 cm shovel test pits and detail mapping of any aboveground resources.

Any artifacts discovered during field work will be cleaned, cataloged, and analyzed to determine age and archaeological cultural affiliation. All materials and records will be deposited in an MHPC-approved facility within the state of Maine.

Phase IB Report Development

The Phase IB report will document all excavation undertaken within the Project's APE. It will describe methods and results including all Precontact period archaeological site finds made during excavation. All testing areas will be GIS located with a Tablet and Geode Antenna and documented with maps suitable for review by the MHPC. The report will also make recommendations regarding whether any of the sites discovered should receive additional archaeological investigation to determine whether they are potentially eligible for eligible for listing in the NRHP. The completed report will be sent to the SHPO for comment.

Study Schedule

The Phase IA archaeology surveys are currently planned to be conducted during the period April through June 2022, with draft 1A study reports anticipated in the middle of 2022. The Phase IA archaeology survey reports will contain a detailed scope of work for Phase IB archeological fieldwork, if necessary. Phase IB fieldwork will be conducted in the fall of 2022 between September-November. Draft reports will be prepared for comment by the SHPO and tribes (if

applicable), which will be included in a Phase 1 study report that will be available in March 2023. Any Phase II survey work ultimately recommended by the SHPO will occur in 2023 and a Phase II study report will be prepared in late 2023. Following review, a final Phase II report will be provided to the SHPO, tribes (if applicable), and FERC along with a draft Historic Properties Management Plan as part of the draft license application. The report will be delivered to the SHPO, FERC, and tribes (if applicable), and will be available to the public (excluding site locations sensitive information). A revised HPMP will be completed and filed with the appropriate entities at the time of filing the final license application.

3.0 STUDIES NOT PROPOSED AS FIRST YEAR STUDIES

3.1 CFD Modeling

BWPH is not proposing to conduct CFD modeling at the Project as a first year study.

In summary, the NMFS in their study request letter dated December 22, 2021 and MDMR in their letter dated January 5, 2022 (and received via email on January 13, 2022) each requested that BWPH develop a three-dimensional computational fluid dynamics (CFD) model for upstream and downstream of the discharge and in the vicinity of the powerhouse forebay with a goal of determining the flow field conditions that exist upstream of the Project powerhouse and dams, under the existing operational condition and potential future conditions (complete copies of the study request letters can be found in Attachment A).

As described previously, BWPH is proposing to conduct a downstream migration study for adult American eel, which will yield information on passage route utilization and survival. This information will be used to determine the overall effectiveness of downstream passage at the Project, and to inform the development of future license requirements related to eel passage. However, once the downstream passage effectiveness study has been conducted and the extent of the conditions are understood, then BWPH would consider conducting this follow up study, in consultation with the agencies. BWPH believes the CFD study would be best utilized as a tool to support the final design phase of possible downstream fish passage improvements at the Project. With regards to upstream passage, BWPH is proposing to conduct an upstream passage study for juvenile American eels. These types of visual surveys are effective for identifying key areas where juvenile eels may congregate downstream of the dam and should be the primary factor in future placement of upstream eel passage.

3.2 Converting the Project to a Reregulating Project

BWPH is not proposing a study to evaluate the feasibility and potential resource impacts of converting the Project to a flow reregulation project as a first year study.

In summary, NMFS in their study request letter dated December 22, 2021 and MDMR in their letter dated January 5, 2022 (and received via email on January 13, 2022) each requested that BWPH evaluate the feasibility and potential resource impacts of converting the Project to a flow reregulation project in order to reduce the influence of Gulf Island peaking operations on downstream flows and habitat conditions. The stated goal for this study would be to determine the feasibility of changes to the headpond and Project operations to reduce the influence of

peaking received inflows on the outflows of the Project. Complete copies of the study request letters can be found in Attachment A.

Potential changes to Project operations, such as that suggested for this study, should be considered based on results of other resource studies that demonstrate ongoing resource impacts and identification of potential mitigation needs. Therefore, first BWPH will conduct the studies proposed herein, which will allow for more informed consideration of and development of scope of such a study.

3.3 Downstream Eel Passage Alternatives

BWPH is not proposing downstream eel passage alternatives study as a first year study.

In summary, MDMR in their letter dated January 5, 2022 (and received via email on January 13, 2022) requested BWPH conduct a downstream eel passage alternatives study to (1) determine conceptual options, and expected performances for, improved downstream passage that will reduce delay, increase passage efficiency, and increase survival for adult American eel as they attempt to pass the Lewiston Falls Project, and (2) to determine conceptual options, and expected performances for, improved downstream passage that will reduce delay, increase passage efficiency, and increase survival for downstream migrating adult and juvenile Atlantic salmon, juvenile sea lamprey, adult eels, adult and juvenile alewife, and adult and juvenile blueback herring as they attempt to pass the Lewiston Falls Project. Complete copies of the study request letters can be found in Attachment A.

As described above, BWPH is proposing to conduct a downstream migration study for adult American eel, which will yield information on passage route utilization and survival. This information will be used to determine the overall effectiveness of downstream passage at the Project, and to inform the development of future license requirements related to downstream eel passage. Until these study results become available and any impacts are identified, it is premature to evaluate potential additional downstream passage protection, mitigation, and enhancement measures. However, once the downstream eel passage study has been conducted and the extent of the problem (if any) understood, then BWPH would consider conducting this follow up study, in consultation with agencies.

4.0 STUDIES NOT PROPOSED

Two studies requested are not being proposed because either the study request is being addressed as part of one of the other studies or there is sufficient existing information with which to fully analyze Project effects on the resource.

4.1 Special DO Study

Downstream DO conditions will be monitored as part of the MDEP requested water quality study and therefore not proposed as a separate study.

In summary, the Cities of Auburn and Lewiston, AW, AMC, TU, and Grow L+A, requested in a joint study request letter dated December 30, 2021, that BWPH conduct a special DO level study to evaluate the effects of water releases over the falls on downstream DO (complete copies of the study request letters can be found in Attachment A). BWPH is not proposing to conduct a separate study to evaluate the effects of water releases over the falls on downstream DO and water temperature conditions for several reasons. First and foremost, as part of the Water Quality study BWPH is proposing to continuously monitor DO and temperature conditions in the river downstream of the Project dam. If there is spill or river flows that results in flow over the falls during the critical warm water July-August monitoring period, the effects of such spill/flow events on DO will be captured by the continuous monitor located downstream of the Project. Additionally, it is not clear that there is a need to monitor the effects of flows over the falls on downstream DO. If the proposed Water Quality Study demonstrates that DO in the tailwater area downstream of the Project dam and powerhouse conditions does not meet exiting water standards, the need for additional studies or potential mitigation measures can be considered at that time.

4.2 Size and Timing of Downstream Eel Migration

BWPH is not proposing an evaluation of the size of American eels and timing of their downstream migratory movements as a first year study.

In summary, MDMR in their letter dated January 5, 2022 (and received via email on January 13, 2022) requested BWPH conduct an evaluation of the size of American eels and timing of their downstream migratory movements at the Project. The approach recommended by MDMR requires a sampling location suitable for both active and passive monitoring of outmigrating eels. MDMR suggested passive sampling occur at a route which conveys a significant proportion of river flow, continuously monitored by a hydroacoustic array from mid-August to mid-December. Concurrent with that, active sampling should be conducted at an adjacent bypass sampler where

fish can be collected and confirmed to species to help validate acoustic targets. Complete copies of the study request letters can be found in Attachment A.

Since there is already existing information on eel size and timing of out-migration in Maine, BWPH proposes to rely on that existing knowledge base. Haro et al. (2003) characterizes the run timing of out-migrating American eels in Maine as occurring from early September to early November, with the peak occurring during September 15 and October 15. Shepard (2015), which is the most recent USFWS status review for the species, stated that eel migration in Maine occurs from August through October with peak passage in response to high river flows. In males, silvering happens at a typical size of about 350 to 400 millimeters (14 to 16 inches). In females, silvering happens at a size greater than 400 millimeters (16 inches) and may exceed 1 meter (39 inches), depending on latitude. Given the availability of previous study results, BWPH is not proposing a study to determine the seasonal timing or body size of outmigrating silver eels or the timing of outmigration of silver eels at the Project.

5.0 REFERENCES

Clark, James and Karen Mack. 2011. Results of Phase I Precontact Archaeological Survey of the Central Maine Power Company Lewiston Loop Project, Androscoggin County, Maine. Prepared for Central Maine Power. Report on file with the Maine Historic Preservation Commission, Augusta, Maine.

Haro, A. 2003. Downstream migration of silver-phase anguillid eels. Pages 215-222 in: Aida, K., K. Tsukamoto, and K. Yamauchi, eds. Eel Biology. Springer, Tokyo.

Shepard, S.L. 2015. American eel biological species report. U.S. Fish and Wildlife Service, Hadley, Massachusetts. xii +120 pages.

Whittaker, D. and B. Shelby. 2017. Flows and Aesthetics: A Guide to Concepts and Methods. Accessible at: https://www.hydroreform.org/sites/default/files/Flows%20and%20aesthetics--%20A%20guide%20to%20concepts%20and%20methods%202017_Final_web.pdf.

ATTACHMENTS

ATTACHMENT 1

CONSULTATION RECORD

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

December 22, 2021

Luke Anderson
Manager, Licensing
Brookfield Renewable
150 Main Street
Lewiston, ME 04240

RE: Comments on the Pre-Application Document and Requested Studies for the Lewiston Falls Hydroelectric Project (P-2302-099)

Dear Mr. Anderson,

On August 4, 2021, Brookfield White Pine Hydro (BWPH) submitted a Pre-Application Document and Notice of Intent to seek a new license for the Lewiston Falls project on the Androscoggin River, in Lewiston, Maine (Accession # 20210804-5115). On November 4, 2021 you held your Joint Agency Meeting.

We have reviewed the application and offer our comments and requested studies in our attachment.

If you have any questions, please contact me (978-281-9131 or christopher.boelke@noaa.gov).

Sincerely,

Christopher Boelke
Chief, New England Branch
Habitat and Ecosystem Services

cc: service list

National Marine Fisheries Service's Comments and Study Requests on Brookfield White Pine Hydro Power's Pre-Application Document for the Lewiston Falls Project (FERC No. 2302-099)

Based on our review of the Pre-Application Document (PAD) submitted by Brookfield White Pine Hydro Power Management (BWPH), we offer the following scoping comments, PAD comments, and study requests.

1 SCOPING COMMENTS

The National Environmental Policy Act (NEPA) review documents should include a cumulative effects analysis that analyzes the benefits of upstream and downstream safe, timely and effective passage at the project, as well as the costs of delaying restoration.

A cumulative effects analysis should be included in the NEPA analysis to evaluate the benefits of safe, timely and effective passage for American eel at the three downstream FERC licensed projects: Worumbo (P-3428) Pejebscot (P-4784) and Brunswick (P-2284).

As part of the balancing of non-power interests, the NEPA analysis should consider the benefits of safe, timely and effective passage for American eel and the costs associated with delaying the restoration of this species.

2 PAD COMMENTS

2.1 PAD SECTION 5.3.4 DIADROMOUS FISH SPECIES | ATLANTIC SALMON

The PAD discussed the 2016 Normandeau report that was conducted as a result of our 2013 Biological Opinion. The PAD does not mention the upstream hydropeaking operations that affect inflow to the project. As a run-of-river project, the projects passes the inflows it receives. The Androscoggin River near Auburn, Maine gage (USGS 01059000) provides an accurate depiction of the flows that are released from this project (Figure 1). The figure below shows the flow in the mainstem Androscoggin River downstream of the Lewiston Falls project that is also critical habitat for listed Atlantic salmon.

The figure shows that from approximately May 28th through June 20th 2020, a hydropeaking signal is apparent whereby flows are rapidly increasing and decreasing. All American shad, sea lamprey, American eel and Atlantic salmon that are in the mainstem Androscoggin River are subject to rapidly changing habitat conditions (e.g. velocity) as a result of rapidly changing flows that licensed projects upstream of Lewiston Falls are providing.

The final license application should state the nature of the inflows it receives from upstream projects, including the down ramping requirement that is in the Gulf Island license order (Accession # 20060823-3018) stating "the downramping of flows from the Deer Rips development from full generating flows to the required minimum flow shall be restricted to a rate no faster than linearly over 20 minutes".

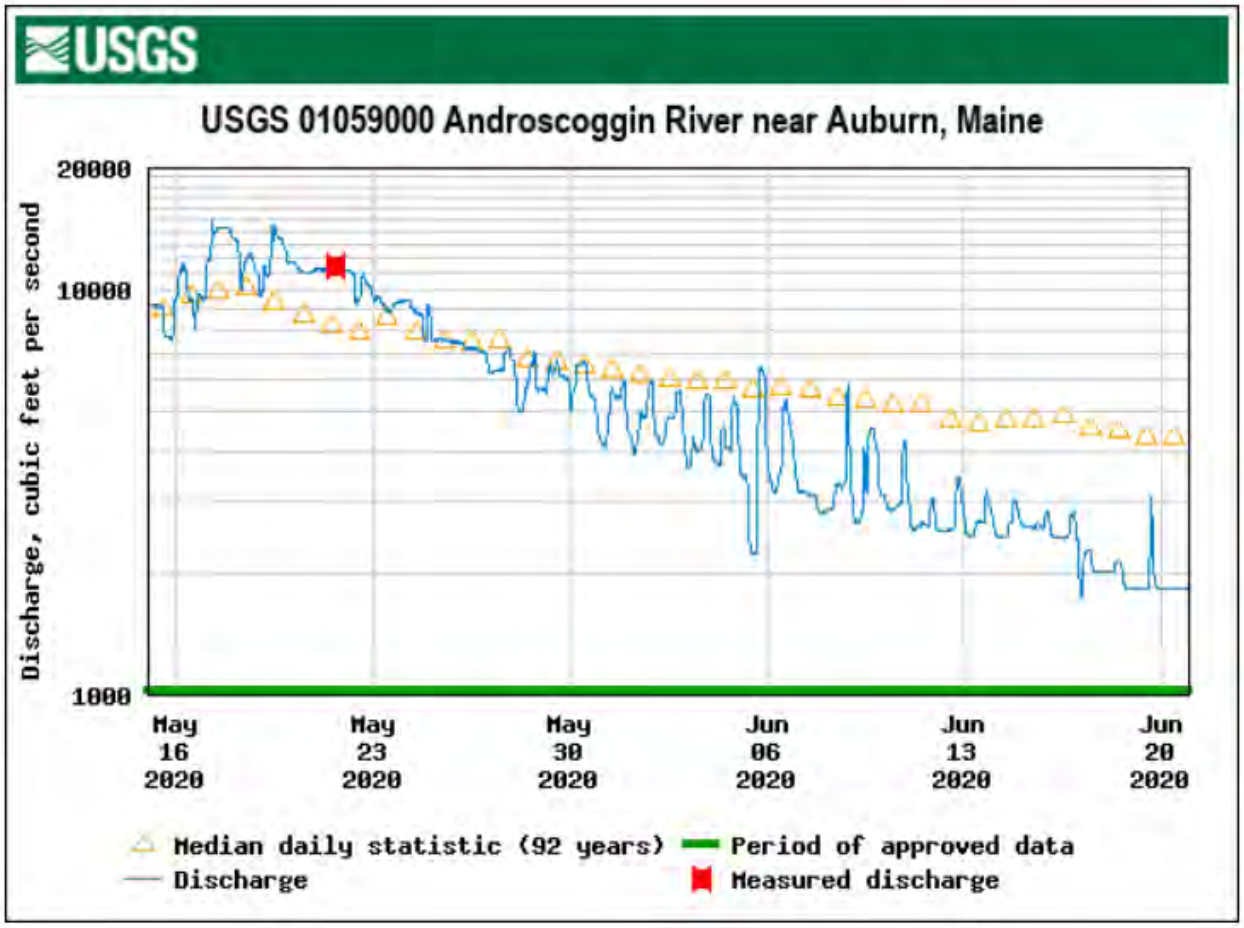


Figure 1. USGS 15-minute flow data for the Androscoggin River near Auburn Maine from May 16, 2020 to June 20, 2020. By May 30, inflows to the project were within the hydraulic capacity range of the Monty Station. Several flow reversals are imposed on the river over a naturally receding limb of the hydrograph.

The PAD references Yoder et al 2006 indicating the presence of American eel. We recommend that the Final License Application include Yoder et al. (2015), specifically the data that are included in this publication's Appendix that highlights the number of observed American Eel observed upstream of the project. We additionally recommend that the license applicant consult with the Maine Department of Inland Fisheries and Wildlife to obtain any geospatial data they have regarding the presence of this species upstream of the project.

Over the course of the new license for this project, we anticipate that American eel returns to the Lewiston Falls project will increase due to improvements made to the three federally licensed projects downstream of Lewiston Falls. The final license application should take into account resource agency involvement at these projects to improve upstream and downstream passage for American eel.

2.3 Section 5.3.2 Fish Resources and Habitats

The PAD provides eel count data in Tables 5-13 and 5-14 at the Brunswick Project (P-2284) and the Worumbo Project (P-3428). The PAD does not provide any of the data that Maine Department of Inland Fisheries and Wildlife has collected with respect to the presence of eels upstream of Lewiston Falls (MDIF&W personal communication)

2.4 General Comments

We recommend that the final license application include the following information:

- Clear width spacing of the existing trashrack
- Minimum hydraulic capacity of the Project's generating units
- The minimum flow of 1,430 cfs or inflow, whichever is less, applies to the flow through the powerhouse, not spill over the dam
- A record of when "refreshment" flows of 300 cfs in the canal system are expected to occur
- The length of free flowing river below the project, i.e. distance to the upstream extent of the Worumbo headpond.

3 Requested Studies

3.1 Three-dimensional computational fluid dynamics (CFD) modeling upstream and downstream of the discharge and in the vicinity of powerhouse Forebays.

1. Goals and Objectives

The goal of this study is to determine the flow field conditions that exist upstream of the project powerhouse and dams under existing condition and potential future conditions. The information from this study can be coupled with data from our other requested studies of downstream passage (Requested Study 3.3) to develop a comprehensive understanding of migratory fish behavior. The objective of this study is to develop a series of layered drawings that show velocity magnitudes at discharges that have been agreed upon by the resource agencies and the licensee. We request that the following three flow conditions be studied, at a minimum: a) river flow at powerhouse capacity, no spill; b) river flow at 50% powerhouse hydraulic capacity, no spill; and c) river flow at 20% exceedance on the May through October flow duration curve with the powerhouse operating at capacity and excess flow being spilled either through gates or over the spillway. The CFD modeling should also be conducted for at least these three aforementioned conditions for each alternative studied in the Downstream Fish Passage Alternatives Study. We expect the results demonstrate velocities and flow orientations upstream of the powerhouse and along the racks.

The goal of this study is to determine the potential impacts of the Lewiston Falls Project on: (1) the zone of passage for migratory fish near turbine discharge; and (2) natural flow regimes in the Androscoggin River immediately upstream and downstream of each project.

Specific objectives of the study include:

1. Develop a CFD model of the full width of the Androscoggin River upstream and downstream of each projects discharge.

2. Model flow characteristics upstream and downstream of the project under existing project operations and at several representative river flow levels, as well as any other modifications under

consideration (including potential future impacts to operations as a result of climate change), to assess potential impacts to fish and wildlife resources.

3. Assess velocities and flow fields at, and in proximity to each project's intake/discharge structure when generating, and their potential to (1) interfere with fish migration; (2) create undesirable attraction flows; and (3) result in fish entrainment and/or impingement.

4. Assess the potential for velocity barriers to aquatic organism movement in the mainstem river resulting from generation flows at each project, alone and in combination with generation flows from the other projects on the Androscoggin River.

5. Model, and then evaluate, flow characteristics under alternative project operations with potential measures to avoid, minimize, or mitigate impacts to fish and wildlife resources.

6. Define flow velocities, fields/magnitudes, and direction in front of each project's powerhouse.

2. Resource Management Goals

Resource management goals and plans are codified in our regulatory statutes. We rely on the best available data to support conservation recommendations and management decisions. This study is an appropriate request for the pre-application period. Minimizing mortalities of adult downstream migrating American Eel is consistent with our resource management goals for this species.

3. Public Interest

The requestor, NMFS, is a federal resource agency.

4. Existing Information and the Need for Additional Information

To date, no CFD modeled data exists in the project forebay. No existing information is available to evaluate the project's effect on downstream migrating anadromous species.

No project-specific information exists that will allow for a comprehensive assessment of existing project operations on Androscoggin River flows and on fish and aquatic organisms in the project areas upstream and downstream the Project. The Pre-Application Document does not contain any information, or tool(s), that will allow for predictions of impacts of alternative project operations, or potential mitigation measures to protect or enhance aquatic fish and wildlife resources. Further, a comprehensive understanding of fish behavior at each powerhouse forebay is needed to create safe, timely, and effective upstream and downstream passage for American Eel on the Androscoggin River. CFD models are a relatively cost-effective way to analyze existing and future conditions. As such, changes in the amount of attraction water, changes in which turbines are operating, and which spillway gates and rubber dams are releasing water can all be examined.

Modeling this information now can help the resource agencies, as well as the Applicant, account for potential drought and/or flood related scenarios that might occur during the duration of any newly issued license, due to climate change and other factors.

This information is necessary to properly assess the scale, and feasibility, of potential upstream and downstream passage alternatives (see the *Downstream Passage Alternatives* study request). The requested information can be utilized to create a more productive, cost-effective, and efficient alternatives analysis process by helping to narrow the focus to a minimal number of feasible alternatives.

5. Nexus to Project Operations and Effects

The Lewiston Falls Project has direct impacts to instream flows, aquatic habitats, and upstream and downstream migrating American eel in the Androscoggin River. The development of the requested CFD models will aid in determining the potential impacts of the Lewiston Falls Project and Project Facilities. For downstream passage, the U.S. Fish and Wildlife Service (FWS) has velocity vector guidelines associated with intake racks and guidance screens; the output from these models will inform the resource agencies under what conditions appropriate velocities are being met and when they are being exceeded. Additionally, modeling of flow will aide in our interpretation of year one downstream passage telemetry results. Therefore, aspects of the CFD modeling effort could focus on the locations identified as important in the study results and the Applicant could assess changes to structures of operations and evaluate them in the model. Suitable alternatives would then be tested in year three studies.

Downstream migrating fish are susceptible to injury or death by becoming entrained or being impinged on project structures while migrating downstream – a direct nexus to project-related effects. Results of this study will be essential for a complete understanding of the project's effects to downstream migrating anadromous fish and will be used to determine the necessity and scope of potential protection, mitigation, and enhancement measures for downstream migrants under Section 18 of the Federal Power Act.

6. Methodology Consistent with Accepted Practice

A three-dimensional CFD model has become an increasingly common standard of analysis at hydroelectric projects across the nation. FERC's study determination at Worumbo (Accession # 20210928-3001) approved this same requested study. In addition, we have seen these types of models developed at the Holyoke (P-2004), Brunswick (P-2284), Shawmut (P-2322), Milford (P-2534), and Weston (P-2325). We would expect to engage with the licensee in terms of determining the appropriate areas and flows to be modeled. We expect the spatial extent of the model at each study site will vary. Given the large number of ways in which output from these models can be presented and the near infinite number of flows which could potentially be modeled, we would expect to consult with the applicant to reach agreed upon modeling efforts and scenarios to be examined.

7. Level of Effort/Cost, and Why Alternative Studies Will Not Suffice

The cost of developing, running, and testing a CFD model can vary tremendously; one large variable in determining the cost is based on the amount of existing bathymetric data to which the Applicant currently has access. We estimate the maximum cost of the CFD model to be $50,000, assuming no bathymetric data currently exists. Proactive communication with resource agencies will reduce the cost and iterative effort. Given the level of effort that has occurred at other projects where licensees have proposed to amend their license, we see the level of effort requested here as reasonable, given that the Applicant is seeking a renewal of its license.

Regarding alternatives, no project-specific instream flow analysis tool has been developed for the Androscoggin River that will allow for assessment of existing operations and alternative operational impacts on instream flow and aquatic habitat for fish and wildlife resources. Further, the model, once built, can be used to simulate flow conditions in the vicinity of each project during the migratory fish passage season and can be used together with behavior studies (i.e., telemetry studies and entrainment studies requested herein) to assess the impacts of varying project operations or potential mitigation operations and measures on fish migration and aquatic habitat.

We know of no other tool that will provide for these types of assessments. No alternatives were proposed in the Pre-Application Document.

3.2 Upstream Juvenile Eel Assessment

Several recent studies have documented the presence of American eel above the Lewiston Falls Project in the Androscoggin River watershed. Dams, such as the Lewiston Falls Project, are known to impair migration success for catadromous species such as American eel (ASMFC 2014). Presently, upstream passage facilities specific to the needs of migrating juvenile eels are not available at the Project (or any of the dams that comprise the Project Facilities). Installing upstream eel passage at the Project will address direct project related impacts and facilitate restoration of American eel within the Androscoggin River watershed. The study request below is intended to provide data necessary to develop reasonable and prudent conservation measures, specifically safe, timely and effective passage for American eel.

If aspects of the project design or project operations changes with any new license, this study may need to be repeated.

1. Goals and Objectives

The goal of this study is to assess the locations for dedicated upstream passage for American eel.

The study has two objectives:

1. Conduct systematic surveys of eel presence/abundance below the A) four stone masonry sections (Dams No. 1, 2, 3, and 4), B) concrete dam section (Dam No. 5), C) the Island Spillway, D) the Powerhouse, E) the two gatehouse buildings (Main Gatehouse and Little Gatehouse), F) the lower gatehouses on the canal or other identified obstructions to passage on the bypass canal, and any other locations within the Project Facilities to identify areas of concentration of eels staging in pools or attempting to ascend wetted structures that would potentially establish the most effective location to place upstream eel passage facilities.

2. Collect eels with temporary trap/pass devices at areas identified from surveys as potential location of eel concentrations to assess whether eels can be collected/passed in substantial numbers, and whether locations are viable sites for permanent eel trap/pass structures.

2. Resource Management Goals

We developed the Androscoggin River Watershed Comprehensive Plan for Diadromous Fish in 2020 (Accession # 20200414-5171) which was the Commission accepted as a comprehensive plan (Accession # 20200618-3041). The comprehensive plan states:

> "The restoration goals for the Androscoggin River Watershed are to provide access to historical spawning, rearing, and migration habitats necessary for diadromous species to complete their life cycles and to make accessible seasonal habitats necessary to support the enhancement of the stocks." The comprehensive plan also notes that the "restoration approach for American eel includes installing and maintaining upstream eel ways at hydroelectric facilities within the Androscoggin River Watershed."

The Atlantic States Marine Fisheries Commission (ASMFC) has developed three documents related to the management of American eel and hydropower facilities:

1. Interstate Fishery Management Plan for American Eel. April 2000. Atlantic States Marine Fisheries Commission.

2. Addendum II to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved October 23, 2008. 8 pp.

3. Addendum III to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved August 2014. 19 pp.

Objectives of the management plan include: (1) protect and enhance American eel abundance in all watersheds where eel now occur; and (2) where practical, restore American eel to those waters where they had historical abundance, but may now be absent, by providing access to inland waters for glass eel, elvers, and yellow eel, and adequate escapement to the ocean for pre-spawning adult eel. Addendum II contains specific recommendations for improving upstream and downstream passage of American eel, including requesting that member states and jurisdictions seek special consideration for American eel in the Commission's relicensing process.

Based on these plans, we seek the accomplishment of a number of resource goals and objectives through the relicensing process for the project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the project.

Specific to upstream passage of American eel, our goals are:

1. Minimize current and potential negative project operational effects that could hinder management goals and objectives.
2. Minimize project-related sources of upstream passage delay, injury, and stress in order to facilitate access to historical rearing habitat.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

3. Public Interest

The requestor, NMFS, is a federal resource agency.

4. Existing Information and the Need for Additional Information

The PAD does not provide information relative to areas eels concentrate below the Lewiston Falls Projects or an assessment of the numbers and size of eels attempting to ascend each facility. Data from this study will provide information in support of the licensing process and in developing the administrative record for potential mitigation measures under Section 10(j) of the Federal Power Act.

The documented presence of adult eels upstream of this project indicates that juveniles are able to find routes of passage past the project. However, the efficiency and delay of whatever routes of passage are taken is currently unknown. We do not have any information that relates to the total number of eels attempting to pass the Project and the proportion successfully passing the Project,

These information gaps need to be filled so resource agencies can determine the best locations to site upstream eel passage facilities.

5. Nexus to Project Operations and Effects

The project generates hydropower on the head created by the project's dam. This dam creates a barrier to upstream migrating eels. While some eels are able to pass dams, some are not, and the passability of a given dam depends on factors such as its height, hydraulics, presence of climbable surfaces, presence of predators, risk of exposure to heat or drying while climbing a dam, etc. The PAD refers to the project having five dams and the maximum height is 23 feet. The inflatable crest bladders lead to the dam face can be dry during the upstream eel passage season. Therefore, the design of the dam is not currently amenable to passage of eels by climbing and no passage criteria for American eel are currently met.

6. Methodology Consistent with Accepted Practice

This study request consists of two parts: (a) an initial survey for presence and identification of areas where juvenile eels congregate and (b) a site evaluation for permanent eel passage. The methodologies described here are consistent with commonly accepted practices.

1. Objective 1: Systematic Surveys

   Surveys of eel presence and relative abundance should be conducted at regular intervals (as described below) throughout the eel upstream migratory season (approximately April 1 to November 30). Surveys should consist of visual inspection and trapping in areas where eels may concentrate. Areas of quiescent water and leakage points along the downstream face of the dams should be targeted. Methods should include visual surveys (on foot, from a boat, or snorkeling) and trapping using small mesh (< 1/8" clear opening) baited eel pots. Visual surveys should be performed once per week, at night, preferentially during precipitation events. Trap sets should be performed once per week, with an overnight soak time. Recorded data should include location, observation of eels (presence, absence, relative numbers, relative sizes, behaviors, time/date of observation), and survey method.

2. Objective 2: Trap/Pass Collections

   Areas identified from the systematic surveys as having substantial number of eels present should be targeted as potential areas for permanent eel trap/passes and should be initially assessed using temporary/portable trap passes. Temporary trap/passes should be purpose-designed and built for each location and operated throughout the eel upstream migratory season in the year following the survey. Ramp-type traps with supplementary attraction flow are preferred temporary trap/pass designs (Solomon and Beach 2004). Traps should operate daily, with catches quantified every 2-3 days. Data recorded should include location, trapping interval, absolute numbers of eels trapped, relative eel sizes, and hydraulic and environmental conditions during the trapping period.

   All collected eels from surveys should be released at their point of capture; those eels collected from trap/pass collections should be transported to and released above each respective dam.

7. Level of Effort/Cost, and Why Alternative Studies Will Not Suffice

The level of cost and effort for the survey component of the study would be low; a minimal number of personnel may be able to conduct the weekly surveys. The trap/pass component would require

low to moderate cost and effort. We estimate the cost will be $50,000 for the study. No alternatives are proposed.

3.3 Downstream American Eel Passage Assessment

1. Goals and Objectives

The goal of this study is to determine the impact of the Lewiston Falls hydroelectric projects on the outmigration of silver American eels in the Androscoggin River. Entrainment into the turbines can result in mortality or injury. It is important to understand the passage routes at the project and the potential for delay, injury, and mortality to assess alternative management options to increase survival.

The objectives of this study are:

- Quantify the movement rates (including delays) and relative proportion of eels passing via various routes at the projects (i.e., through the turbines, through the downstream canal system and spill at the dam.
- Evaluate instantaneous and latent mortality and injury to eels passed via each potential route.

2. Resource Management Goals

We developed the Androscoggin River Watershed Comprehensive Plan for Diadromous Fish in 2020 (Accession # 20200414-5171) which was the Commission accepted as a comprehensive plan (Accession # 20200618-3041). The plan states:

> "The restoration goals for the Androscoggin River Watershed are to provide access to historical spawning, rearing, and migration habitats necessary for diadromous species to complete their life cycles and to make accessible seasonal habitats necessary to support the enhancement of the stocks."

The comprehensive plan also notes that "downstream protection measures and bypasses are necessary at hydroelectric facilities, as turbine mortality is a significant threat to pre-spawn silver eels (Shepard 2015, ASFMC 2013)."

The Atlantic States Marine Fisheries Commission (ASMFC) has developed three documents related to the management of American eel:

- Interstate Fishery Management Plan for American Eel. April 2000. Atlantic States Marine Fisheries Commission.
- Addendum II to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved October 23, 2008. 8 pp.
- Addendum III to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved August 2013. 19 pp.

Objectives of the management plan include: (1) protect and enhance American eel abundance in all watersheds where eel now occur; and (2) where practical, restore American eel to those waters where they had historical abundance, but may now be absent, by providing access to inland waters for glass eel, elvers, and yellow eel, and adequate escapement to the ocean for pre-spawning adult eel.

Addendum II contains specific recommendations for improving upstream and downstream passage of American eel, including requesting that member states and jurisdictions seek special

consideration for American eel in the Federal Energy Regulatory Commission relicensing process.

We seek the accomplishment of several resource goals and objectives through the relicensing process for the project. General goals include the following:

- Ensure that protection, mitigation, and enhancement measures are commensurate with project effects and help meet regional fish and wildlife objectives for the basin.
- Conserve, protect, and enhance the habitats for fish, wildlife, and plants that the projects continue to affect.

Specific to downstream passage of American eel, our goals are:

- Minimize current and potential negative project operation effects that could hinder management goals and objectives.
- Minimize project-related sources of downstream passage delay, injury, stress, and mortality to maximize the number of silver eels migrating to the spawning grounds.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq*.), and the Federal Power Act (16 U.S.C. §791a, *et seq*.).

3. Public Interest

The requestor, NMFS, is a federal resource agency.

4. Existing Information and the Need for Additional Information

To date, no directed studies of eel entrainment or mortality have been conducted with complete results at the Lewiston Falls project. Significant information gaps regarding project impacts to downstream migrating eels exist. This information is needed for natural resource agencies to assess the relative and cumulative impacts of project operations on outmigrating eels and develop adequate passage and protection measures to meet management goals and objectives.

5. Nexus to Project Operations and Effects

The project configurations present problems with respect to providing safe, timely and effective passage for outmigrating eels. The intakes are deep and the trashrack have 3-inch spacing which are unlikely to prevent entrainment of eels given that eels tend to move much deeper in the water column than other surface oriented downstream migrants. Eels are known to occur upstream of the dam; therefore, it is necessary to understand how eels move through the project and the level of injury and/or mortality caused by entrainment through the projects' turbines.

6. Methodology Consistent with Accepted Practice

In order to understand the movements of outmigrating silver eels as they relate to operations at the Project, radio telemetry technology should be utilized. Radio telemetry is an accepted technology that has been used for several studies associated with hydropower projects, including the 2018 downstream eel passage study at West Enfield (P-2600) (Accession # 20180213-5378) and others (Bellows Falls (FERC No. 1855), Wilder (FERC No. 1892), and Vernon (P-1904) Projects).

Studies should be designed to investigate route selection (i.e., entrainment vs. spill vs. fishway vs. downstream bypass) independently from estimation of mortality/injury, because these metrics require different telemetric methodologies. Studies will also likely benefit from data collected over two study years (especially route selection studies, which may be more significantly affected by environmental conditions during a given season than mortality/injury studies). It is also envisioned that results from route selection studies can guide design of turbine mortality studies. Therefore, it is proposed, at a minimum, route selection studies be conducted in multiple years, but mortality/injury studies may be conducted after the first year of route selection studies have been completed.

Objective 1: Route Selection

This study will involve systematic releases of radio-tagged silver phase eels above the Project, to assess general routes of passage (i.e., via spill, canal, or turbines). Active downstream migrants should be collected within-basin, if possible, but fish sourced from out of basin may be acceptable to meet sample size demands. Experimental fish must meet morphometric (e.g., eye diameter relative to body size) criteria to ensure they are migrant silver phase. Collections should be made within the migratory season (late August to mid-October), and eels should be tagged and released within 21 days after capture, but preferably within seven days (particularly if the test eels are from out-of-basin).

A minimum number of 150 telemetered eels (e.g., five separate groups of approximately 30 eels each) will be required to maximize the data return. Tagged eels should be released at least 5 km upstream of the Project. Groups of eels should be released during spill (if any) and non-spill and during periods of low, moderate, and high generation conditions. All operational measures during these releases must be documented included releases from the gatehouse into the canal system. Additionally, since fish can drift a considerable distance downstream after they have died (Havn et al. 2017); a minimum of 25 dead eels should also be released as a control group in this study.

Telemetry receivers and antennas should be located upstream and downstream of the each section of the dam, upstream and downstream of the Main Gatehouse, above and below the decommissioned generation facilities in the canal system at turbine intakes, the station tailrace, downstream of the confluence of the Androscoggin River and the canal system, and downstream of the Brunswick Project (FERC No. 2284). These locations will permit assessment of passage via the following potential routes: A) four stone masonry sections (Dams No. 1, 2, 3, and 4), B) concrete dam section (Dam No. 5), C) the Island Spillway, D) the Powerhouse, E) the Main Gatehouse, and F) the lower gatehouses on the canal or other identified obstructions to passage in the bypass canal. While the canal system is no longer part of the Project facilities, water is released through the Main Gatehouse and creates the potential for adult eels to migrate via this route. The final placement of receivers and antennas should be developed in consultation with the fisheries agencies.

Mobile tracking (i.e., via boat or streambank) in the river and canal between release sites and several kilometers downstream will be performed at regular intervals during and after releases to confirm routes and fates of passed fish or lost fish.

Movement rates (time between release and detection at radio antenna locations, and between additional radio antenna locations) of eels passing the projects by various routes will also be quantified.

The route selection portion of this study should occur in both study years to capture variation in flow and spill conditions at the Project facilities.

Objective 2: Spill, Bypass, and Turbine Mortality/Injury Studies

Spill, gatehouse/canal, and turbine mortality will be assessed using a radio-telemetric balloon tag method. A minimum number of 70 tagged eels will be required to assess impact of relevant project facilities: one group of 30 eels to assess passage via spill at each section of the dam, a separate group of 20 eels to assess the Main Gatehouse and canal system, and a final group of 20 eels to assess turbine passage at the project.

For non-turbine mortality sites (spill, canal), tagged eels will be injected or released into spill flow at points where water velocity exceeds 10 ft/sec to minimize the possibility of eels swimming upstream into the headpond or canal. Passed balloon-tagged eels will be recovered below areas of spill and held for 96 hours in isolated tanks for observation of injury and latent mortality; any injuries or unusual behavior should be noted, unrecovered balloon-tagged eels will be censored from the data.

For turbine mortality, tagged eels will be injected into intakes of units operating at or near full generation at points where intake water velocity exceeds 10 ft/sec to minimize the possibility of eels swimming back upstream through the intakes. Passed balloon-tagged eels will be recovered in the tailrace and held for 96 hours in isolated tanks for observation of injury and latent mortality; unrecovered balloon-tagged eels will be censored from the data.

X-ray imaging should be used to assess internal injuries of recovered balloon-tagged eels. Mueller et al. (2020) demonstrated that 29 percent of individuals with vertebral fractures did not present externally visible signs of severe injury and x-ray imaging showed that skeletal fractures were most pronounced for eel. Therefore, this method will ensure accurate documentation of injuries sustained during passage.

If the balloon-tag mortality component of the study occurs in study year one, all route selection sites would need to be evaluated. If the balloon-tag mortality component of the study occurs in study year two, results from the route selection study could be used to inform which sites need to be evaluated for mortality. Eels recovered from balloon tag studies should not be used for route selection studies.

Data analyses of route selection and turbine mortality (instantaneous and latent) will follow standard methodology.

Project operation (flows, levels, gate openings, number of units operating and operation level) and environmental conditions (river flow, temperature, turbidity, air temperature, precipitation) will be monitored regularly (hourly measurements if possible) throughout the duration of the studies.

These methodologies are consistent with accepted practice.

7. Level of Effort/Cost, and Why Alternative Studies Will Not Suffice

The level of cost and effort for the downstream eel passage study would be moderate to high; silver eels would need to be collected, tagged, and released in several locations over the course of the migration season. Antennas and receivers would need to be installed at various locations at the Project and monitored regularly. Data would need to be retrieved periodically, then analyzed. A multi-site route selection study conducted by the USGS Conte Lab on the Shetucket River in

Connecticut cost approximately $75,000 for the first year of study. Costs are estimated at $100,000 per year for the route selection studies and $75,000 per year for the spill, bypass, canal, and turbine mortality/injury studies although it may be less since this is a single-site study.

3.4 FEASIBILITY OF CONVERTING THE PROJECT TO A FLOW REREGULATION PROJECT

1. Goals and Objectives

The goal of this study is to determine if it is feasible to manage the headpond and project operations to reduce the influence of peaking received inflows on outflows of the project. The outcome of this study would be one or several operational plans that will reduce the artificial flow regime characterized by sudden increases and decreases in flow.

The objectives are the following

- When project inflows are within the range of minimum and maximum hydraulic capacity of the project, determine if 1,600-acre feet of headpond storage and four feet of allowed headpond fluctuation can reregulate received inflows
- Evaluate whether battery storage could aid in the reregulation of flows to offset generation losses from reregulating flows

2. Resource Management Goals

Dams disrupt the natural characteristics and ecological integrity of rivers (Juracek, 2016). Figure 1 in the comments above indicate a departure from the natural flow regime which is essential for providing the diversity of habitat conditions required to maintain the ecological integrity of rivers. (Poff et al. 1997).

NMFS is a federal resource agency with a mandate to protect and conserve fisheries resources and associated habitat. Resource management goals and plans are codified in our regulatory statutes. We rely on the best available data to support conservation recommendations and management decisions. This study is an appropriate request for the pre-application period.

The Androscoggin River downstream of Lewiston Falls is listed as critical habitat for Atlantic salmon. American shad, river herring, sea lamprey and American eel are all present in the Androscoggin River downstream of Lewiston Falls and use this section of the river as migratory habitat.

The goal of this study is to determine if operational changes to the Project can improve the overall aquatic habitat of the Androscoggin River by dampening the effects of upstream hydropeaking projects, reducing the flashiness and number of flow reversals.

3. Public Interest

The requestor, NMFS, is a federal resource agency.

4. Existing Information and the Need for Additional Information

The PAD states that the Lewiston Falls impoundment is approximately 2.5 miles long, covers an area of 200-acres and has a gross storage volume of 1,600-acre-feet at the full pond elevation. In addition, the Project is licensed to operate with up to four feet of impoundment fluctuation. The PAD does not state the downramping restriction for the Gulf Island-Deer Rips Project (P-2283), which directly relates to the inflow rate to the Lewiston Falls headpond.

The 2016 Flow Demonstration study showed that all four transects downstream of the project fluctuated by approximately 2.5 feet as flows in the mainstem Androscoggin River went from allowed project minimum flow to maximum hydraulic capacity of the Monty Station at 6,600 cfs. We reviewed the station, depth and velocity measurements made at Transects 1-4 and calculated discharge at each of these transects under the minimum flow and maximum generation conditions. We acknowledge the limitations of the equipment to measure velocity in the deep pool at Transect 3 and do not include it our summary below.

Scenario	**T1**	**T2**	**T4**
Minimum Flow (cfs)	1,652	2,545	3,849
Maximum Generation (cfs)	9,088	8,306	6,178
Delta in scenario	7,436	5,761	2,329

These data indicate that at Transect 1, the difference in flows conditions was in excess of 7,400 cfs whereas at Transect 4, the difference was less than 2,400 cfs. Based on these differences, the depth and velocity comparisons that were presented should be reconsidered. We do not know the depth and velocity fluctuations that fish in the river experience between the required minimum flow and maximum generation capacity in the mainstem Androscoggin River below the project. We do know, however, that depth and velocity can rapidly change in the mainstem Androscoggin River which in turn is rapidly changing the habitat characteristics for our trust species that are using the river as a migration corridor to get to spawning habitat.

The modeling effort in (Olivares et al. 2021) suggests that re-regulation reservoirs can significantly reduce the flashiness of a river. The information derived from this study request is necessary to determine if the Lewiston Falls headpond can be operated in such a way as to reduce the flashiness and overall habitat of the Androscoggin River downstream of the project.

An understanding of ways the project can feasibly change to a reregulation project so that rapid changes in outflow are not imposed on Atlantic Salmon Critical Habitat downstream of the project is important. Changes in depth and velocity can limit the amount of persistent habitat that remains intact between two flow conditions. These results were evident in the persistent habitat analyses that were conducted at the Turners Falls Project (P-1889) (Accession # 20161017-5012).

5. Nexus to Project Operations and Effects

A clear nexus exists between project operations, downstream releases, and aquatic habitat (e.g., depth and velocity) in the mainstem Androscoggin River. The project's headpond has a volume of 1,600-acre feet and the project is allowed to fluctuate the headpond by up to four feet. Trust species are using the Androscoggin River as migratory habitat to swim to spawning habitat. The literature review in Olivares et al. (2021) points out several hydropeaking impacts including stranding of juvenile fish.

Improved flow releases from the project have the potential to improve upstream migration conditions for Atlantic salmon, river herring, American shad and sea lamprey that use the fishways at Brunswick, Pejebscot and Worombo.

6. Methodology Consistent with Accepted Practice

McManamay et al. (2016) would classify the Lewiston Falls project as a run-of-river/upstream peaking project. The methods in this study request will determine the ways in which the project

can feasibly be converted to a reregulating project whereby the received inflows are reregulated to diminish the upstream peaking signal.

The licensee should use the U.S. Army Corps of Engineers Hydrologic Engineering Center's HEC-ResSim to develop an existing condition model[1]. After that model is developed, the licensee should develop models that evaluate reregulation scenarios that the Lewiston Falls project is operationally capable of executing. The 2016 Flow Demonstration Study indicated that water surface elevations below Lewiston Falls rose approximately 2.4 feet as the project went from the minimum flow condition to maximum hydraulic capacity. The HEC-ResSim model should develop scenarios whereby the change in downstream water surface elevations from minimum to maximum hydraulic capacity is reduced on a sub-daily basis. The input and output should use hourly data. The developed metrics should be based on those developed in Zimmerman et al. (2010) for existing conditions and reregulated conditions:

- Richards-Baker Flashiness Index
- Number of Reversals
- Percent of Total Flow
- Coefficient of Diel Variation

The licensee should review the costs and benefits of installing battery storage. Installation of a battery, such as what was proposed at the Bonny Eagle project (P-2529), could yield an increase in revenue from the ISO real time energy market as well as from the capacity market. The study should review the potential revenue gains and how the installation of a battery could allow the headpond to serve as a means to reregulate the received inflows.

7. Level of Effort/Cost, and Why Alternative Studies Will Not Suffice

The level of effort of a study of this type is commensurate with a project that has an installed capacity of 28.44 MW. HEC-ResSim is a standard piece of software for dam owners to evaluate different operational release regimes. Brookfield Renewable Energy Group filed a non-capacity license amendment for the Bonny Eagle Project indicating that it is fully capable of conducting a cost benefit analysis for this type of technology (Accession # 20210323-5253).

Federally licensed hydropower projects upstream of Lewiston Falls are allowed to operate as hydropeaking facilities. The mainstem Androscoggin River downstream of Lewiston Falls is listed Critical Habitat for Atlantic salmon. This study is necessary in order to determine if Lewiston Falls can reregulate its received inflows for the term of the new license. Other alternative studies will not determine if the observed two and half feet of observed water surface elevation fluctuation downstream of the project can be diminished (Accession # 20160329-5151).

4 REFERENCES

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[1] Software is available for download from the U.S. Army Corps of Engineers Hydrologic Engineering Center here: https://www.hec.usace.army.mil/software/hec-ressim/downloads.aspx

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United States Department of the Interior

NATIONAL PARK SERVICE
REGION I Northeast Appalachian
15 State Street
Boston, Massachusetts 02109-3572

January 3, 2022 Filed Electronically ER 21/0398

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Comments on Pre-Application Document and Support for Study Requests for Lewiston Falls Hydroelectric Project FERC#2302

Dear Secretary Bose,

The National Park Service (NPS) offers the following comments on the PAD, as well as support for requests for studies filed with FERC.

Study Requests

The NPS supports and concurs with the study requests[1] and proposed methodologies included in the Study Requests submitted by the City of Auburn, City of Lewiston, American Whitewater, Appalachian Mountain Club, Grow LA, Maine Council of Trout Unlimited dated December 30, 2021.[2]

hydroelectric facility located atop the dramatic 37-foot Lewiston Falls, also known as Great Falls, which is a character defining resource located within the center of the second largest metropolitan area in the State of Maine. Trail networks, overlooks and a large hotel have been located with a focus on the falls within the last 20 years of the current license. Blocks through paddling (Source to the Sea). There is currently no formal portage, as acknowledge during the Joint Agency and Public Meeting / Virtual Site Visit conducted on November 4, 2021. In addition, it was noted at that same meeting that since the opening of the Charles E. Monty Station in 1990, flows over Great Falls have been reduced by roughly 2/3 in terms of times, duration, and magnitude.

The Aesthetic Study (Request #1) and the River Access and Recreational Flow study (Request #2) should include an evaluation and identification of a safe and efficient portage route around the project dam. The identification of a new portage should be done in consultation between the applicant and all applicable stakeholders, including RAs, NGOs, the public and the host municipalities.

[1] Study request #1: Aesthetic study, Study Request #2: Study request #2: River Access and Recreational Flow study.
[2] See also the comments of the Maine Bureau of Parks and Lands (BPL), dated December 23, 2021.

The dam is an important, but currently missing link in the Androscoggin River Trail as noted in the PAD at 5-116. That water trail http://www.androscogginwatershed.org/androscoggin_river_trail_home.html extends the full length of the river, from Umbagog Lake in New Hampshire to Merrymeeting Bay. The current take out above the dam and put in below are roughly one mile apart on a public road with no designated or formalized signage or marking to assist through paddlers. The Source to the Sea trip continues to be enjoyed by paddlers annually.

However, designated portage trails exist around the Gulf Island - Deer Rips Project (P-2283) located upstream of Great Falls, a requirement their current license. Established portage routes also exist downstream at Worumbo (P-3428), Pejepscot (P-4784), and Brunswick (P-2284). The portage at Brunswick is comparable to the situation at Lewiston where the route between the take-out and put-in is through a developed urban setting. The marked portage route follows Brunswick city sidewalks.

Some elements of the studies requested by the National Marine Fisheries Service (NMFS letter filed with FERC on December 22, 2021) could potentially be integrated with the aesthetic flow study and river access/recreational studies, potentially reducing the aggregate costs.

A thorough evaluation of recreational use and opportunities in the project area should also consider a critical element for the residents of Lewiston, Auburn, and the surrounding area, and identify appropriate mitigation to assess and address the needs of the local community. As noted in the City of Auburn et al filing:

Any mitigation must first and foremost meet the needs of the immediate community. The poverty rate for Lewiston is 19.5%, nearly double the state rate. Forty percent of downtown residents do not own a car, and therefore do not have access to the river at distant locations. Many cannot afford specialized recreation equipment. Similarly, 46% of Auburn residents qualify for public assistance due to their income levels. These qualifying households are largely located within a 1-mile area surrounding the project and many depend on walking and public transit to access recreational opportunities along the Androscoggin River.

The NPS appreciates the opportunity to provide comments and offer concurrence with pending Study Requests. Any questions should be directed to Kevin Mendik at kevin_mendik@nps.gov or by phone at 6173203496.

Sincerely,

Kevin R. Mendik
Hydro Program Manager, NPS
DOI Region 1 Northeast Appalachian

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Eastern Regional Office
545 Marriott Drive, Suite 700
Nashville, Tennessee 37214

December 10, 2021

IN REPLY REFER TO:
Branch of Natural Resources

Luke Anderson
Manager, Licensing
Brookfield White Pine Hydro, LLC
150 Main Street
Lewiston, Maine 04240

Dear Mr. Anderson:

The Bureau of Indian Affairs (BIA) is filing in response to the request for studies for Lewiston Falls Hydroelectric Project (FERC Project No. 2302). In coordination with the Penobscot Nation Tribal Historic Preservation Officer, we request a cultural resources study of the project area. There are archaeological sites within the APE, and we have concerns the sites may be impacted by water level fluctuations within the impoundment.

Should you have any questions, please feel free to contact Mr. Harold Peterson, Natural Resources Officer, at 615-564-6838.

Sincerely,

KIMBERLY BOUCHARD
Digitally signed by KIMBERLY BOUCHARD
Date: 2021.12.13 14:35:54 -06'00'

Kimberly A. Bouchard
Regional Director

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

January 3, 2022

Mr. Luke Anderson
Brookfield Renewable for
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Subject: FERC No. 2302 – Lewiston Falls Hydroelectric Project
Pre-Application Document Comments
Study Request Submission

Dear Mr. Anderson:

The Maine Department of Environmental Protection (Department or MDEP) has received and reviewed the Notice of Intent to File License Application and Pre-Application Document (PAD), submitted on behalf of Brookfield White Pine Hydro (BWPH) on August 4, 2021. The PAD was submitted for the Lewiston Falls Hydroelectric Project (Project) (FERC No. 2302), located on the Androscoggin River in the Towns of Lewiston and Durham in Androscoggin County, Maine.

The proposed relicensing is subject to Water Quality Certification provisions of Section 401 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act). By Executive Order of the governor of the State of Maine, the Maine Department of Environmental Protection is the State certifying agency for projects located wholly or in part in organized towns and cities, and as such, has jurisdiction over the Lewiston Falls Hydroelectric Project. BWPH requested and was authorized to use the Traditional Licensing Process (TLP).

Project Description

The Project consists of a dam comprised of four stone masonry sections, a concrete dam section, and an island spillway; a 200-acre impoundment; a powerhouse near the east end of Dam #4 containing two turbine/generators; two gatehouse buildings; electrical connections; and appurtenant facilities. The Project impoundment has a normal maximum surface area of 200 acres at a full pond elevation of 168.17 feet msl. A 1.34 -foot-high flashboard system is installed on the dam crest of the concrete dam (dam #5), a split rubber bladder is installed on Dam #4, and a single rubber bladder is installed on each of Dams #1, 2, and 3. The Project has a normal pond elevation of 168.17 feet, with negligible useable storage when operated in run-of-river-mode.[1] The powerhouse is located at the east end of the falls and contains two vertical Kaplan turbine/generators with a combined FERC authorized rating of 36.354 MW.

[1] The PAD indicates that the Project is licensed to draw down up to four feet of impounded water but that the Project typically operates as a run-of-river facility with impoundment fluctuations limited to one foot or less.

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Comments on PAD

The Department appreciates the effort that BWPH and their consultants have made to prepare the PAD. The PAD provides an understanding of the project, the surrounding resources, and proposed Project operation. The PAD also provides information from which issues related to relicensing can be readily identified. The Department understands that no changes to Project operations are proposed. After review of the available documents, the Department has the following comments on the PAD:

1. **Section 3.3 Existing Operations** discusses Project operation coordination with the upstream Gulf Island-Deer Rips Project. In this section, the licensee states that the impoundment has no appreciable storage capacity and that the Project operates as a run-of-river facility with impoundment fluctuations of one foot or less on a daily basis. However, the PAD goes on to say that the Project is licensed to operate with up to four feet of impoundment fluctuation to allow adjustments between inflow and minimum flow requirements, or in response to operating emergencies. The Department notes that a Project cannot be operated as a run-of-river facility and also have an allowable fluctuation of four feet; run-of-river means inflow equal to outflow, with fluctuations one foot or less. Project descriptions provided in the PAD are inconsistent with accepted descriptions of the operational mode and the correct definition of proposed operations should be used. The Project operations should be clarified as run-of-river, store and release, or re-regulating.

2. **Section 4.3.2.3 Existing Water Quality Data** references water quality monitoring data that was collected in the impoundment and downstream of the Project by the Licensee and others to monitor water quality in the lower Androscoggin River. Studies that collected water quality data pertinent to water quality standards and the Project area include
    - Lewiston Falls Project Article 402Post-Operational Water Quality Monitoring (1990-1994);
    - Center for Applied Bioassessment & Biocriteria (CABB) 2002-2003 study on thew Spatial and Relative Abundance Characteristics of the Fish Assemblages in Three Maine Rivers;
    - MDEP 2011 Lower Androscoggin River Basin Water Quality Monitoring Study Modeling Report;
    - MDEP Volunteer River Monitoring Program (VRMP); and MDEP Dioxin Monitoring Program (DMP) and Fish Consumption information.

    The PAD discusses each of these datasets and concludes that based on its review, the Project meets Class C water quality classification standards, however it is not clear that the studies were conducted in accordance with the Department's Sampling Protocol for Hydropower Studies, or that the data reflects current conditions. The Applicant proposes and the Department supports conducting water quality studies to support this current relicensing, in consultation with the Department and other resource agencies to

demonstrate that current water quality conditions in the impoundment and in the tailrace meet water quality standards. As discussed below in the Water Quality Certification Data Requirements section, the Department requires several studies to demonstrate attainment of Maine Water Quality Standards in the Project area.

Water Quality Classifications and Standards

Water Quality Standards and the water quality classifications of all surface water of the State have been established by Maine Legislature (Title 38 M.R.S. §§ 464-468). The following classification applies to the waters affected by the Lewiston Falls Project:

"Androscoggin River, main stem, including all impoundments, from its confluence with the Ellis River to a line formed by the extension of the Bath-Brunswick boundary across Merrymeeting Bay in a northwesterly direction - Class C."[2]

Class C waters must be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing, agriculture, recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation[3], navigation, and as a habitat for fish and other aquatic life.

The dissolved oxygen content of Class C waters may not be less than 5 parts per million or 60% of saturation, whichever is higher, except that in identified salmonid spawning areas where water quality is sufficient to ensure spawning, egg incubation and survival of early life stages, that water quality is sufficient for these purposes must be maintained.

Discharges to Class C waters may cause some changes to aquatic life, except that the receiving waters must be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.

MDEP is aware of a proposed bill to the State Legislature which is an act to reclassify a section of the Androscoggin River to Class B[4]. The proposed legislation may impact the reach of the Androscoggin River in which the Lewiston Falls Project resides and may cause a change in water quality standards. Further, a proposal for upgrade to Class B is currently before the Board of Environmental Protection, which views the proposed change favorably. Therefore, classification of the Androscoggin River may change during the relicensing of the Lewiston Falls Project, and so MDEP recommends that, when conducting the studies outlined below, BWPH consider the results of the water quality studies in accordance with both Class C and Class B Water Quality Standards and water quality classifications.

Water Quality Certification Data Requirements

[2] Title 38 M.R.S. §467(1)(A)(2)
[3] Except as prohibited under Title 12, section 403.
[4] http://legislature.maine.gov/LawMakerWeb/summary.asp?ID=280079141

Water quality studies in the impoundment and tailrace reaches are typically required to evaluate compliance with Maine Water Quality Standards before the Department issues a water quality certification for a hydropower Project. It has been the Department's practice to determine the metrics, methods, timing, and duration of water quality monitoring necessary to ensure that the water quality studies meet data quality objectives. The Department requests that the Applicant conduct water quality studies that include the following parameters, and that adhere to the Department's established sampling protocols in support of water quality certification. Formal study requests are attached to this comment letter.

Water Quality Studies

Impoundment Trophic State Study – The goal of this study is to demonstrate that the trophic state of the impoundment is steady or declining[5]. BWPH presented baseline data collected by the Department and by others, including post-operational dissolved oxygen monitoring (1990-1994) by the then-licensee Central Maine Power, dissolved oxygen data collected for a bioassessment and biocriteria report (2003), and a DEP water quality sampling program in the lower Androscoggin that included a sample location in the impoundment and a river reach between the discharge of the Lewiston Falls Project and the Little Androscoggin River. Some of this data included sampling locations within the Lewiston Falls impoundment, however there is no indication that the data was collected in accordance with standard sampling protocols for Hydropower Studies and does not demonstrate that the impoundment exhibits a steady or improving (declining) trophic state. Therefore, the Department requires an Impoundment Trophic State Study, as outlined in the *DEP Sampling Protocol for Hydropower Studies* (March 2021) to determine if Maine's water quality standards are met under the proposed operating conditions.

Impoundment Aquatic Habitat Study – The purpose of this study is to determine the effect of impoundment drawdowns on the impoundment's littoral zone and the ability of the impoundment to support fish and other aquatic life. The Project is reportedly operated as a run-of-river facility but is licensed for a drawdown of up to four feet; therefore, operations may affect the littoral zone unless a change is made limiting operations to run-of-river (where run-of-river means inflow equal to outflow, with water level fluctuations one foot or less). The Applicant should conduct an impoundment aquatic habitat study following the "Habitat Study" protocol under "Lakes, Ponds, and Impoundments" in the *DEP Sampling Protocol for Hydropower Studies* (March 2021) which is attached to this comment letter. Such a study may require the collection of bathymetric data in the impoundment, to be used in conjunction with Secchi disk measurements collected during the Trophic State Study to determine the impact to impoundment habitats.

Temperature and Dissolved Oxygen Study – Temperature and dissolved oxygen (DO) must be monitored downstream of the Lewiston Falls dams in the large ledge pool and downstream of the powerhouse tailrace to demonstrate whether the Project meets Maine's Class C (and B) DO numeric criteria. Data must be collected in accordance with the Department's "Temperature and

[5] A declining trophic state indicates improved water quality conditions.

Dissolved Oxygen Study" protocol under "Rivers and Streams" in the *DEP Sampling Protocol for Hydropower Studies* (March 2021), which is attached to this comment letter. As noted in the protocol, the Applicant will need to consult with the Department to verify representative sampling locations as the study plan is developed.

Benthic Macroinvertebrate (BMI) Studies – The purpose of this study is to demonstrate whether current in-stream flow releases affect attainment of aquatic life and habitat criteria in the Androscoggin River downstream of the Lewiston Falls dams, including in the large ledge pool.

A BMI study will be required to determine the current macroinvertebrate community structure and to evaluate any impacts caused by project operations. The Applicant must conduct the benthic macroinvertebrate study downstream and in the vicinity of the Lewiston Falls Project dams following the DEP's standard protocol in *Methods for Biological Sampling and Analysis of Maine's Rivers and Streams (*April 2014), attached to this comment letter.

Downstream Habitat and Aquatic Life Cross-Section Flow Study – The purpose of this study is to evaluate whether proposed Project operations affect attainment of habitat standards for fish and other aquatic life in the river below the Lewiston Falls Project. The Applicant will need to test the proposed minimum flow, the range of flows associated with current operations, as well as other flow regimes to determine the flow at which at least 75% of the bank full cross-sectional area of the river is continuously watered. The Applicant must evaluate the impact to downstream habitats from operations that would result from the (currently) allowed four-foot drawdown and/or other operational schemes used at this facility. It is the Department's position that there must be both sufficient quality and quantity of habitat for aquatic organisms to meet aquatic life and habitat standards. The applicant must conduct the Cross-Section Flow Study following the "Habitat and Aquatic Life Studies" protocol under "Rivers and Streams" in the *DEP Sampling Protocol for Hydropower Studies* (March 2021), which is attached to this comment letter.

The Applicant must demonstrate that all designated uses, numeric DO standard and narrative criteria are maintained in all water affected by Project operations. Such demonstrations may require additional studies, such as a fish assemblage study, or a recreational access study. Therefore, in addition to standard water quality studies, the Department supports a study to evaluate the impact of a potential four-foot impoundment drawdown on access to the impounded reach of the Androscoggin River, to demonstrate whether the Project meets the designated uses of recreation in and on the water and navigation in the impoundment through the complete range of operational conditions, including full drawdown, as well as a fish assemblage study to determine if Project waters support all species of fish indigenous to the receiving waters.

MDEP also supports study requests prepared by other natural resource agencies, including but not limited to, Maine Department of Inland Fish and Wildlife (MDIFW), Maine Department of Marine Resources (MDMR), US Fish and Wildlife (USFWS), National Marine Fisheries Service (NMFS).

Thank you for the opportunity to comment on the Pre-Application Document for the Lewiston Falls Hydroelectric Project. If you have any questions, please contact me by phone at (207) 446-2642 or by email at Kathy.Howatt@maine.gov.
Sincerely,

Kathy Davis Howatt
Hydropower Coordinator, Bureau of Land Resources
Maine Department of Environmental Protection

Attachment:

DEP sampling Protocol for Hydropower Studies (March 2021)

Cc: Kimberly Bose (FERC), efile

Maine Department of Environmental Protection
Study Request
Lewiston Falls Hydropower Project (FERC No. 2302)

Impoundment Trophic State Study

1. **Describe the goals and objectives of each study proposal and the information to the obtained.**
   Trophic state is an important indicator of water quality within the impoundment. Assessment of this criteria provides information to evaluate the health of the Lewiston Falls impoundment and the impact of the dam structures on water quality in the Androscoggin River. The objective of this study proposal is to determine if the project impoundment meets Maine Water Quality Standards, including the dissolved oxygen standards and the designated use of recreation in and on the water. This study will assess whether the trophic state of the impoundment is stable or improving.

2. **If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.**
   The resource management goal is to ensure attainment of Maine Water Quality Standards pursuant to the provisions of the *Water Classification Program*, 38 M.R.S. Sections 464-468 and to certify attainment of such, with any necessary conditions, under Section 401 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act).

3. **If the requestor is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.**
   Requestor is a resource agency.

4. **Describe existing information concerning the subject of the study proposal, and the need for additional information.**
   The Applicant proposes to conduct water quality studies in the Project PAD. As described in the Department's PAD comment letter, the applicant will need to conduct a trophic state study to demonstrate whether the Project meets water quality standards, including dissolved oxygen in the impoundment and that the trophic state is stable or declining (improving) in order to obtain water quality certification.

5. **Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.**
   Data collected will identify trophic state and may identify stratification effects on the impounded water and habitat. Information will be used to evaluate whether the Project meets Maine designated uses, habitat and aquatic life criteria, and dissolved oxygen criteria, which will inform the water quality certification process.

6. **Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate filed season(s) and duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.**
The DEP Sampling Protocol for Hydropower Studies (March 2021) was established by Department staff and has been used successfully throughout the State by the DEP and others. A copy of the Department protocol is attached to the PAD comment letter.

7. **Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.**
Trophic state samples are collected twice each month for five consecutive months during open water season. The impoundment aquatic habitat study, requested in a separate Study Request, relies in part on data collected during the Trophic State Study. The Trophic State Study can be completed in a single field season. Costs are considered reasonable given that this study is required for Maine water quality certification and is routinely completed at hydropower projects being relicensed in the State. No alternatives to this study are proposed.

Maine Department of Environmental Protection
Study Request
Lewiston Falls Hydropower Project (FERC No. 2302)

Impoundment Aquatic Habitat Study

1. **Describe the goals and objectives of each study proposal and the information to the obtained.**
   The objective of this study proposal is to determine if the project impoundment meets Maine Water Quality Standards including habitat and aquatic life criteria. Measurements of Secchi disk transparency and bathymetric data are applied to determine the extent of the littoral zone in the impoundment and an assessment of the volume and surface area dewatered under normal operating conditions is made to determine if at least 75% of the littoral zone remains watered at all times. Assessment of the shoreline littoral environment is necessary to evaluate the impact of Project operations on habitat there to determine if the Project attains Maine's aquatic life criteria, a narrative water quality standard.

2. **If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.**
   The resource management goal is to ensure attainment of Maine Water Quality Standards pursuant to the provisions of the *Water Classification Program*, 38 M.R.S. Sections 464-468 and to certify attainment of such, with any necessary conditions, under Section 401 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act).

3. **If the requestor is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.**
   Requestor is a resource agency.

4. **Describe existing information concerning the subject of the study proposal, and the need for additional information.**
   The PAD does not indicate that the Lewiston Falls impoundment meets Maine Water Quality Standards, specifically aquatic life and habitat criteria. The Applicant proposes to conduct water quality studies, which must include assessment of proposed Project operations on the littoral zone in the impoundment.

5. **Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.**
   Data collected will identify any drawdown effects and may identify stratification effects on the impounded water and habitat. Information will be used to evaluate whether the project meets Maine designated uses including habitat and aquatic life criteria, which will inform the water quality certification process.

6. **Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate filed season(s) and duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.**
The DEP Sampling Protocol for Hydropower Studies (March 2021) was established by Department staff and has been used successfully throughout the State by the DEP and others. A copy of the Department protocol is attached to the PAD comment letter.

7. **Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.**
The impoundment aquatic habitat study can be completed in one field season and can be designed as a desktop study utilizing data collected in the Trophic State Study along with bathymetric data. Costs are considered reasonable given that this study is required for Maine water quality certification and is routinely completed at hydropower projects being relicensed in the State. No alternatives to this study are proposed.

Maine Department of Environmental Protection
Study Request
Lewiston Falls Hydropower Project (FERC No. 2302)

Downstream Temperature and Dissolved Oxygen Study

1. **Describe the goals and objectives of each study proposal and the information to the obtained.**
   Temperature and dissolved oxygen (DO) are important indicators of water quality to ensure that discharges from the hydropower Project are sufficient to maintain the resident biologic community downstream of the Lewiston Falls dams. Assessment of temperature and DO data in the downstream reaches will be used to determine if the hydropower Project meets Maine Water Quality Standards including Class C DO criteria.

2. **If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.**
   The resource management goal is to ensure attainment of Maine Water Quality Standards pursuant to the provisions of the *Water Classification Program*, 38 M.R.S. Sections 464-468 and certify attainment of such, with any necessary conditions, under Section 401 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act)

3. **If the requestor is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.**
   Requestor is a resource agency.

4. **Describe existing information concerning the subject of the study proposal, and the need for additional information.**
   Dissolved oxygen concentrations downstream of the Lewiston Falls dams must meet Maine water quality criteria for Class C waters. A review of data summaries included in the PAD indicates temperature and dissolved oxygen data is dated and may have been collected in a manner inconsistent with approved protocols for hydropower studies, and therefore is insufficient to assess current attainment of these criteria. The PAD indicates that the Applicant intends to conduct water quality studies and the Department determines that a study of this nature is necessary to assess impacts of Project operations on DO.

5. **Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.**
   Data collected will be used to evaluate Project effects on water temperature and DO concentrations in the Androscoggin River downstream of the Lewiston Falls dams. Information will be used to evaluate whether the project meets Maine DO criteria for Class C waters and will inform the water quality certification process.

6. **Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate filed season(s) and duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.**
The DEP Sampling Protocol for Hydropower Studies (March 2021) was established by Department staff and has been used successfully throughout the State by the DEP and others. A copy of the Department protocol is attached to the PAD comment letter.

7. **Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.**
The DEP Sampling Protocol for Hydropower Studies (March 2021) offers two options for the temperature and DO study that can be completed in one field season. Temperature and DO samples can be collected one day per week for at least 10 weeks or measured hourly using data sondes placed at designated locations during summer low flow, high water temperature conditions (e.g. July through August, or mid-August through mid-September). The Department prefers the second method. Costs are considered reasonable given that this study is required for Maine water quality certification and is routinely completed at hydropower projects being relicensed in the State. No alternatives to this study are proposed.

Maine Department of Environmental Protection
Study Request
Lewiston Falls Hydropower Project (FERC No. 2302)

Benthic Macroinvertebrate Study

1. **Describe the goals and objectives of each study proposal and the information to the obtained.**
   Assessment of the benthic macroinvertebrate community is critical to determine whether current in-stream flow releases affect attainment of Maine habitat and aquatic life criteria for Class C waters in the Androscoggin River below the Lewiston Falls dam. The assessment provides biological data to evaluate potential impacts caused by Project operations.

2. **If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.**
   The resource management goal is to ensure attainment of Maine Water Quality Standards pursuant to the provisions of the *Water Classification Program*, 38 M.R.S. Sections 464-468 and certify attainment of such, with any necessary conditions, under Section 401 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act)

3. **If the requestor is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.**
   Requestor is a resource agency.

4. **Describe existing information concerning the subject of the study proposal, and the need for additional information.**
   The Androscoggin River must meet Maine's habitat and aquatic life criteria in the vicinity of the Lewiston Falls Project. Agency file review indicates data is insufficient to evaluate the current aquatic community in the tailrace reaches downstream of the Lewiston Falls dams. The PAD indicates that water quality studies will be conducted but does not indicate that a study of this nature is planned for the Project.

5. **Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.**
   Data collected will be used to evaluate the benthic macroinvertebrate community in the tailrace reach downstream of the Lewiston Falls dam and in the large ledge pool downstream of dam #3. Information will be used to evaluate whether the project meets Maine aquatic life criteria and will inform the water quality certification process.

6. **Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate filed season(s) and duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.**

The DEP Methods for Biological Sampling and Analysis of Maine's Rivers and Streams (April 2014) was established by Department staff and has been used successfully throughout the state by DEP and others since 1983. A copy of the Department manual is attached to the PAD comment letter.

7. **Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.**
Replicate benthic macroinvertebrate sample collectors (rock baskets or cones) are deployed for a 28-day study period in the tailrace reach of the hydropower Project during low flow, high temperature conditions. Samples must be collected by a professional aquatic biologist and evaluated by a professional freshwater macroinvertebrate taxonomist. Methods are documented in the DEP manual Methods for Biological Sampling and Analysis of Maine's River and Streams (April 2014). Costs are considered reasonable given that this study is required for Maine water quality certification and is routinely completed at hydropower projects being relicensed in the State. No alternatives to this study are proposed.

Maine Department of Environmental Protection
Study Request
Lewiston Falls Hydropower Project (FERC No. 2302)

Aquatic Habitat Cross-Section Flow Study

1. **Describe the goals and objectives of each study proposal and the information to the obtained.**
   Assessment of aquatic habitat downstream of the Lewiston Falls dams is required to determine whether current in-stream flow releases meet Maine habitat and aquatic life criteria. A cross-section flow study measures width and depth at various flows along established transects at various discharges to determine flows at which at least 75% of the bankfull cross-sectional area is sufficiently watered[6] to provide habitat for fish and other aquatic organisms. Data will be evaluated to determine if the downstream waters provide sufficient quantity of water to maintain riverine aquatic habitat in the bypass and tailrace reaches.

2. **If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.**
   The resource management goal is to ensure attainment of Maine Water Quality Standards pursuant to the provisions of the *Water Classification Program*, 38 M.R.S. Sections 464-468 and to certify attainment of such, with any necessary conditions, under Section 401 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act).

3. **If the requestor is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.**
   Requestor is a resource agency.

4. **Describe existing information concerning the subject of the study proposal, and the need for additional information.**
   The Androscoggin River downstream of the Lewiston Falls dams must meet Maine habitat and aquatic life criteria. The PAD does not present data for the tailrace reach of the Lewiston Falls Project that examines these criteria. The PAD indicates that the Applicant intends to conduct water quality studies, but does not specify that a study of this nature is planned for the Project.

5. **Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.**
   Data collected will be used to evaluate aquatic habitat in the Androscoggin River downstream of the Lewiston Falls Project. Information will be used to evaluate whether the Project meets Maine habitat and aquatic life criteria and will inform the water quality certification process.

[6] Sufficiently watered means providing a continuously watered zone of passage with a water depth of at least one foot that allows indigenous fish or other aquatic life freedom of movement without harm.

6. **Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate filed season(s) and duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.**
   The DEP Sampling Protocol for Hydropower Studies (March 2021) was established by Department staff and has been used successfully throughout the State by the DEP and others. A copy of the Department protocol is attached to the PAD comment letter.

7. **Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.**
   A cross-section flow study measures depth and wetted width along established transects in the bypass and tailrace reaches at various discharges to determine flows where at least 75% of the bankfull cross-sectional area has enough water to provide habitat for fish and other aquatic organisms. This type of study can typically be accomplished in one or two days. Costs are considered reasonable given that this study is required for Maine water quality certification and is routinely completed at hydropower projects being relicensed in the State. No alternatives to this study are proposed.

LAKES, PONDS, AND IMPOUNDMENTS

Applicability

This impoundment sampling protocol shall apply to existing hydropower impoundments regardless of their waterbody classification, where existing data are insufficient (in terms of density or quality) to determine water quality.

Trophic State Study

Overview & Sampling Stations

Each basin or station shall be sampled at the deepest location twice each month, at approximately 2-week intervals for at least five consecutive months during one open-water season. Sampling will consist of obtaining physical measurements as well as water samples. Water samples will be obtained using an integrated core sampler that is 10-meters long, and, when water is of adequate depth, a grab device. During August, additional water samples will be obtained. Sampling personnel must be certified for this sampling protocol annually, prior to data collection by DEP's Division of Environmental Assessment, Lake Assessment Section staff. If sampling is inadequate or certification is bypassed, a second open water season of data may be required. Additional sampling may be required due to the hydraulic or physical characteristics of a given waterbody or to the presence of significant water quality problems. Refer to Table 1 for an overview of parameters, frequency, sampling methods and detection/reporting limits.

Table 1. Summary of parameters, frequency, sampling methods and detection/reporting limits for hydropower impoundment sampling.

Parameter	Frequency	Sampling Method	Detection/Reporting Limits
Secchi disk transparency	2x/month	disk and water scope	0.1 meter
Temperature	2x/month	electronic meter (profile)	0.1 °C
Dissolved oxygen	2x/month	electronic meter (profile)	0.2 mg/l
Trichromatic Chlorophyll-a (uncorrected)	2x/month	core tube	0.001 mg/L
Water Chemistry	2x/month; additional samples in August	core tube or grab device	See Table 2 below

Physical measurements

Physical measurements will include the determination of water transparency using a Secchi disk and water scope following the Maine Lake Assessment SOP for *Secchi Disk Transparency* (DEPLW0947R2). In addition, profiles for temperature and dissolved oxygen will be taken from the water surface to the bottom of the impoundment. Readings will be obtained, recorded, and submitted on DEP lake monitoring forms. Readings will be obtained in 1-meter increments from the surface to 15 meters in depth, then in 2 meter increments from 15 meters to 25 meters, and every 5 meters in water deeper than 25 meters; if between 15 and 25 meters, a rapid change in temperature or oxygen is discovered, readings will be taken at 1 meter intervals until they stabilize. Refer to the Maine Lake Assessment SOP for obtaining Dissolved Oxygen/Temperature Profiles using electronic meters for additional details (DEPLW0941R2). If a multiparameter device is used that can also measure pH and specific conductance, these data may be substituted for lab data, providing that calibration and quality control check records are maintained and submitted with the data.

Epilimnetic core samples

The depth to which an integrated epilimnetic sample will be obtained using a core tube will be determined according to the Maine Lake Assessment SOP for *Epilimnetic Core Sample Collection* (DEPLW0946R2). Water samples collected through the season will be analyzed for uncorrected chlorophyll-a by the trichromatic method, total phosphorus, color, pH and alkalinity. Water samples collected in August will be additionally analyzed for nitrate, TKN, DOC, iron, calcium, magnesium, total and dissolved aluminum, sodium, potassium, silica, specific conductance, chloride, and sulfate. Refer to Table 2 for specific requirements; obtain bottles and preservatives from the analytical lab. In impoundments that do not thermally stratify (no change in temperature greater than or equal to 1°C per meter below a depth of 2 meters from the water surface), the core sample will be collected to 1 meter above the bottom, unless dissolved oxygen is less than or equal to 2 ppm, in which case the sample should be collected to the meter above that depth.

During warmer times of the year, if the lake is deep enough to stratify, examine the dissolved oxygen / temperature profile to determine the depth of the true seasonal epilimnion using the 1°C change over 1 meter of depth rule below a depth of 2 meters. Be aware that within the true or seasonal epilimnion, a shallow, secondary ephemeral (temporary) epilimnion can form in the top few meters of water as a result of a few calm, warm days. Take the core sample to 1-meter below the bottom of the true epilimnion so as to include neutrally-buoyant algal growth at the epi/metalimnion interface. Elevated dissolved oxygen lower in the profile may indicate need to extend the core deeper to capture the algae responsible for the oxygen spike. Because Chlorophyll samples are generally obtained from the core sample, never incorporate any water having 2 ppm of oxygen or less into the sample.

Grab samples

During late summer (mid to late August depending on latitude and weather conditions), in stratified lakes, grab samples will be obtained using a Kemmerer, Van Dorn or similar device, according to the Maine Lake Assessment SOP for the *Collection of Grab (discrete) Samples* (DEPLW0949R2). The grab samples will be analyzed for total phosphorus, color, pH, alkalinity, TKN, DOC, iron, calcium, magnesium, total and dissolved aluminum, sodium, potassium, silica, specific conductance, chloride, and sulfate. Refer to Table 2 for additional details.

If the lake does not stratify, no grab samples are needed. Otherwise, the number of grab samples taken is determined by the depth and thermal stratification pattern in the lake. In lakes deep enough to thermally stratify into 3 layers, grabs will be obtained from the metalimnion and hypolimnion. The metalimnetic sample will be taken 1 meter below the depth to which the integrated epilimnetic core sample was taken, and the hypolimnetic sample will be taken a meter above the bottom of the impoundment. In lakes that only stratify thermally into 2 layers, only one grab depth is necessary; in this case the grab sample will be obtained a meter above the bottom of the impoundment.

Table 2. Summary of water sampling parameters, reporting levels, frequency, and sample types limits for hydropower impoundment sampling.

Parameter	Reporting Level	2x per month	August	Sample types
Trichromatic Chlorophyll a (uncorrected)	0.001 mg/L	X	X	core
Total phosphorus	0.001 mg/L	X	X	core & grab(s)
Nitrate	0.01 mg/L	X	X	core & grab(s)
TKN	0.01 mg/L	X	X	core & grab(s)
Color	5.0 SPU	X	X	core & grab(s)
DOC	1.0 mg/L	X	X	core & grab(s)
pH	0.1 pH units	X	X	core & grab(s)
Total alkalinity	1.0 mg/L	X	X	core & grab(s)
Total iron	0.05 mg/L		X	core & grab(s)
Total & dissolved aluminum	0.002 mg/L		X	core & grab(s)
Total calcium	0.05 mg/L		X	core & grab(s)
Total magnesium	0.05 mg/L		X	core & grab(s)
Total sodium	0.05 mg/L		X	core & grab(s)
Total potassium	0.05 mg/L		X	core & grab(s)
Total silica	0.05 mg/L		X	core & grab(s)
Specific conductance	2 µS/cm		X	core & grab(s)
Chloride	0.5 mg/L		X	core & grab(s)
Sulfate	1 mg/L		X	core & grab(s)

Habitat Study

For lakes, ponds, and riverine impoundments, determination of attainment of the designated use 'habitat for fish and other aquatic life' will be determined as follows. Using a depth of twice the mean summer Secchi disk transparency, determined from the Trophic State Study or historic DEP data, as the bottom of the littoral zone, the volume and surface area dewatered by the drawdown will be calculated to determine if at least 75% of the littoral zone remains watered at all times. Alternatively, studies of fish and other aquatic life communities, including freshwater mussels, may be conducted to demonstrate that the project maintains 'structure and function of the resident biological community' despite a drawdown that results in less than 75% of the littoral zone remaining watered at all times.

Fishing (Mercury Contamination) Study

To ensure that the project does not contribute to the Statewide Fish Consumption Advisory due to mercury, projects with excessive drawdowns (generally >10 feet) may be required to analyze sport fish from the project waterbody and one or more reference waters for mercury. Contact DEP for specific requirements for each project.

RIVERS AND STREAMS

Temperature and Dissolved Oxygen Study

Applicability

This rivers and streams sampling protocol shall apply to tailwater areas that are not impoundments where existing data are insufficient to determine existing and future water quality.

Sampling Stations

Sampling shall occur in the tailwater downstream from the turbine/gate outlet or dam at a location representative of downstream flow as agreed by DEP on a case by case basis. Initially, measurements of temperature and dissolved oxygen should be made along a transect across the stream at the first, second and third quarter points across the width. If there is no violation of dissolved oxygen criteria and no significant (<0.4 mg/l) difference in concentrations among the quarter points, subsequent measurements may be made at the location shown to be representative of the main flow. Otherwise, measurements should be made at the location of the lowest concentration and the location of the main flow. Sampling should also occur in any bypassed segment of the river created by the project. Additional sampling stations may be required in the upstream or downstream areas where significant point or nonpoint sources exist or where slow moving or deep water occurs. The number and spacing of any additional stations will be determined by DEP on a case-by-case basis.

Parameters

Temperature and dissolved oxygen shall be sampled at mid-depth in rivers less than 2 m deep or in a profile of 1-meter increments of depth in rivers greater than 2 m deep. In rivers where it is already known that attainment of required statutory dissolved oxygen criteria is questionable, sampling for additional parameters (e.g. BOD, nitrogen, phosphorus) may be necessary.

Frequency and Timing

Sampling should be conducted during the summer low flow high temperature period, with the ideal conditions being the 7Q10 flow (the 7-day average low flow with a 10-year recurrence interval) combined with daily average water temperatures exceeding 24 ^{O}C. Measurements of temperature and dissolved oxygen shall be made every hour with a data sonde in remote unattended mode continuously during July and August, unless high flows well above seasonal median flows occur.

Alternatively, with concurrence by DEP, sampling could be undertaken one day per week for a minimum of ten weeks throughout the summer low flow, high temperature period. Each discrete grab sampling event for temperature and dissolved oxygen would consist of a minimum of two daily runs, the first of which should occur before 7 AM and the second of which should occur after 2 PM. Sampling results will not be considered complete unless a minimum of 5 sampling days meets the following conditions: The product of the water temperature (^{O}C) and the flow duration (the percentage of the time a given flow is statistically exceeded) at the time of sampling exceeds 1500. For cycling hydropower projects, in addition to twice daily monitoring, continuous monitoring may be required at some locations for a duration equivalent to the period of one cycle of the storage and the release of flow.

For either method, a summer in which low flows and high temperatures are not experienced may result in additional sampling requirements for the next summer. Low flow conditions may occur naturally, as an unregulated river or may be artificially induced, as in the case of upstream flow regulation or flows downstream from a cycling or peaking power project or in the case of a bypassed segment which receives flow only by spillage, leakage or specific releases.

Available Data

The use of data already available is encouraged provided that adequate QA/QC procedures have been followed. Old data may not be acceptable for considerations of meeting minimum sampling requirements but could still provide useful information. Acceptance/rejection of data will be determined on a case by case basis, but generally data more than 10 years old may be rejected.

Habitat and Aquatic Life Studies

For rivers and streams, determination of attainment of the designated use 'habitat for fish and other aquatic life' and "structure and function of the resident biological community" will be determined as follows. A Cross-Section Flow Study is required that measures width and depth at various flows to determine the flow at which at least 75% of the bank full cross-sectional area of the river or stream is continuously watered. At least three cross-sections representative of the river or stream must be measured. Alternately, a combination of ambient measurements in one cross-section, flow data from existing flow gages, and/or modelling may be approved by DEP.

In addition, to determine if the project 'attains the aquatic life criteria, i.e. 'maintains the structure and function of the resident biological community', biological monitoring of the benthic macroinvertebrate community must be conducted following DEP's standard protocol in Methods for Biological Sampling and Analysis of Maine's Rivers and Streams, DEP LW0387-B2002.
A copy can be found at www.maine.gov/dep/water/monitoring/biomonitoring/material.html

Methods for Biological Sampling and Analysis of Maine's Rivers and Streams

Susan P. Davies
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DEP LW0387-C2014
Revised April, 2014

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

METHODS

FOR

BIOLOGICAL SAMPLING AND ANALYSIS OF

MAINE'S RIVERS AND STREAMS

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CONTENTS

FOREWORD

This manual describes the field, laboratory and data preparation methods required by the Maine Department of Environmental Protection to collect and analyze benthic macroinvertebrate samples for the River and Stream Biological Monitoring Program. The biological classification of Maine's inland waters was authorized by the Maine State Legislature with the passage of Public Law 1985 Chapter 698 - The Classification System for Maine Waters. This law states that it is the State's objective "to restore and maintain the chemical, physical and biological integrity" of its waters, and establishes a water quality classification system to enable the State to manage its waters so as to protect their quality. The classification system further establishes minimum standards for each class, which are based on designated uses, and related characteristics of those uses, for each class of water.

Each water quality class contains standards that, among other things, describe the minimum condition of the aquatic life necessary to attain that class. The Maine Department of Environmental Protection (the Department) has developed numeric criteria in support of the narrative aquatic life standards in the Water Quality Classification Law. The Department has collected a large, standardized database consisting of benthic macroinvertebrate samples from above and below all significant licensed discharges in the State, from areas impacted by non-point sources, as well as from relatively unperturbed areas. These sampling locations were chosen to represent the range of water quality conditions in the State. This information has been used to develop numeric criteria which are specific to the natural biotic community potential of the State of Maine (see Davies et al., 1995 and 1999 for a description of the development and application of numeric criteria) and is established in DEP regulation Chapter 579 : Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams.

Standardization of data collection and analytical methods is fundamental to the consistent, unbiased and scientifically sound evaluation of aquatic life impacts. This manual sets forth the standardized practices and procedures used by the Department to acquire or accept benthic macroinvertebrate data for use in regulation, assessment or program development.

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I GENERAL METHODS FOR RIVER AND STREAM AQUATIC LIFE CLASSIFICATION ATTAINMENT EVALUATION

Each water quality class is defined by standards that describe the minimum condition of the aquatic community necessary to attain that class. The benthic macroinvertebrate community is used as an indicator community of the general state of the aquatic life in flowing waters for the purpose of assessment of classification attainment. Standardized sampling techniques and sample analysis are required for assessment of biological attainment of stream water quality classification. This manual presents the standard practices and procedures that have been adopted by the Department to acquire benthic macroinvertebrate data for purposes of aquatic life classification attainment evaluation.

Purpose:

To determine the water quality class attained by a particular river or stream reach in terms of the aquatic life standards set forth in 38 MRSA Sec. 465 (The Classification System for Maine Waters).

Requirements:

All samples of aquatic life that are collected for purposes of classification attainment evaluation, whether collected by the Department or by any party required to make collections by the Department, must be collected, processed and identified in conformance with the standardized methods outlined in this manual. Selection of appropriate sampling sites and micro-habitat to sample, as well as procedures for quantitative analysis of the sample must conform to methods set forth in this manual. Data submitted by any party required to make collections by the Department must be accompanied by a Quality Assurance Plan, approved by the Commissioner.

1. Qualifications of Sampling Personnel

Biological sampling must be performed by a professional aquatic biologist or by qualified personnel under the supervision of a professional aquatic biologist. The professional aquatic biologist must have, as a minimum, a Bachelor of Science degree in biological sciences with aquatic entomology, invertebrate zoology, fisheries or closely related specialization, and greater than 6 months experience working with macroinvertebrate sampling methods and taxonomy. (See also Qualifications of Laboratory Personnel, Sec. II-1.)

2. Apparatus, Equipment, Supplies, Instruments

(1) Sampling devices

a) Rock-filled wire basket introduced substrate

Use: flowing wadeable, eroded, mineral-based bottom rivers and streams.

Description: cylindrical plastic coated or chrome wire, baskets with at least 1.5 cm spaces between wires, a hinged opening, and secure closure (Klemm, D.J. et al, 1990).

Substrate material: clean, washed, bank-run cobble, graded to uniform diameter range of 3.8 to 7.6 cm (1.5 to 3 inches) in size (#2 roofing stone).

Baskets must be filled to 7.25 +/- 0.5 kg (16 lbs +/-1 lb) of substrate material.

b) Rock-filled mesh bag introduced substrate

Use: small flowing streams, too shallow for rock baskets to be fully submerged.

Description: mesh bags of sufficient size to hold 7.25 +/- 0.5 kg of cobble substrate as described above, with at least 2.54 cm aperture mesh, and secure closures.

c) Closing introduced substrate cone

Use: deep, non-wadeable rivers having sufficient flow to have an eroded, mineral based bottom.

Description: cone shaped wire, or plastic coated wire basket filled with substrate material and closed by means of an inverted, weighted funnel (Courtemanch, 1984).

Substrate material: (see above Rock-filled wire basket substrate material).

(2) Sieves, sieve buckets, nets

Samples are concentrated on sieves having a mesh size between 500 - 600 microns (USA Standard Testing Sieve ASTM-E-11 Specification size No. 30 or No. 35).

(3) Optical equipment

a) Binocular microscope: Magnification range from 10x or less to 30x or greater.

b) Compound microscope: Magnification range from 10x to at least 400x; 100x with oil immersion lens is advisable.

3. Sampling Season, Sampler Exposure Period, Placement and Retrieval

(1) Sampling season

The standard sampling season upon which all macroinvertebrate classification criteria are based is the late summer, low flow period (July 1 to September 30). All baseline data for the biological classification program has been collected during this time period. This period often presents conditions of maximal stress to the biological community due to decreased dilution of pollutional material and increased stream water temperatures. Furthermore, because the composition of the benthic macroinvertebrate community changes with season, due to natural life history features, this period defines a standardized seasonal community.

As noted, the Department's linear discriminant models define biological classification criteria derived from a macroinvertebrate community defined by the specific sampling methods and index season under which they were collected. Samples collected at other times of year may yield valuable water quality related information, however classification attainment may not be assigned solely on the basis of results of the linear discriminant models for these non-standard samples.

(2) Exposure period

Standard methods require that substrate samplers be exposed in the water body for a period of 28 days +/- four days within the above-specified sampling season. However, extended exposure periods may be necessary to allow for adequate colonization in the case of assessments of low velocity or impounded habitats. If such conditions exist a 56 days +/- four days exposure period may be used.

(3) Sampler placement

Rock Baskets/Bags

The actual sampler location should be approached so as to avoid any disturbance in, or upstream of, the sampled site. Position baskets in locations of similar habitat characteristics. Orient baskets with the long axis parallel to stream flow. Provide for relocation of baskets by flagging trees in the vicinity and/or by drawing a diagram with appropriate landmarks indicated.

Cones

Cone samplers should be marked with individual marker buoys (milk jugs or other suitable float) leaving about 5 extra feet of line to allow for water level changes and to provide for easy retrieval. They should be placed on the substrate with a minimum of disturbance, in an apex-up position, and located in the approximate middle fifty percent of the channel. (Note however, care should be taken not to create an obstruction to boat traffic.) In areas subject to vandalism, or in rivers having extensive macrophyte beds, it may be necessary to attach the sampler lines to a common anchor and thence to one unobtrusive surface float. Retrieval funnels will not properly close when lines are fouled with drifting macrophytes.

(4) Sampler retrieval

Rock Baskets/ Bags

Baskets are approached from downstream. Excessive accumulations of macrophytes, algae or debris clinging to the outside of the basket should be carefully removed, taking care to avoid jarring the basket itself. An aquatic net or drift net (mesh size 500 - 600 microns) is positioned against the substrate immediately downstream of the basket which is then quickly lifted into the net. The contents of the basket and all net washings are emptied into a sieve bucket (500 - 600 microns); the basket wires are carefully cleaned first, then rocks are hand washed and inspected and returned to the basket. All sieve bucket contents are placed in sample jars. A small amount of stream water and 95% ethyl alcohol is added to yield an approximately 70% solution of alcohol. Especially dense samples should be re-preserved in the laboratory, with fresh 70% ethyl alcohol. Rock baskets should be thoroughly cleaned and allowed to desiccate prior to re-use.

Cones

Cone samplers should be retrieved with the boat anchored directly upstream of the samplers. Once the float is retrieved and removed, the line should be held as vertically as possible while the weighted funnel is released down the line to enclose the cone. Cone and funnel should be retrieved quickly and smoothly from the bottom, and released directly into a sieve bucket or tub. Field processing should then proceed as described above for rock baskets.

4. Site Selection Criteria

Classification criteria apply to a strictly defined sample of the benthic macroinvertebrate community. Habitat type from which the community is obtained is a significant determinant of the make-up of the target community. Benthic macroinvertebrate communities of flowing streams and rivers having a hard, eroded substrate comprise the majority of samples in the baseline data set. This habitat is characteristic of the majority of the river and stream waters of the State. Exceptions to these conditions may require special consideration and the exercise of professional judgment. (Note: See Section III-2. (3) "Classification attainment evaluation of waters subjected to flow regulation" page 13, for procedures relating to the assessment of regulated flow sites.) While it is useful to obtain both an upstream and downstream sample to evaluate the effect of a pollution source, classification attainment evaluation does not require data from a matched reference site in order to arrive at a determination of aquatic life class. Analytical methods for classification attainment evaluation are described in Section III.

(1) Site attributes

a) The area selected should be generally representative of the habitat of the stream reach as a whole;
b) Where there is alternating riffle/pool habitat, the riffle/run is the habitat of choice;
c) A location should be selected where there is a high degree of certainty that the rock basket samples will remain fully submerged even if the water level drops significantly.

(2) Precautions

a) Avoid atypical influences such as bridges, entering culverts, channelized areas such as road crossings, culverts, or obstructions to flow;
b) Avoid bank effects: samplers should be located in the middle 50% of the bank to bank width, or in an area with a flow regime typical of the overall character of the stream segment;
c) Avoid slackwater areas and eddies immediately upstream or downstream of large rocks or debris.

(3) Matching reference and effluent impacted sites

If possible both stream reaches should be viewed prior to selection of sampling sites. Efforts should be made to sample habitats which are comparable in the following characteristics:

a) Water velocity;
b) Substrate composition (i.e., size ranges and proportions of particles making up the substrate);
c) Canopy coverage;
d) Depth;
e) Other upstream influences except the pollution source in question (for example, use caution when one site is just below a lake outfall and the other is not).

(4) Factors to be considered in site selection below point sources

The area of initial dilution of an effluent should be determined by visual observation of the plume pattern; by observations of biotic effects attributable to the plume, if evident (periphyton growth, die-off patterns); and by transects of specific conductance measurements from the outfall, in a downstream direction. The site selected should be in an area where reasonable opportunity for mixing of the effluent has occurred. If a mixing zone has been defined in a license, sampling should occur immediately downstream of it. In cases where the effluent plume channels down one bank for great distances (>1 km), or where localized effluent impact is expected to be severe for a distance beyond the zone of initial dilution, it is advisable to have a sampling site upstream of the source, one or more in the plume, and at least two farther downstream. One downstream site should be located at the point of presumed bank to bank mixing and subsequent sites should be located to assess the extent of impact downstream.

5. Sample Size

The biological community is evaluated on the basis of benthic macroinvertebrates obtained from at least three samplers which yield an average of at least 50 organisms per sampler. Matched upstream and downstream sites must be sampled using identical methods and level of effort, preferably by the same personnel.

Subsampling may be performed on samples if the mean number of organisms in a sampler exceeds 500 and subsampling will yield at least 100 organisms per rock/cone sampler. All samplers in a site should be treated consistently. Subsampling methods are described in Section II-5. Note: Subsampling will

reduce sample richness by an indeterminate amount. This may affect the outcome of linear discriminant analysis. See Section III-2. (2).

6. Physical Habitat Evaluation

A field data sheet (Appendix A) is to be completed at the time of sampler placement. This form records site specific information concerning natural variables that may affect community structure. Items addressed include exact site location (latitude and longitude, narrative description of the mapped location and/or a topographic map with site indicated); substrate composition; canopy coverage; land use and terrain characteristics; water velocity, temperature, dates of exposure and investigator name. The form is to be completed by observation as well as instrument measurement of water velocity, specific conductance, dissolved oxygen, global positioning device, temperature, etc.

II LABORATORY METHODS

1. Qualifications of Laboratory Personnel

Sample processing and taxonomy in the laboratory must be performed or supervised by a professional freshwater macroinvertebrate taxonomist who is certified by the Society of Freshwater Science in the identification of eastern US taxa. Certification must include Genus level categories, such as Ephemeroptera, Plecoptera and Trichoptera (EPT), General Arthropods and Chironomidae taxa. Taxonomic data will not be accepted without verification that the supervising laboratory taxonomist has been certified in relevant categories.

2. Sample Preservation, Sorting

All sample material collected in the field, as described in Section I, is preserved in 70% ethyl alcohol. Samples are stored in airtight containers until sorted. Sorting of macroinvertebrates from detritus and debris should follow methods described in Appendix B. One out of every ten samples is evaluated by a biologist for sorting completeness.

After sorting, recommended storage for macroinvertebrates is in 70% ethyl alcohol with 5% glycerin, in vials sealed with tightly fitting rubber stoppers.

3. Sample Labeling

All samples are labeled in the field immediately upon collection. The label must include the following information:

Date of sample retrieval
Waterbody
Town or target discharge
Whether above or below the discharge (if applicable)
Replicate number

4. Sample Log Book

In the laboratory, the samples from each sampled site are to be assigned a sample log number, written on all items generated by the sample (e.g., sample vials, slides, records, count sheets, etc.). Log numbers are sequentially recorded in a master log book. The log book shall also contain site identification, date of placement and retrieval, investigator name, sampler type and any comments regarding sampler retrieval or data quality.

5. Subsampling

(1) Methods

If it is determined that a sample should be subsampled (see criteria in Section I-5 Sample Size) methods of Wrona et al, (1982) are followed. These are summarized below:

a) Fit a plastic or glass Imhoff-type settling cone with an aquarium air stone sealed in the bottom and connected to a compressed air supply.

b) Place the sorted macroinvertebrate sample in the cone and fill the apparatus with water to a total volume of one liter.

c) Agitate gently for 2 to 5 minutes with the air stone.

d) Remove 25% of the sample in 5 aliquots with a wide-mouth 50 ml dipper and combine into one sample vial. The dipper should be submerged and withdrawn over a five second interval.

e) Ascertain whether or not the required 100 organisms have been obtained in the subsample.

f) Indicate clearly on the sample label and on the data sheet the fraction of the sample that the subsample represents.

(2) Precautions

a) Especially large or dense organisms such as crayfish, molluscs or caddisflies with stone cases, which do not suspend randomly in the sample, should not be included in the subsample. They should be counted separately.

b) When removing aliquots, the subsampler should be careful to avoid biased capture of organisms in the cone. Avoid watching the cone as the dipper is withdrawn.

This method has been tested by the Department and has been found to randomly distribute the sample. The five separate counts conform to a Poisson series and thus can be combined into one sample (Elliott, 1979).

(3) Chironomidae subsampling

A subsampling plan for Chironomidae shall be approved by the Department. A Department recommended subsampling plan follows the following criteria:

a) For samples having less than 100 midges, all midges will be identified to genus/species level.

b) For samples having 100 to 199 midges, a subsample of one half (0.5) will be removed by randomly selecting the specimens to be identified and identified to genus/species level. Remaining unsampled midges will be examined for unusual or rare specimens, which will be removed and identified to genus/species level separate from the subsample of the sample.

c) For samples having 200 to 499 midges, a subsample of one quarter (0.25) will be removed by randomly selecting the specimens to be identified and identified to genus/species level. Remaining unsampled midges will be examined for unusual or rare specimens, which will be removed and identified to genus/species level separate from the subsample of the sample.

d) For samples having 500 or more midges, midges will be grouped by genus for those for which it is possible to confidently identify them to genus level without mounting. For remaining midges not grouped by genus, a subsample of 100 specimens will be randomly selected and identified to genus/species level. Remaining unsampled midges will be examined for unusual or rare specimens, which will be removed and identified to genus/species level separate from the subsample of the sample.

e) Reporting of the subsample of the sample will be as follows. Numbers reported on the Excel spreadsheet will be converted to reflect the sample total. Any round-off errors between the subsample total and the sample total will be equalized by adding or deducting the difference from the most numerous taxon. If unusual or rare specimens are removed from the sample following the subsample removal, the conversion of the subsample total to a "partial" sample total will be based on the sample total minus the number of unusual or rare specimens. Following this procedure, the number of unusual or rare specimens will be added to the "partial" sample total to bring it back to the sample total.

6. Sample Taxonomy

All taxonomic data submitted to the Department must be accompanied by the name(s) of the individual(s) actually performing the identifications. A list of taxonomic references used, and a reference collection of organisms must also be submitted (see below).

(1) Taxonomic resolution

Macroinvertebrate organisms are identified to genus in all cases where possible. If generic keys are not available or taxonomic expertise is lacking for a taxon it should be identified to the lowest level possible. Identification of organisms to species is highly recommended whenever possible. Although quantitative analysis of benthic macroinvertebrate samples by the Department is based on counts adjusted to the generic level of resolution, species designations are recorded in the Department database and can contribute to the final stage of data analysis, Professional Judgment Evaluation of the model outcome. This is especially important for Class Insecta. Taxonomists submitting data for use by the Department must use current taxonomic references.

(2) Identification of Chironomidae

Specimens of chironomid midges are identified from slide mounts of the cleared head capsule and body parts. Euparol or Berlese mounting medium is recommended for preparation of slides. CMCP-9 is recommended for the preparation of permanent slide mounts of reference material, for voucher specimens or for permanent collections. These slides should be prepared under a fume hood. Instructions for preparation and slide mounting may be found in Wiederholm, (1983). In samples in which a given taxon is represented by a large number of individuals, the identification to genus may be made from slide mounts of a sufficient proportion of the individuals to give a high degree of certainty that they are all the same (10-50% depending on

the distinctiveness of the taxon visible under binocular microscope). A subsampling plan for Chironomidae is described in Section II-5. Each permanent slide mount is to be fully labeled or coded in a manner which positively associates the slide with the sample from which it originated.

(3) Quality control

All organisms and records from any sampling event intended to serve regulatory purposes must be preserved for a period of at least ten years. In the course of identifying taxa collected as part of the Department's biological monitoring program, or in other collection activities, a special reference collection of separate taxa is established. This collection allows subsequent identifications of the same taxon to be confirmed and thus serves to standardize taxonomy for the program.

Each contracted taxonomist, working for the Department or working for anyone submitting data to the Department, will be required to submit a reference collection of taxa identified, as well as a list of the taxonomic references used in the identifications. Organism identifications will be checked against the Department's collection by a Department taxonomist.

III ANALYTICAL METHODS

In general, it is the responsibility of the Department, or its agents, to conduct sampling for the purpose of making decisions on the attainment of water quality classification. Under certain conditions, sampling may be required of applicants for waste discharge licenses, or applicants requiring Section 401 Water Quality Certification. Sampling may be performed by corporations, businesses, organizations or individuals who can demonstrate their qualifications and ability to carry out the Department's sampling and analytical protocol, described in this manual. Such monitoring will be conducted according to a quality assurance plan provided to the Department and approved by the Commissioner.

Classification attainment evaluation is established in DEP regulation Chapter 579: Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams. Davies et al, 1995 details the conceptual and technical basis for the State’s application of linear discriminant analysis to assess attainment of aquatic life standards. A synopsis of Chapter 579 follows in this section.

1. Minimum Provisions

Properly collected and analyzed samples that fail to achieve the following criteria are unsuitable for further analysis through the numeric criteria statistical models:

- Total Mean Abundance must be at least *50* individuals (average per basket/bag/cone);
- Generic Richness for three replicate basket/bag/cone samplers must be at least *15*.

Samples not attaining these criteria shall be evaluated by Professional Judgment. A determination will be made whether the affected community requires re-sampling or whether the community demonstrates non-attainment of minimum provisions of the aquatic life standards.

2. Aquatic Life Statistical Decision Models

The four statistical decision models consist of linear discriminant functions developed to use quantitative ecological attributes of the macroinvertebrate community (Appendix C-1) to determine the strength of the association of a test community to any of the water quality classes (Appendix D). The coefficients or weights are calculated using a linear optimization algorithm to minimize the distance, in multivariate space, between sites within a class, and to maximize the distance between sites between classes.

(1) Linear discriminant models

The discriminant function has the form:

$$Z = C + W_1X_1 + W_2X_2 + ...W_nX_n$$

Where: Z = discriminant score
C = constant
W_i = the coefficients or weights
X_i = the predictor variable values

Association values are computed, using variable values from a test sample, for each classification using one four-way model and three two-way models. The four-way model uses nine variables pertinent to the evaluation of all classes and provides four initial probabilities that a given site attains one of three classes (A, B, or C), or is in non-attainment (NA) of the minimum criteria for any class. These probabilities have a possible range from 0.0 to 1.0, and are used, after transformation, as variables in each of the three subsequent final decision models. The final decision models (the three, two-way models)

are designed to distinguish between a given class and any higher classes as one group and any lower classes as the other group (i.e., Classes A+B+C vs. NA; Classes A+B vs. Class C+NA; Class A vs. Classes B+C+NA). The equations for the final decision models use the predictor variables relevant to the class being tested (Appendix E). The process of determining attainment class using association values is outlined in Appendix F.

(2) Application of professional judgment

Where there is documented evidence of conditions which could result in uncharacteristic findings, allowances may be made to account for those situations by adjusting the classification attainment decision through use of professional judgment as provided in DEP regulation Chapter 579: Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams. The Department may make adjustments to the classification attainment decision based on analytical, biological, and habitat information or may require that additional monitoring of affected waters be conducted prior to issuing a classification attainment decision.

Professional Judgment may be utilized when conditions are found that are atypical to the derivation of the linear discriminant model. Factors that may allow adjustments to the model outcome include but are not limited to:

a) Habitat factors
- Lake outlets
- Impounded waters
- Substrate characteristics
- Tidal waters

b) Sampling factors
- Disturbed samples
- Unusual taxa assemblages
- Human error in sampling

c) Analytical factors
- Subsample vs. whole sample analysis
- Human error in processing

(3) Classification attainment evaluation of waters subjected to flow regulation

The Maine State Legislature, in 38 MRSA Article 4-A Sec. 464 (9)-(10), *The Water Classification Program*, acknowledges that changes to aquatic life and habitat occur as the result of the impoundment of riverine waters and has modified the standards of waters so affected. The habitat and aquatic life criteria of riverine impounded waters of Class A, Class B or Class C are

deemed to be met if the impoundment attains the standards of Class C (e.g., maintenance of structure and function of the resident biological community). Impoundments managed as Great Ponds must also attain Class C aquatic life standards. If the actual water quality attains any more stringent characteristic or criterion than the Class C standards dictate, then the waterbody must be managed so as to protect those higher characteristics. Class C standards also apply to the *downstream* waters below certain specified riverine impoundments on the Kennebec River and the Saco River (Wyman Dam, Moosehead East Outlet Dam, West Buxton Dam and Skelton Dam) that are classified as A or B. All other waters subjected to flow regulation are managed according to standards of the water quality classification assigned by the Legislature.

(4) Adjustments of a decision

It is the responsibility of the Department to decide if adjustments of a decision should occur. The following adjustments may be made to correct for these conditions:

a) Resample
The Department may require that additional monitoring of the test community be done before a determination of class attainment can be made, based on documented evidence of specific sampling factors that may have influenced the results.

b) Raise the finding
   i. The Department may raise the classification attainment outcome predicted by the model from non-attainment of any class to indeterminate or to attainment of Class C, based on documented evidence of specific conditions, as defined above.

   ii. The Department may raise the classification attainment outcome predicted by the model from attainment in one class to attainment in the next higher class, based on documented evidence of specific conditions, as defined above.

c) Lower the finding
The Department may decide to lower the classification attainment finding, on the basis of documented, substantive evidence that the narrative aquatic life criteria for the assigned class are not met.

d) Determination of non-attainment: minimum provisions not met
Samples having any of the ecological attributes not attaining the minimum provisions, and where there is no evidence of conditions which could result in uncharacteristic findings, as defined above, must be determined to be in non-attainment of the minimum provisions of the aquatic life criteria for any class.

e) Determination of attainment: minimum provisions not met
Where there is evidence of factors that could result in minimum provisions not being met, professional judgment may be used to make a professional finding of attainment of the aquatic life criteria for any class. Such decisions will be provisional until appropriate resampling is carried out.

(5) Sampling procedures do not conform

For classification attainment evaluation of test communities that do not conform to criteria provided in Section I General Methods, or Section III-1, Minimum Provisions, of this manual, and are therefore not suitable to be run through the linear discriminant models, the Department may make an assessment of classification attainment or aquatic life impact in accordance with the following procedures:

a) Approved assessment plan
A quantitative sampling and data analysis plan must be developed in accordance with methods established in the scientific literature on water pollution biology, and shall be approved by the department.

b) Determination of sampling methods
Sampling methods are determined on a site-specific basis, based on habitat conditions of the sampling site, and the season sampled:

i. Soft-bottomed substrates shall, whenever ecologically appropriate and practical, be sampled by core or dredge of known dimension or volume.

ii. The preferred method for sampling hard-bottomed substrates shall be the rock basket/cone/bag as described in Section I-2.

iii. Other methods may be used where ecologically appropriate and practical.

c) Classification attainment decisions
Classification attainment decisions may be based on a determination of the degree to which the sampled site conforms to the narrative aquatic life classification criteria provided in 38 MRSA Section 465 and found in Appendix D. The decision is based on established principles of water pollution biology and must be fully documented.

d) Site-specific impact decisions
Site-specific impact decisions may rely on established methods of analysis of comparative data between a test community and an approved reference community.

e) Determination of detrimental impact
A determination of detrimental impact to aquatic life of a test community without an approved reference community may be made if it can be documented, based on established methods of the interpretation of macroinvertebrate data, and based on established principles of water pollution biology, that the community fails to demonstrate the ecological attributes of its designated class as defined by the narrative aquatic life standards in the water quality classification law.

Appendix A

Maine DEP Biological Monitoring Unit
Stream Macroinvertebrate Field Data Sheet

Log Number _____ Directions_____ Type of Sample_____
Station Number_____ _____ Date Deployed_____
Waterbody_____ _____ Number Deployed_____
River Basin_____ Lat-Long Coordinates (WGS84, meters) Date Retrieved_____
Municipality_____ Latitude_____ Number Retrieved_____
Stream Order_____ Longitude_____ Agency/Collector(s)_____

1. Land Use (500 m radius upstream)
- ☐ Urban
- ☐ Cultivated
- ☐ Pasture
- ☐ Upland hardwood
- ☐ Upland conifer
- ☐ Swamp hardwood
- ☐ Swamp conifer
- ☐ Marsh

2. Terrain (500 m radius upstream)
- ☐ Flat
- ☐ Rolling
- ☐ Hilly
- ☐ Mountains

3. Canopy Cover (upstream view)
- ☐ Dense (75-100% shaded)
- ☐ Partly open (25-75% shaded)
- ☐ Open (0-25% shaded)

(% daily direct sun) _____

4. Physical Characteristics of Bottom (estimate % of each component over 12 m stretch of site; total = 100%)

[ ] Bedrock [ ] Rubble (3" – 10") [ ] Sand (<1/8") [ ] Boulders (<10") [ ] Gravel (1/8" – 3") [ ] Silt-clay-muck [ ] Detritus

5. Habitat Characteristics (immediate area)

Time _____AM PM	Time _____AM PM
Width (m) _____	Width (m) _____
Depth (cm) _____	Depth (cm) _____
Flow (cm/s) _____	Flow (cm/s) _____
Diss. O_2 (ppm)_____	Diss. O_2 (ppm)_____
Temp (°C) _____	Temp (°C) _____
pH _____	pH _____
SPC (µS/cm) _____	SPC (µS/cm) _____
TDS (ppm) _____	TDS (ppm) _____

Temperature Probe # _____

☐ deployed ☐ retrieved

6. Observations (describe)
Fish_____
Algae_____
Macrophytes_____
Habitat quality_____
Dams/impoundments_____
Discharges_____
Nonpoint stressors _____

7. Water Samples
- ☐ Standard
- ☐ Metals
- ☐ Pesticides

Lab Number

8. Photographs

9. Landmarks of Sampler Placement (illustrate or describe landmarks to be used for relocation)

Appendix B

Instructions for Macroinvertebrate Sorters

1. Pick the sample **in small portions** (1-2 TBS of material) at a time.

2. Pick all organisms you can see. If in doubt it's usually best to include it.

3. Some types of samples can be easily floated by adding a saturated solution of Epsom salt or sugar to the water. Maintain the saturated solution for the lab by adding enough salt or sugar to water to maintain a thick layer of crystals on the bottom of the storage jar. Use the supernatant solution for picking. Large numbers of organisms can be removed with a sieve spoon from the water surface. After the floaters have been removed, proceed to pick the rest of the sample as usual. A significant portion of the sample will not float and must be picked out with forceps.

4. The sample can be considered done when a careful 45 second search, after swirling the sample, yields no further organisms.

5. The samples are picked in water but should not remain unpreserved for more than 8 hours. Be certain that the final sample vial is preserved with 70% alcohol and 5% glycerin solution when done.

6. Return the detrital material to the original sample jar and preserve with 70% alcohol.

7. Write on the sample jar label "Picked X1 (your initials)".

8. Include in the vial of organisms a slip of index card label in hard pencil (No. 2) including **all information appearing on the original jar label**:

   Log Number — River
   Date - month/day/year — Location (Town or industry name)
   whether above or below
   Basket or Cone number
   Vial number if more than 1 vial is needed per basket

   ex. Log 621 Sandy R. 9/5/97
   Below Farmington (disturbed)
   Basket 2 vial #1 of 2

9. Complete all samples from one log number before beginning a new log number.

10. Keep a record of samples picked including log number

    Basket number — Time spent per basket
    Your name — Date

Appendix C-1

Methods for the Calculation of Indices and Measures of Community Structure Used in the Linear Discriminant Models

Variable Number

1 **Total Mean Abundance**

Count all individuals in all replicate samples from one site and divide by the number of replicates to yield mean number of individuals per sample.

2 **Generic Richness**

Count the number of different genera found in all replicates from one site.

Counting rules for Generic Richness:

a) All population counts at the species level will be aggregated to the generic level.

b) A family level identification which includes no more than one taxon identified to the generic level is counted as a separate taxon in generic richness counts.

c) A family level identification with more than one taxon identified to generic level is not counted towards generic richness. Counts are to be divided proportionately among the genera that are present.

d) Higher level taxonomic identifications (Phylum, Class, Order) are not counted toward generic richness unless they are the only representative.

e) Pupae are ignored in all calculations.

3 **Plecoptera Mean Abundance**

Count all individuals from the order Plecoptera in all replicate samplers from one site and divide by the number of replicates to yield mean number of Plecopteran individuals per sampler.

4 **Ephemeroptera Mean Abundance**

Count all individuals from the order Ephemeroptera in all replicate samplers from one site and divide by the number of replicates to yield mean number of Ephemeropteran individuals per sampler.

5 **Shannon-Wiener Generic Diversity (Shannon and Weaver, 1963)**

After adjusting all counts to genus following counting rules in Variable 2:

$$\bar{d} = \frac{c}{N}\left(N \log_{10} N - \sum n_i \log_{10} n_i\right)$$

where: $\bar{d}$ = Shannon-Wiener Diversity
c = 3.321928 (converts base 10 log to base 2)
N = Total abundance of individuals
n_i = Total abundance of individuals in the i^{th} taxon

6 **Hilsenhoff Biotic Index (Hilsenhoff, 1987)**

$$HBI = \sum \frac{n_i a_i}{N}$$

where: HBI = Hilsenhoff Biotic Index
n_i = number of individuals in the i^{th} taxon
a_i = tolerance value assigned to that taxon
N = total number of individuals in sample with tolerance values.

7 **Relative Chironomidae Abundance**

Calculate the mean number of individuals of the family Chironomidae, following counting rules in Variable 4, and divide by total mean abundance (Variable 1).

8 **Relative Diptera Richness**

Count the number of different genera from the Order Diptera, following counting rules in Variable 2, and divide by generic richness (Variable 2).

9 ***Hydropsyche* Mean Abundance**

Count all individuals from the genus *Hydropsyche* in all replicate samplers from one site, and divide by the number of replicates to yield mean number of *Hydropsyche* individuals per sampler.

10 **Probability (A + B + C) from First Stage Model**

Sum of probabilities for Classes A, B, and C from First Stage Model.

11 ***Cheumatopsyche* Mean Abundance**

Count all individuals from the genus *Cheumatopsyche* in all replicate samplers from one site and divide by the number of replicates to yield mean number of *Cheumatopsyche* individuals per sampler.

12 **EPT - Diptera Richness Ratio**

EPT Generic Richness (Variable 19) divided by the number of genera from the order Diptera, following counting rules in Variable 2. If the number of genera of Diptera in the sample is 0, a value of 1 is assigned to the denominator.

13 **Relative Oligochaeta Abundance**

Calculate the mean number of individuals from the Order Oligochaeta, following counting rules in Variable 4, and divide by total mean abundance (Variable 1).

14 **Probability (A + B) from First Stage Model**

Sum of probabilities for Classes A and B from First Stage Model.

15 **Perlidae Mean Abundance (Family Functional Group)**

Count all individuals from the family Perlidae (Appendix C-3) in all replicate samplers from one site and divide by the number of replicates to yield mean number of Perlidae per sampler.

16 **Tanypodinae Mean Abundance (Family Functional Group)**

Count all individuals from the subfamily Tanypodinae (Appendix C-3) in all replicate samplers from one site and divide by the number of replicates to yield mean number of Tanypodinae per sampler.

17 **Chironomini Mean Abundance (Family Functional Group)**

Count all individuals from the tribe Chironomini (Appendix C-3) in all replicate samplers from one site and divide by the number of replicates to yield mean number of Chironomini per sampler.

18 **Relative Ephemeroptera Abundance**

Variable 4 divided by Variable 1.

19 **EPT Generic Richness**

Count the number of different genera from the Order Ephemeroptera (E), Plecoptera (P), and Trichoptera (T) in all replicate samplers, according to counting rules in Variable 2, generic richness.

20 **Variable Reserved**

21 **Sum of Mean Abundances of**: ***Dicrotendipes, Micropsectra, Parachironomus* and *Helobdella***

Sum the abundance of the 4 genera and divide by the number of replicates (as performed in Variable 4).

22 **Probability of Class A from First Stage Model**

Probability of Class A from First Stage Model.

23 **Relative Plecoptera Richness**

Count number of genera of Order Plecoptera, following counting rules in Variable 2, and divide by generic richness (Variable 2).

24 **Variable Reserved**

25 **Sum of Mean Abundances of *Cheumatopsyche, Cricotopus, Tanytarsus* and *Ablabesmyia***

Sum the number of individuals in each genus in all replicate samplers and divide by the number of replicates (as performed in Variable 4).

26 **Sum of Mean Abundances of *Acroneuria* and *Stenonema***

Sum the number of individuals in each genus in all replicate samplers and divide by the number of replicates (as performed in Variable 4).

27 **Variable Reserved**

28 **Ratio of EP Generic Richness**

Count the number of different genera from the order Ephemeroptera (E), and Plecoptera (P) in all replicate samplers, following counting rules in Variable 2, and divide by 14 (maximum expected for Class A).

29 **Variable Reserved**

30 **Ratio of Class A Indicator Taxa**

Count the number of Class A indicator taxa as listed in Appendix C-2 that are present in the community and divide by 7 (total possible number).

Appendix C-2

Indicator Taxa: Class A

Brachycentrus (Trichoptera: Brachycentridae)
Serratella (Ephemeroptera: Ephemerellidae)
Leucrocuta (Ephemeroptera: Heptageniidae)
Glossosoma (Trichoptera: Glossosomatidae)
Paragnetina (Plecoptera: Perlidae)
Eurylophella (Ephemeroptera: Ephemerellidae)
Psilotreta (Trichoptera: Odontoceridae)

Appendix C-3

Family Functional Groups

PLECOPTERA

Perlidae
Acroneuria
Attaneuria
Beloneuria
Eccoptura
Perlesta
Perlinella
Neoperla
Paragnetina
Agnetina

CHIRONOMIDAE

Tanypodinae
Ablabesmyia
Clinotanypus
Coelotanypus
Conchapelopia
Djalmabatista
Guttipelopia
Hudsonimyia
Labrundinia
Larsia
Meropelopia
Natarsia
Nilotanypus
Paramerina
Pentaneura
Procladius
Psectrotanypus
Rheopelopia
Tanypus
Telopelopia
Thienemannimyia
Trissopelopia
Zavrelimyia

Appendix C-3

Family Functional Group (continued)

Chironomini
Pseudochironomus
Axarus
Chironomus
Cladopelma
Cryptochironomus
Cryptotendipes
Demicryptochironomus
Dicrotendipes
Einfeldia
Endochironomus
Glyptotendipes
Goeldichironomus
Harnischia
Kiefferulus
Lauterborniella
Microchironomus
Microtendipes
Nilothauma
Pagastiella
Parachironomus
Paracladopelma
Paralauterborniella
Paratendipes
Phaenopsectra
Polypedilum
Robackia
Stelechomyia
Stenochironomus
Stictochironomus
Tribelos
Xenochironomus

Appendix D

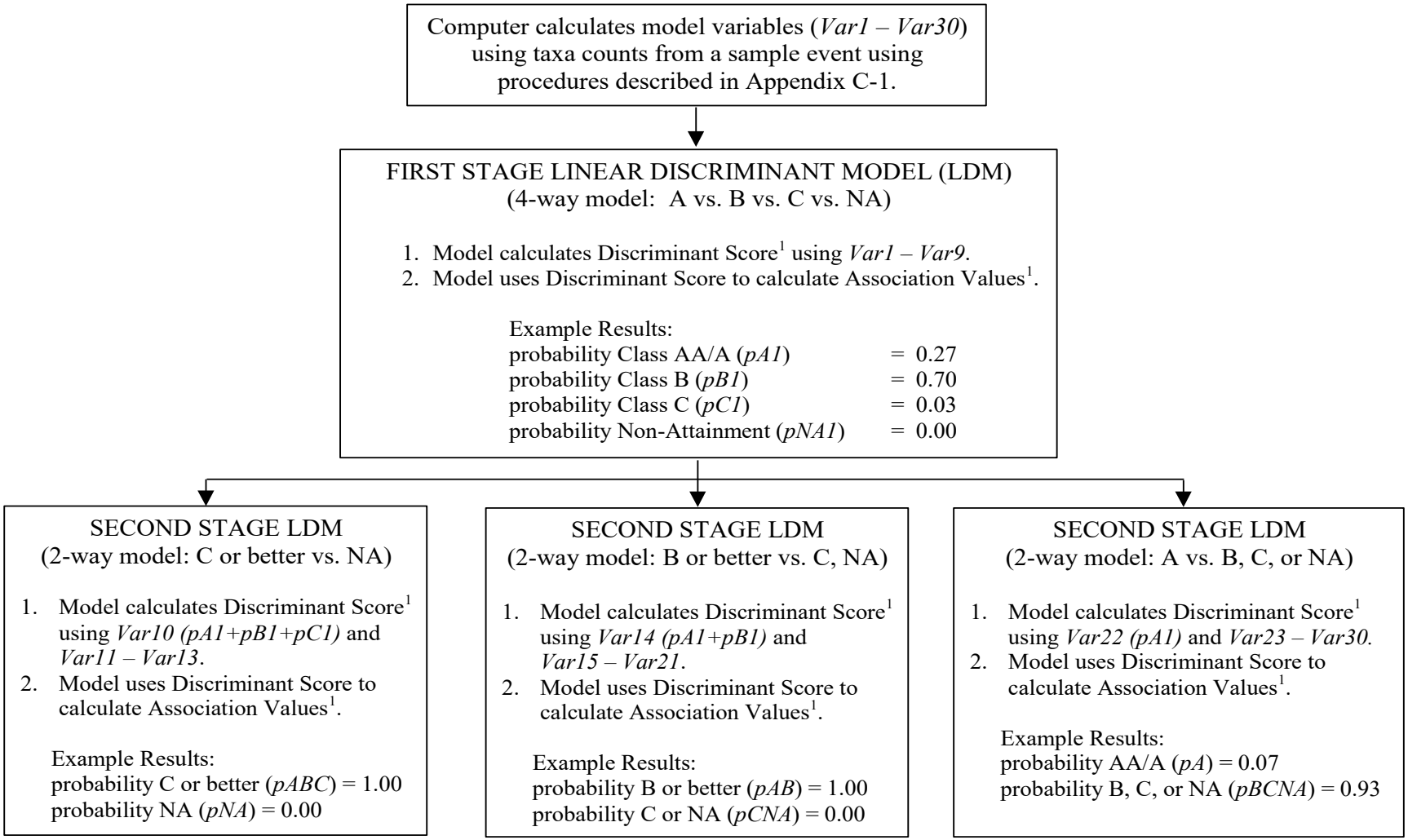
MRSA 38, 4-A Sec 464-465

Aquatic Life Standards for the State of Maine

Classification	Biological Standards
AA	No direct discharge of pollutants; aquatic life shall be as naturally occurs.
A	Natural habitat for aquatic life; aquatic life shall be as naturally occurs.
B	Unimpaired habitat for aquatic life; discharges shall not cause adverse impact to aquatic life in that the receiving waters shall be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community.
C	Habitat for aquatic life; discharges may cause some changes to aquatic life, provided that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.

Appendix E

Process of Calculating Model Variables and Association Values Using Linear Discriminant Models

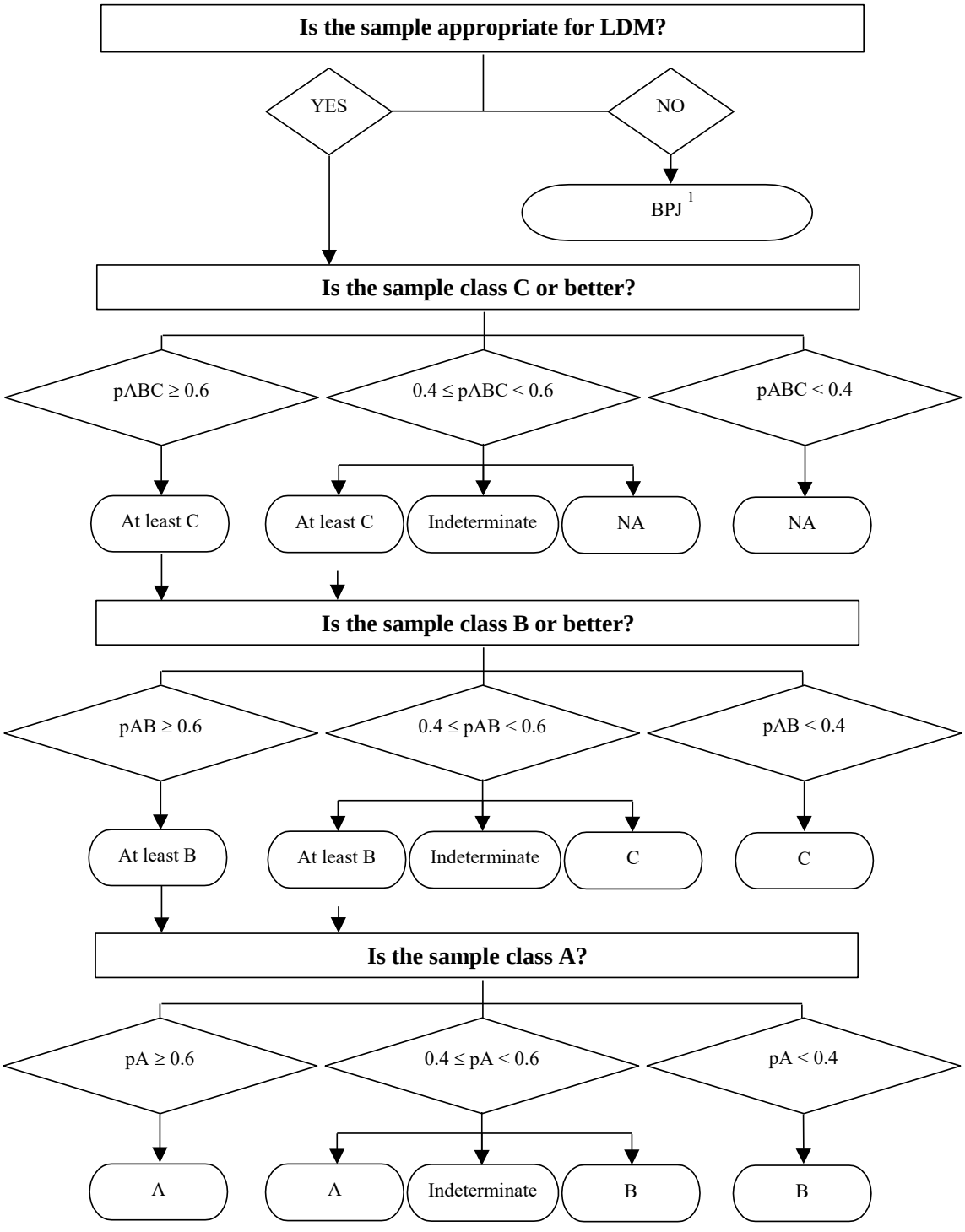


[1] Discriminant Score and Association Values are defined in Section III-2.(1).

Chart by Thomas J. Danielson

Appendix F

Process for Determining Attainment Class Using Association Values



[1] Best Professional Judgment (BPJ) is defined in Section III-2. (2), (4), and (5)

Chart by Thomas J. Danielson

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Maine DEP Biological Monitoring Unit
Stream Macroinvertebrate Field Data Sheet

Location: _____

_____

Potential Stressor: _____

_____

Log Number _____
Station Number_____
Waterbody_____
River Basin_____
Town_____
Stream Order_____

Directions_____
_____
_____
Lat-Long Coordinates (WGS84, meters)
Latitude_____
Longitude_____

Type of Sampler_____
Date Deployed_____
Number Deployed_____
Date Retrieved_____
Number Retrieved_____
Agency/Collector(s) Put-In:
Take-Out:

1. Land Use (surrounding watershed)
- ☐ Urban
- ☐ Cultivated
- ☐ Pasture
- ☐ Upland hardwood
- ☐ Upland conifer
- ☐ Swamp hardwood
- ☐ Swamp conifer
- ☐ Marsh

2. Terrain (surrounding watershed)
- ☐ Flat
- ☐ Rolling
- ☐ Hilly
- ☐ Mountains

3. Canopy Cover (surrounding view)
- ☐ Dense (75-100% shaded)
- ☐ Partly open (25-75% shaded)
- ☐ Open (0-25% shaded)

(% daily direct sun) _____

4. Physical Characteristics of Bottom (estimate % of each component over 12 m stretch of site; total = 100%)

[ ] Bedrock [ ] Cobble (2.5" – 10") [ ] Sand (<1/8") [ ] Clay
[ ] Boulders (>10") [ ] Gravel (1/8" – 2.5") [ ] Silt [ ] Muck [ ] Detritus

5. Habitat Characteristics (immediate area)

Time _____ AM PM	Time _____ AM PM
Wetted Width (m)_____	Wetted Width (m) _____
Bank Full Width (m) _____	Bank Full Width (m) _____
Depth (cm) _____	Depth (cm) _____
Velocity (cm/s) _____	Velocity (cm/s) _____
Diss. O_2 ___ (ppm) ___ (%)	Diss. O_2 ___ (ppm) ___ (%)
Temp (°C) _____	Temp (°C) _____
SPC (µS/cm) _____	SPC (µS/cm) _____
pH _____	pH _____
DO Meter #_____ Cal? Y / N	DO Meter #_____ Cal? Y / N
SPC Meter # _____ Cal? Y / N	SPC Meter # _____ Cal? Y / N

Flag location where measured

Temperature Probe # _____
☐ deployed ☐ retrieved

6. Observations (describe, note date)

7. Water Samples
- ☐ Standard
- ☐ Other

Lab Number:

8. Photograph #
Put-In
- Up
- Down

Take-Out
- Up
- Down

9. Landmarks of Sampler Placement (illustrate or describe landmarks to be used for relocation)

Options for Potential Stressor:

Agricultural Runoff
Altered Habitat
Altered Hydrology
BOD (Low DO)
Bog Headwaters
Chlorine
Gravel Pit
Impounded
Inorganic Solids
Lake Outlet
Logging
Low Gradient
Low pH
Metals
NPS Pollution
Nutrients
Organic Solids
Pesticides
Regulated Flows
Sedimentation
Superfund Site
Thermal
Tidal/Estuary
Toxic Organics
Urban Runoff

Options for 6. Observations:

Fish
Algae
Macrophytes
Habitat quality
Dams/impoundments
Discharges
Nonpoint stressors

Options for Location:

Above Road Crossing
Below Road Crossing
Above Town
Below Town
Above Fish Hatchery
Below Fish Hatchery
Above POTW
Below POTW
Above Landfill
Below Landfill
Below Airport
Below In-Place Contamination
Above In-Place Contamination
Above Point Source
Below Point Source
Above Urban NPS
Below Urban NPS
Above Agriculture NPS
Below Agriculture NPS
Above Forestry NPS
Below Forestry NPS
Above Dam
Below Dam
Impoundment
Lake Outlet
Main Stem (only for larger systems)
Above Confluence
Below Confluence
Below Falls
Pristine Landscape
Designated Ecoreserve
Minimally Disturbed

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

VIA ELECTRONIC FILING

January 3, 2022

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

Re: MDIFW Comments and Study Requests for the Lewiston Falls Hydroelectric Project (FERC No. 2302)

Dear Secretary Bose:

On August 4, 2021, Brookfield White Pine Hydro (Brookfield, Licensee) submitted a Notice of Intent (NOI) to file an application for a new license and a Pre-Application Document (PAD) for the Lewiston Falls Hydroelectric Project (FERC No. 2302). The Project is located on the Androscoggin River in Androscoggin County, Maine. The Maine Department of Inland Fisheries and Wildlife (MDIFW) is a cabinet-level agency of the State of Maine, and under Maine State Law (12 MRSA, §10051) MDIFW's mandate is "*…to preserve, protect, and enhance the inland fisheries and wildlife resources of the State; to encourage the wise use of these resources; to ensure coordinated planning for the future use and preservation of these resources; and to provide for effective management of these resources.*" Based on our statutory responsibility we have prepared the following comments on the PAD and are submitting appropriate Study Requests:

Comments on the PAD

Section 3.3 Existing Operations

The Project is licensed to operate with up to four feet of impoundment fluctuation, yet "*is normally operated as run-of-river with impoundment fluctuations of one foot or less.*" MDIFW requests clarification on the exact operational mode for the Project, as four-foot impoundment fluctuations would be inconsistent with a run-of-river facility. To this end, we also request data on the frequency, magnitude, and duration of impoundment fluctuations over the last 5 years of Project operations, as well as Project outflow over the same time period. Without these data, it is unclear what is meant by the facility "normally" operating as run-of-river.

Typically, MDIFW recommends hydropower projects limit impoundment fluctuations to one foot or less without prior notification to the Department. This protects inland aquatic species from habitat loss and reproductive failure and is particularly important during the spawning seasons for each fish species. As the PAD notes in further sections (see 5.3.1), smallmouth bass

are the "*dominant recreationally targeted species*" in this section of the Androscoggin River; bass are particularly prone to reproductive failure from impoundment fluctuations as nests are typically formed in shallow depths of water bodies. Further, in Tables 5-10 and 5-11 smallmouth bass represented a much smaller proportion of fish species assemblage in the impounded reach versus downstream riverine habitat. Without further data on Project operations, we cannot determine whether this disparity may have been influenced by impoundment fluctuations.

Though MDIFW does recognize the influence of upstream facilities on water levels in the Project impoundment, fluctuations in the impoundment of greater than one foot are concerning and could greatly impact resident aquatic species. Without further clarification on Project operational mode and necessity, fluctuations in the Project impoundment should be limited to one foot or less without prior approval, consistent with hydropower requirements for run-of-river projects statewide. As the relicensing process moves forward, MDIFW will seek to change language in the Project license to be more consistent with these statewide requirements, and limit impoundment fluctuations to one foot or less without prior approval.

Section 5.3.1

While data collected by Yoder in 2003 were relatively comprehensive at the time, more recent changes and invasions in the Androscoggin River are not fully reflected. Relative species composition of the river and Project impoundment may not be the same as it was nearly twenty years ago. Additionally, MDIFW data indicates that abundance of invasive species such as northern pike, black crappie, and rock bass have increased in the Androscoggin River since 2003.

Brook trout should be included in the list of species that provide some limited natural reproduction to the fishery of the Upper Androscoggin River (page 5-41). Brook trout now likely represent a more significant component to the wild trout fishery than rainbow trout, which have seen more limited wild production in the area recently.

On page 5-42, the Applicant states: "*Smallmouth Bass, Black Crappie and Northern Pike, the latter of which are both non-native introductions to the Androscoggin River and are also present in the lower river.*"

Phrasing here is unclear and suggests that not all species listed are introduced. It should be clarified that smallmouth bass are also a non-native introduction to the Androscoggin River, along with the listed black crappie and northern pike.

Section 5.3.3

On page 5-51, the Applicant states: *"Some of these fish species (e.g. Smallmouth Bass, Yellow Perch) are actively managed as sport fish by the state of Maine (MDIFW 2001; MDIFW 2002)…*"

It should be clarified that yellow perch, while a sport fish species, are not the focus of active management by the State of Maine. Smallmouth bass may be actively managed in some areas of the State but not in other areas and are not prioritized over native sport fish species.

On page 5-53 the PAD notes that "*high water flows*" and "*excessive lowering of the water level during spawning are the two most common habitat-related reasons for reproductive failure*" in Centrarchids, a family which includes smallmouth bass. Again, we express our concern that allowing impoundment fluctuations up to four feet may put resident aquatic species at risk of habitat loss and reproductive failure.

Note misspelling of "Percidae" heading on page 5-53.

Section 5.7.3.1

The PAD should clarify whether non-Project recreation sites have access to the river, particularly for the purposes of angling. It may also be helpful to provide more information on non-Project facilities overall (capacity, water access, etc.) to aid in overall assessment of recreational potential in the Project area.

Section 5.7.3.2

MDIFW appreciates the inclusion of capacity and amenities for Project recreational facilities. Currently, the Project has adequate facilities for boat access to the impoundment and riverine reaches below. However, it should be noted that any proposed changes to Project recreational access should be made in consultation with MDIFW.

While the Project has adequate facilities for boater access to the impoundment and riverine reaches below, the PAD should clarify if there are any shoreline access locations within Project boundaries, particularly to the Project tailrace. If no such facilities exist, the Applicant should explore locations that may allow for angler access to the tailrace, which is typically a popular fishing location for both resident and diadromous species.

Section 5.7.3.3

Licensed Hydropower Recreation Report Form 80 (Form 80) is a frequently used methodology for estimating recreational use but can underestimate actual recreation days due to the limitations of spot counts in assessing use over time. Note that even allowing for possible underestimation, Project recreation facilities are well-utilized. This underscores the need to ensure quality, perpetual, and equitable access to the Project for recreational purposes.

Section 5.7.4.1

The PAD makes reference to a 1995 Maine Department of Agriculture, Conservation, and Forestry (MDACF) and MDIFW plan governing public access to Maine waters. While the Androscoggin River was not identified as lacking in public access in that plan, we seek to clarify that there is an ongoing need to guarantee public access to all Maine waters. Additionally, and

as referenced above, provision for shoreline access to the tailrace of the Project has the potential to greatly enhance sport fishing programs in the Project vicinity.

Section 6.2.3.2

The Applicant proposes no studies of resident fish species, claiming that due to "*limited fluctuation of the Project impoundment, continued Project operation will not have a significant effect on the resident fish and aquatic life.*" MDIFW fundamentally disagrees that allowance of four-foot changes in impoundment water level constitutes a "*limited fluctuation*." As detailed in previous comments, rapid and/or frequent changes in water level can have severe, deleterious impacts to resident fish species. Additionally, while the resident fisheries of the Lower Androscoggin River have been the focus of past studies, the impact of Project operations on those fisheries merits much additional consideration.

Section 6.2.7.1

The Applicant again uses "*limited impoundment fluctuations*" to support its assertion that Project operations will not adversely impact recreational opportunities. Again, MDIFW disagrees that allowance of four-foot fluctuations are "*limited.*" Such a large fluctuation has the potential to affect safe water levels at the Project impoundment boat launch and provide an inconsistent environment for anglers. Further, if large impoundment fluctuations lead to recruitment failure for resident fish species, recreational opportunities to fish for said species will inevitably suffer.

Study Requests

Study Request 1: Bass Survey

1. Describe the goals and objectives of each study proposal and the information to the obtained.

The goal of this study is to determine whether Project operations (specifically, impoundment fluctuations) are impacting reproductive success of black bass species. Black bass species, including largemouth and smallmouth bass, may be particularly susceptible to rapid changes in water level, especially during the spring while eggs and larvae are most vulnerable. Past data collected by Yoder et al. in 2003 indicates that smallmouth bass represented the dominant fish species in Project waters. Additionally, bass are one of the most popular sportfish in Maine, with the Androscoggin River providing popular, quality smallmouth fisheries throughout most of its length. To ensure the health of these fisheries and the continued ability of Maine anglers to utilize this popular resource, MDIFW is requesting a study of black bass. A comprehensive survey of largemouth and smallmouth bass nests within the Project impoundment during mid-May to mid-June will help determine the degree to which fluctuations in headpond level may impact bass populations. Furthermore, collection of adult bass and subsequent aging of some individuals, when correlated with past data on impoundment fluctuations, will help identify any Project operations that may have led to bass year-class failure. Knowledge of the current status of these important sportfish will help determine the best course of action for future Project operations.

Objectives include 1) determining the number, depth, and spatial extent of black bass nests during a typical spawning season, as well as their vulnerability to fluctuations in impoundment level, and 2) collecting adult bass, aging of a subset of individuals to correlate with data on past fluctuations in impoundment level, and determination of any year-class failures related to Project operations.

2. If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Smallmouth bass in particular are a popular sportfish in the Androscoggin River, and information regarding their natural recruitment is essential to successful management. This study is requested to ensure that any agreed upon impoundment level fluctuations meet inland fisheries needs. Rapid changes in water level, such as those associated with large fluctuations in impoundments, can lead to habitat loss, nest failure, and insufficient recruitment to sustain resident fish populations.

3. If the requestor is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

MDIFW is a cabinet-level agency of the State of Maine.

4. Describe existing information concerning the subject of the study proposal, and the need for additional information.

The PAD states that the Project is typically operated as run-of-river, but that impoundment fluctuations are allowed up to four feet. It is unclear what the frequency, magnitude, and timing of impoundment fluctuations may be under existing Project operations. This information should be provided. There is also no information on the current status of bass recruitment or year-class failure within the Project impoundment.

5. Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

MDIFW typically requires notification prior to impoundment fluctuations exceeding one foot for hydropower projects and/or precludes them during sensitive spawning periods. Data collected will determine whether Project operations, which currently allow for impoundment fluctuations of up to four feet, are adversely impacting resident fish species. Further, results will inform the need for changes to existing Project operations pertaining to impoundment level for the upcoming license renewal.

6. Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

Surveys of resident fish populations are commonly requested during hydropower relicensing. This study request may be able to be accomplished in parallel with additional surveys of fish assemblage, both resident and diadromous, and should be a collaborative effort between MDIFW, other interested agencies, and the Applicant. Therefore, the study details, including the actual methodology, should be developed after a review of all study requests to minimize redundancy and meet the collective need for fish assemblage analyses. Black bass nests typically occur in relatively shallow water so surveys and counts can often be accomplished through visual analysis. Peak spawning usually occurs in southern Maine between mid-May and mid-June. Additionally, a similar electrofishing methodology as Yoder et al. (2006) and/or gillnetting may allow for sufficient collection of adult bass for aging purposes.

7. Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.

The level of effort and cost is commensurate with a project the size of the Lewiston Falls Hydroelectric Project and the likely license term. Only evaluation of bass nets *in situ* during the spawning season will allow for determination of risk to nests due to impoundment fluctuations.

Study Request 2: Fish Assemblage Study

1. Describe the goals and objectives of each study proposal and the information to the obtained.

While data on the fish assemblage of the Androscoggin River were relatively comprehensive when collected by Yoder et al. in 2003, much has changed in the intervening years. The proliferation of non-native species such as northern pike, spottail shiner, black crappie, and rock bass throughout the Androscoggin drainage calls into question the status of the fish community within the Project impoundment. Importantly, Project operations may help create an environment in which many of these species may thrive: all of the above listed species are often associated with more lentic habitats and higher levels of vegetation, characteristics that are more likely to be found in impounded reaches of a river. As the State of Maine continues to combat the spread of these introduced species, it is imperative to understand the degree to which operations of hydropower projects may influence their expansion. By conducting a comprehensive study of the fish assemblage in the Project impoundment, we can learn how each of these species may respond to impounded habitat and inform future operations for this project and for hydropower around the state.

The goal of this study is to assess relative changes to the fish community of the Project impoundment since previous surveys were completed in 2003. Of particular importance is the degree to which introduced species may have expanded their dominance of the fish community and therefore their probability of invading nearby systems. Objectives include a comprehensive analysis of species present and their relative abundances in the overall fish community.

2. If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

This study is requested to ensure that a full understanding of the present fish community is in place prior to the new license term. The spread of introduced species is a major concern for the

State of Maine and knowledge of source populations and how Project conditions may be influencing their expansion is imperative to limiting the impacts to resident fisheries.

3. If the requestor is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

MDIFW is a cabinet-level agency of the State of Maine.

4. Describe existing information concerning the subject of the study proposal, and the need for additional information.

The most recent comprehensive survey of Project fish assemblages was completed in 2003. Since that time, it is unclear how introduced species such as northern pike, black crappie, spottail shiner, and rock bass may have changed utilization of Project habitat. For some of these species that were not present in the Androscoggin River in Maine in 2003 (bluegill, rock bass) it is unclear to what degree they may have established and influenced existing fish communities.

5. Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

Project operations create impounded riverine habitat that resembles lentic habitat in function and may allow for more vegetative growth. This habitat type is associated with the proliferation of many of the introduced species referenced above. Therefore, study results would seek to determine the degree to which Project conditions and operations may have influenced colonization by introduced species. This information will further aid in evaluation of whether the Project meets Maine designated uses, habitat, and aquatic life criteria which may inform the State's Water Quality Certification process. Results would not only inform direct effects of the Project on the Androscoggin River drainage but could be applied Statewide to the cumulative impacts of impounded hydropower projects.

6. Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

Surveys of resident fish populations are commonly requested during hydropower relicensing. This study request may be able to be accomplished in parallel with additional surveys of fish assemblage, both resident and diadromous, and should be a collaborative effort between MDIFW, other interested agencies, and the Applicant. Therefore, the study details, including the actual methodology, should be developed after a review of all study requests to minimize redundancy and meet the collective need for fish assemblage analyses. However, a similar electrofishing methodology as Yoder et al. (2006) may be appropriate and would provide comparable data to previous sampling efforts. Additional methods such as gillnetting and/or shallow water seine netting may aid in collection of fish species that are often difficult to capture via electrofishing methods (e.g., American eel, northern pike).

7. Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.

The level of effort and cost is commensurate with a project the size of the Lewiston Falls Hydroelectric Project and the likely license term. Only evaluation of the fish assemblage *in situ* will allow for determination of current community composition and relative influence of introduced species.

References

Yoder, C.O., B. H. Kulik, and J.M. Audet. 2006. The Spatial and Relative Abundance Characteristics of the Fish Assemblages in three Maine Rivers. MBI Technical Report MBI/12-05-01. Grant X-98128601 report to U.S. Environmental Protection Agency, Region 1, Boston, Massachusetts. 136 pp. and appendices.

MDIFW also supports study requests from other natural resource agencies, including but not limited to the Maine Department of Marine Resources, Maine Department of Environmental Protection, US Fish and Wildlife Service, and the National Marine Fisheries Service.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

John Perry
Environmental Review Coordinator

Cc: Francis Brautigam, Joe Overlock—MDIFW Fisheries Division, Augusta Headquarters
Jim Pellerin, Nick Kalejs—MDIFW Fisheries Division, Region A
Casey Clark, MDMR
Kathy Howatt, MDEP
Julianne Rosset, USFWS
William McDavitt, NMFS

STATE OF MAINE
DEPARTMENT OF MARINE RESOURCES
21 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0021

JANET T. MILLS
GOVERNOR

PATRICK C. KELIHER
COMMISSIONER

January 5, 2022

Mr. Luke Anderson
Brookfield Renewable for
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Subject: **FERC No. 2302 – Lewiston Falls Hydroelectric Project**
Pre-Application Document Comments
Study Request Submission

Dear Mr. Anderson:

The Maine Department of Marine Resources (MDMR) has received and reviewed the Notice of Intent to File License Application and Pre-Application Document (PAD), submitted on behalf of Brookfield White Pine Hydro (Applicant or BWPH) on August 4, 2021. The PAD was submitted for the Lewiston Falls Hydroelectric Project (Project) (FERC No. 2302), located on the Androscoggin River in the Towns of Lewiston and Durham in Androscoggin County, Maine. BWPH requested and was authorized to use the Traditional Licensing Process (TLP).

Project Description

The Project consists of a dam comprised of four stone masonry sections, a concrete dam section, and an island spillway; a 200-acre impoundment; a powerhouse near the east end of Dam #4 containing two turbine/generators; two gatehouse buildings; electrical connections; and appurtenant facilities. The Project impoundment has a normal maximum surface area of 200 acres at a full pond elevation of 168.17 feet msl. A 1.34 -foot-high flashboard system is installed on the dam crest of the concrete dam (dam #5), a split rubber bladder is installed on Dam #4, and a single rubber bladder is installed on each of Dams #1, 2, and 3. The Project has a normal pond elevation of 168.17 feet, with negligible useable storage when operated in run-of-river-mode. The powerhouse is located at the east end of the falls and contains two vertical Kaplan turbine/generators with a combined FERC authorized rating of 36.354 MW.

Comments on the Pre-Application Document

3.2 Existing Project Facilities

1) Trashrack spacing and related infrastructure for the trashracks are not reported for any of the facilities at the Project. MDMR requests the Applicant include detailed information, including photos and diagrams, of the trashracks and related infrastructure for the Powerhouse and Gatehouse at the Project.

2) In the 2017 application for non-capacity amendment of the Lewiston Falls license, the gates at the Gatehouse are described as bottom opening.[1] The only information about the gate infrastructure at the Gatehouse included in the PAD is the following. "Flow into the Lewiston Canal System is regulated by seven hydraulically operated steep slide gates housed in a 9' wide, 12' tall opening. The total maximum hydraulic capacity of the gates is approximately 3,500 cfs." MDMR requests the Applicant include a more thorough description of the gates at the gatehouse including but not limited to: dimensions of each gate, crest elevation of the gates, crest elevation of the dam, design details, and operation details (I.e. prioritization).

3) The description of the Project in the PAD does not include any description of the Libbey, Cowan, and Columbia Mill Facilities and the canal system associated with them. These three mills and canal were once located south of the Monty Station powerhouse and tailrace and north of Main Street and are depicted in Figure 1 of the Lewiston Canal Stagnation Prevention plan.[2] Although no additional information on the three mills is included in the Stagnation Plan because they are located upstream of the Canal. Figure 3-2 of the PAD depicts the Project boundary and shows at least one of the three mill buildings. While the three mills are not within the project boundary, the intake and outlet of the canal for the mills would directly adjoin Project boundary at the impoundment and in the tailrace. The canal system for these three mills is not obvious in the provided materials, see figure referenced above, but Figure 3-2 of the PAD appears to show an inclusion of the downstream end of the canal. MDMR requests the Applicant include a description of the Libbey, Cowan, and Columbia Mill Facilities and the canal system associated with them. If these facilities and the canal have been decommissioned, MDMR requests the Applicant provide a description of the measures undertaken for decommissioning with particular attention to measures taken to prevent water from flowing into the canal from the impoundment and to prevent fish from entrainment into these facilities. Photo documentation of the site would also be appreciated to help depict the current state of the site.

3.2.4 Gatehouse and Canals

As stated in the Draft Biological Assessment "Additional generating capacity exists within the Lewiston Canal system, but is currently not being operated … the canal system may be retired at some point during the term of this ISPP. If so, the canal system may no longer pass flow." In 2017, FERC accepted the license amendment to decommission the generating facilities in the canal system and remove the

[1] Accession Number: 20170224-5087. At page 37-38.
[2] Accession Number: 20170224-5087. See Figure 1 at page 4.

canal system from the Project area.[3] The decommissioning plan included license conditions to provide a minimum flow of at least 50 cfs into the canal at all times, except during maintenance, or in the event of operating emergencies. In addition, periodic flows of 300 cfs are to be provided as part of Lewiston Canal Stagnation Plan.[4] The refreshment flow schedule was described as twice every 7 days from June 1 to September 30 and refresh "as needed"[5] from October 1 to May 31.

The Applicant has made it clear that the canal system is no longer part of the project area, but the Applicant owned and operated the canal system until 2017 and should have the appropriate level of detail on the facilities and structures of the canal system to inform the resource agencies. In addition, the Project provides regular flows to the canal system with the Main Gatehouse project facility and therefore the Applicant has the ability to adjust the timing, ramping, and magnitude of flows to the canal system. These changes in flows have the potential to attract upstream migrants as well as strand downstream migrants. MDMR also understands the Stagnation Prevention Plan was agreed upon my multiple stakeholders and There is no information on record of surveys of the canal system to determine the ability of American eels to migrate through the canal system including through the decommissioned generating facilities and other water control structures. In the 2017 application for non-capacity amendment of the Lewiston Falls license, BREG describes the canal system as the following:

> *"There is no natural fish habitat in the Canal System. Some fish may periodically utilize the canal, but there is no information available on fish that may inhabit or occasionally occupy the Canal System. There are no bar racks located at the canal intake, and though the gates open from the bottom, it is possible that some fish are entrained into and passed through the canal. Similarly, fish may occasionally enter the Canal System at the downstream outlets, but with the possible exception of American eel, would be expected to be impeded by the existing weirs."*

In order to better understand the potential for impacts to diadromous species, MDMR requests the Applicant provide detailed information about the canal system, decommissioned generating facilities, and associated water control structures. This information should include a description of how water flows through each of these facilities, details water control structures (I.e. types of gates, trash racks, elevations of component parts), and elevations of canals and water control structures.

5.3.1 Fish and Aquatic Resources

The PAD references Yoder et al 2006 indicating the presence of American eel. We recommend that the Final License Application include Yoder et al. (2015), specifically the fish assemblage data that are included in the Appendix.[6]

[3] Accession Number: 20171109-3008.
[4] Accession Number: 20170224-5087
[5] "Need for Canal Stagnation Prevention refreshment flow during the winter months will be determined through onsite inspection by the owner of the Canals." Accession Number: 20170224-5087. At page 6.
[6] Yoder, C.O., E.T. Rankin, and Lon E. Hersha. 2015. Development of Methods and Designs for the Assessment of the Fish Assemblages of Non-Wadeable Rivers in New England. MBI Technical Report MBI/2015-3-3. U.S. EPA Assistance Agreement RM-83379101. U.S. EPA, Office of Research and Development, Atlantic Ecology Division, Narragansett, RI and U.S. EPA, Region I, Boston, MA. 152 pp. http://www.midwestbiodiversityinst.org/.

5.3.5 Fish Passage on the Androscoggin River

1) The PAD states, "Historically, Lewiston Falls, the natural falls at the site of the Lewiston Falls Project dam, was a natural barrier to upstream movement for Alewife, Blueback Herring, Striped Bass, American Shad, and likely Sea Lamprey (MDMR and MDIFW 2017)."

   This statement is incorrect and does not accurately represent the text that it is referencing. The 2017 Draft Androscoggin River Management plan states, "On the mainstem Androscoggin River, Lewiston Falls stopped the upstream migration of Alewife, American Shad, Blueback Herring, Striped Bass and ***perhaps*** (emphasis added) Sea Lamprey, while Rumford Falls was a barrier to Atlantic Salmon (Atkins 1887)." While this statement mentions Sea Lamprey, the 1887 reference document does not include any information on the species in the Androscoggin River.[7][8] At the time of writing, Lamprey were not a commercially or recreationally valued species and therefore were not worth documenting comprehensively as was done with other species. At this time, the upstream extent of Sea Lamprey on the Androscoggin River is unknown, but it is assumed to be Rumford Falls as that is the historic upstream extent of Atlantic Salmon. Given the lack of natural barriers and the similarities in upstream migration behavior and spawning habitat between Sea Lamprey and Atlantic salmon, it is assumed that Sea Lamprey had a similar historic extent as salmon in all Maine rivers[9]. MDMR requests the PAD be updated to include the above information related to Sea Lamprey.

2) The PAD continues, "With no plans for the restoration of Atlantic Salmon to the river above the Project in the foreseeable future, no fish passage facilities are currently provided or necessary for anadromous species at the Lewiston Falls Project. American eel are capable of ascending Lewiston Falls and have been identified in the mainstem above Lewiston Falls (Yoder et al. 2006[10]) despite the fact that there are no eel passage facilities at the Deer Rips or Gulf Island dams.)"

   The exclusion of the Androscoggin River above Lewiston Falls from the Atlantic Salmon critical habitat listing has prioritized habitat in the lower Androscoggin River currently. That said, the critical habitat listing for salmon has nothing to do with restoration of other indigenous species. As the PAD clearly states, American eel are present upstream of the Lewiston Falls Project, but unlike the language in the PAD, eels are present above several dams in the face of the lack of adequate upstream and downstream measures for more than a century. Of the three projects downstream from Lewiston Falls, Worumbo was the first to install dedicated upstream eel

[7] Atkins, C. G. 1887. The river fisheries of Maine. Pages 673-728 in G. B. Goode, editor. The fisheries and fishing industries of the United States, Section V, Volume 1. Government Printing Office, Washington, D.C

[8] Later text references Foster and Atkins 1868. Similar to Atkins 1887, this document does not include information on Sea Lamprey. Foster, N. W. and C. G. Atkins. 1868. First report–1867. Reports of the Commissioners of Fisheries of the State of Maine. Augusta, Maine.

[9] Nislow, K. H., and B. E. Kynard. 2007. The ecological role of Sea Lamprey in freshwater streams of the North Atlantic basin. in A. Haro, editor. Challenges for Diadromous Fishes in a Dynamic Global Environment. American Fisheries Society, Halifax, NS.

[10] Yoder, C.O., B. H. Kulik, and J.M. Audet. 2006. The Spatial and Relative Abundance Characteristics of the Fish Assemblages in three Maine Rivers. MBI Technical Report MBI/12-05-01. Grant X-98128601 report to U.S. Environmental Protection Agency, Region 1, Boston, Massachusetts. 136 pp. and appendices.

passage in 2012. Upstream eel passage measures have been included in mandatory measures for the Pejepscot Project (P-4784) as part of the ongoing FERC relicensing. Similar measures are expected for the Brunswick Project (P-2284) during the relicensing process. The current license for the Brunswick Project expires in 2029. MDMR has included several study requests in this filing to address gaps in information that will aide in development of appropriate measures to provide safe, timely, and effective eel passage at the Lewiston Falls Project. Any measures should be implemented as soon as practicable upon the completion of the licensing process to reduce the impact on eels that interact with the Project at present.

5.6.1 Federally Threatened and Endangered Species

While the Androscoggin River above the confluence of the Little Androscoggin River was not included in critical habitat for GOM DPS of Atlantic salmon, the mainstem of the Androscoggin River up to Rumford Falls is well documented as historic habitat for the species. As climate change continues to impact habitat downstream of the Projects, habitat in the mainstem Androscoggin River may be an important asset to recovering Atlantic salmon in the future.

6.2.3 Fish and Aquatic Resources

The PAD references the Atlantic Salmon Stranding Plan but does not report any data on implantation of this plan at the Project. As stated in the Draft Biological Assessment,

"At the cessation of spill events, it is possible that salmon could become trapped on the ledges and in pools. To further reduce the potential effects of stranding on Atlantic salmon and other fish species at the Lewiston Falls Project, the Licensee will monitor the Great Falls area after significant spill events and during flashboard replacement and collect any stranded Atlantic salmon and release them back into the Androscoggin River. The Licensee will record its monitoring actions following each significant spill event, and the records of any Atlantic salmon found stranded, will be reported annually."[11]

MDMR requests the licensee report the measures that have been taken to monitor the Great Falls area under the Stranding Plan. We request the licensee share documentation of these efforts with as much detail as is available. Data should include date, time, estimated cfs in river, protection operations, and other relevant details. Stranding and injury during spill events is a concern for adult eels at the project. Reporting of the above requested information will help to inform the frequency of such events during the downstream migration period for eels and the efficacy of the stranding plan approach.

6.2.3.2 Proposed Studies

The Applicant states,

"Similarly, because the status of anadromous fish runs in the lower Androscoggin River below the Project are monitored and well understood, and because there are no plans to restore anadromous fish species to the Androscoggin River at this time, the Licensee is proposing no additional study of

[11]Accession Number: 20130221-5160. At page 78

anadromous fish species at the Project. Catadromous American eel are able to ascend Lewiston Falls and do have access to the river above the Project. Continued operation of the Project with no changes, as proposed, will have no impact on Project fisheries. For these reasons, no further studies of resident or diadromous fish are necessary or proposed."

Under Maine State Law (12 MRSA, §6021), the Maine Department of Marine Resources mandate is "…to conserve and develop marine and estuarine resources; to conduct and sponsor scientific research; to promote and develop the Maine coastal fishing industries; to advise and cooperate with local, state and federal officials concerning activities in coastal waters; and to implement, administer and enforce the laws and regulations necessary for these enumerated purposes, as well as the exercise of all authority conferred by this Part." The Project boundary includes historic habitat for Atlantic salmon, current habitat for American eel, and potential historic habitat for Sea Lamprey. While MDMR has not developed a management plan specific to this reach of the Androscoggin River, it is MDMR's mandate to restore indigenous species to the habitats within the Project boundaries and to reduce the impacts of the Project on these species during their migrations.

The Applicant states the Project operations will have no impact on fisheries. MDMR finds this statement to be inaccurate. It is well known that the upstream migration of diadromous species is blocked or highly reduced by dams without adequate fishway facilities. In addition, it is well known that entrainment of fish into turbines results in injury and mortality. These are well known impacts that are imposed on eel that are currently present within the Project boundary as they attempt to complete their lifecycle. MDMR has included several study requests in this filing to address gaps in information that will aide in development of appropriate measures to provide safe, timely, and effective passage at the Lewiston Falls Project. Any measures should be implemented as soon as practicable upon the completion of the licensing process to reduce the impact on eels that interact with the Project at present.

Thank you for the opportunity provide comments on the Lewiston Falls Project. Please contact Casey Clark (casey.clark@maine.gov) with any questions.

Sincerely,

Patrick C. Keliher, Commissioner

cc: Sean Ledwin, MDMR
John Perry, MIF&W
Kathy Howatt, DEP
Amanda Cross, USFWS
William McDavitt, NMFS

RECOMMENDED STUDIES

BWPH is not proposing to undertake any studies as part of this relicense proceeding. Enclosed please find our formal study requests in the format required pursuant to 18 CFR §4.38(b)(5). In addition, MDMR supports the study requests of Maine Department of Environmental Protection, Maine Department of Inland Fisheries and Wildlife, and NOAA Fisheries.

None of the study requests submitted by MDMR should be interpreted as in conflict with the management goals, comments, or requests of other natural resource agencies.

Study Requests

1. Three-Dimensional Computational Fluid Dynamics (CFD) Modeling Upstream and Downstream of the Discharge and in the Vicinity of Powerhouse Forebays
2. Upstream Juvenile Eel Assessment
3. Downstream Adult American Eel Passage Assessment
4. Downstream Passage Alternatives Study
5. Evaluation of the Size of American Eels and the Timing of their Downstream Migratory Movements
6. Project Flow Reregulation Study

Study Request #1
Three-Dimensional Computational Fluid Dynamics (CFD) Modeling Upstream and Downstream of the Discharge and in the Vicinity of Powerhouse Forebays

Goals and Objectives
The goal of this study is to determine the flow field conditions that exist upstream of the project powerhouse and dams under existing condition and potential future conditions. The information from this study can be coupled with data from our other requested studies of downstream passage to develop a comprehensive understanding of migratory fish behavior. The objective of this study is to develop a series of layered drawings that show velocity magnitudes at discharges that have been agreed upon by the resource agencies and the licensee. We request that the following three flow conditions be studied at the minimum: a) river flow at powerhouse capacity, no spill; b) river flow at 50% powerhouse hydraulic capacity, no spill; and c) river flow at 20% exceedance on the May through October flow duration curve with the powerhouse operating at capacity and excess flow being spilled either through gates or over the spillway. The CFD modeling should also be conducted for at least these three aforementioned conditions for each alternative studied in the Downstream Fish Passage Alternatives Study. We expect the results demonstrate velocities and flow orientations upstream of the powerhouse and along the racks.

The goal of this study is to determine the potential impacts of the Lewiston Falls Project on: (1) the zone of passage for migratory fish near turbine discharge; and (2) natural flow regimes in the Androscoggin River immediately upstream and downstream of each project.

Specific objectives of the study include:
1. Develop a CFD model of the full width of the Androscoggin River upstream and downstream of each projects discharge.

2. Model flow characteristics upstream and downstream of the project under existing project operations and at several representative river flow levels, as well as any other modifications under consideration (including potential future impacts to operations as a result of climate change), to assess potential impacts to fish and wildlife resources.

3. Assess velocities and flow fields at, and in proximity to each project's intake/discharge structure when generating, and their potential to (1) interfere with fish migration; (2) create undesirable attraction flows; and (3) result in fish entrainment and/or impingement.

4. Assess the potential for velocity barriers to aquatic organism movement in the mainstem river resulting from generation flows at each project, alone and in combination with generation flows from the other projects on the Androscoggin River.

5. Model, and then evaluate, flow characteristics under alternative project operations with potential measures to avoid, minimize, or mitigate impacts to fish and wildlife resources.

6. Define flow velocities, fields/magnitudes, and direction in front of each project's powerhouse.

This information is necessary to properly assess the scale, and feasibility, of potential upstream and downstream passage alternatives (see the *Downstream Passage Alternatives* study request). The requested information can be utilized to create a more productive, cost-effective, and efficient

alternatives analysis process by helping to narrow the focus to a minimal number of feasible alternatives.

Resource Management Goals

MDMR is a cabinet level agency of the State of Maine. MDMR was established to regulate, conserve, and develop marine, estuarine, and diadromous fish resources; to conduct and sponsor scientific research; to promote and develop marine coastal industries; to advise and cooperate with state, local, and federal officials concerning activities in coastal waters; and to implement, administer, and enforce the laws and regulations necessary for these purposes. MDMR is the lead state agency in the restoration and management of diadromous (anadromous and catadromous) species of fishes. In order to achieve the State of Maine's restoration goals for these species in the Androscoggin River, the Projects must provide safe and effective passage.

Public Interest

The requestor is a state natural resource agency.

Existing Information and the Need for Additional Information

No project-specific information exists that will allow for a comprehensive assessment of existing project operations on Androscoggin River flows and on fish and aquatic organisms in the project areas upstream and downstream the Project. The Pre-Application Document does not contain any information, or tool(s), that will allow for predictions of impacts of alternative project operations, or potential mitigation measures to protect or enhance aquatic fish and wildlife resources. Further, a comprehensive understanding of fish behavior at each powerhouse forebay is needed to create safe, timely, and effective upstream and downstream passage for American Eel on the Androscoggin River. CFD models are a relatively cost-effective way to analyze existing and future conditions. As such, changes in the amount of attraction water, changes in which turbines are operating, and which spillway gates and rubber dams are releasing water can all be examined.

MDMR notes, modeling this information now can help the resource agencies, as well as the Applicant, account for potential drought and/or flood related scenarios that might occur during the duration of any newly issued license, due to climate change and other factors.

Nexus to Project Operations and Effects

The Lewiston Falls Project has direct impacts to instream flows, aquatic habitats, and upstream and downstream migrating American eel in the Androscoggin River. The development of the requested CFD models will aid in determining the potential impacts of the Lewiston Falls Project and Project Facilities. For downstream passage, the U.S. Fish and Wildlife Service (FWS) has velocity vector guidelines associated with intake racks and guidance screens; the output from these models will inform the resource agencies under what conditions appropriate velocities are being met and when they are being exceeded. Additionally, modeling of flow will aide in our interpretation of year one downstream passage telemetry results. Therefore, aspects of the CFD modeling effort could focus on the locations identified as important in the study results and the Applicant could assess changes to structures of operations and evaluate them in the model. Suitable alternatives would then be tested in year three studies.

Methodology Consistent with Accepted Practice

A three-dimensional CFD model has become an increasingly common standard of analysis at hydroelectric projects across the nation. Within the northeast region, we have seen these types of

models developed at the Worumbo (P-3428)[12], Holyoke (P-2004), Brunswick (P-2284), Shawmut (P-2322), Milford (P-2534) and Lowell (P-2790) projects. We would expect to engage with the licensee in terms of determining the appropriate areas and flows to be modeled. We expect the spatial extent of the model at each study site will vary. Given the large number of ways in which output from these models can be presented and the near infinite number of flows which could potentially be modeled, we would expect to consult with the Applicant to reach agreed upon modeling efforts and scenarios to be examined.

Level of Effort/Cost, and Why Alternative Studies Will Not Suffice

The cost of developing, running, and testing a CFD model can vary tremendously; one large variable in determining the cost is based on the amount of existing bathymetric data to which the Applicant currently has access. We roughly estimate the maximum cost of the CFD model to be $50,000, assuming no bathymetric data currently exists. Proactive communication with resource agencies will reduce the cost and iterative effort. Given the level of effort that has occurred at other projects where licensees have proposed to amend their license, we see the level of effort requested here as reasonable, given that the Applicant is seeking a renewal of its license.

Regarding alternatives, no project-specific instream flow analysis tool has been developed for the Androscoggin River that will allow for assessment of existing operations and alternative operational impacts on instream flow and aquatic habitat for fish and wildlife resources. Further, the model, once built, can be used to simulate flow conditions in the vicinity of the Project during the migratory fish passage season and can be used together with behavior studies (i.e., telemetry studies and entrainment studies requested herein) to assess the impacts of varying project operations or potential mitigation operations and measures on fish migration and aquatic habitat. MDMR knows of no other tool that will provide for these types of assessments. No alternatives are proposed.

[12] Accession Number 20210928-3001

Study Request #2
Upstream Juvenile American Eel Passage Assessment

Several recent studies have documented the presence of American eel above the Lewiston Falls Project in the Androscoggin River watershed. Dams, such as the Lewiston Falls Project, are known to impair migration success for catadromous species such as American eel (ASMFC 2014). Presently, upstream passage facilities specific to the needs of migrating juvenile eels are not available at the Project (or any of the dams that comprise the Project Facilities). Installing upstream eel passage at the Project will address direct project related impacts and facilitate restoration of American eel within the Androscoggin River watershed. The study request below is intended to provide data necessary to develop reasonable and prudent conservation measures, specifically safe, timely and effective passage for American eel.

If aspects of the project design or project operations changes with any new license, this study may need to be repeated.

Goals and Objectives
The goal of this study is to assess the locations for dedicated upstream passage for American eel. The study has two objectives:

1. Conduct systematic surveys of eel presence/abundance below the A) four stone masonry sections (Dams No. 1, 2, 3, and 4), B) concrete dam section (Dam No. 5), C) the Island Spillway, D) the Powerhouse, E) the two gatehouse buildings (Main Gatehouse and Little Gatehouse), F) the lower gatehouses on the canal or other identified obstructions to passage on the bypass canal, and any other locations within the Project Facilities to identify areas of concentration of eels staging in pools or attempting to ascend wetted structures that would potentially establish the most effective location to place upstream eel passage facilities.
2. Collect eels with temporary trap/pass devices at areas identified from surveys as potential location of eel concentrations to assess whether eels can be collected/passed in substantial numbers, and whether locations are viable sites for permanent eel trap/pass structures.

Resource Management Goals
MDMR is a cabinet level agency of the State of Maine. MDMR was established to regulate, conserve, and develop marine, estuarine, and diadromous fish resources; to conduct and sponsor scientific research; to promote and develop marine coastal industries; to advise and cooperate with state, local, and federal officials concerning activities in coastal waters; and to implement, administer, and enforce the laws and regulations necessary for these purposes. MDMR is the lead state agency in the restoration and management of diadromous (anadromous and catadromous) species of fishes.

NOAA Fisheries developed the Androscoggin River Watershed Comprehensive Plan for Diadromous Fish in 2020[13], which was accepted by the Commission as a comprehensive plan[14]. The comprehensive plan states:
"The restoration goals for the Androscoggin River Watershed are to provide access to historical spawning, rearing, and migration habitats necessary for diadromous species to complete their life cycles and to make accessible seasonal habitats necessary to support the enhancement of the stocks." The comprehensive plan also notes that the "restoration approach for American eel includes installing and maintaining upstream eel ways at hydroelectric facilities within the Androscoggin River Watershed."

[13] Accession Number: 20200414-5171.
[14] Accession Number: 20200618-3041.

The Atlantic States Marine Fisheries Commission (ASMFC) has developed three documents related to the management of American eel and hydropower facilities:

1. Interstate Fishery Management Plan for American Eel. April 2000. Atlantic States Marine Fisheries Commission.
2. Addendum II to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved October 23, 2008. 8 pp.
3. Addendum III to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved August 2014. 19 pp.

Objectives of the management plan include: (1) protect and enhance American eel abundance in all watersheds where eel now occur; and (2) where practical, restore American eel to those waters where they had historical abundance, but may now be absent, by providing access to inland waters for glass eel, elvers, and yellow eel, and adequate escapement to the ocean for pre-spawning adult eel. Addendum II contains specific recommendations for improving upstream and downstream passage of American eel, including requesting that member states and jurisdictions seek special consideration for American eel in the Commission's relicensing process.

MDMR's management goal is to restore American eel to their historic habitat in the Androscoggin River. The waters upstream of Projects represent significant habitat for American eel. The protection, enhancement, and restoration of this species relies on safe, timely, and effective upstream fish passage at the Projects.

Public Interest

The requester is a state natural resource agency.

Existing Information and the Need for Additional Information

The PAD does not provide information relative to areas eels concentrate below the Lewiston Falls Projects or an assessment of the numbers and size of eels attempting to ascend each facility. Data from this study will provide information in support of the licensing process and in developing the administrative record for potential mitigation measures under Section 10(j) of the Federal Power Act.

Nexus to Project Operations and Effects

Dams impede the safe, timely, and effective passage of eels. The ability of eels to pass a dam depends on factors such as its height, hydraulics, presence of climbable surfaces (e.g., rough surface, wetted substrate), presence of predators, and risk of exposure to heat or drying while climbing a dam among others (Solomon and Beach 2004). Passage is also limited by the size of eel present. Only small juvenile eels are able to scale vertical surfaces (Machut et al. 2007). The design of the East Millinocket Development, Dolby Development, Millinocket Development, North Twin Development, Millinocket Lake Storage Development, and the Ripogenus dam creates multiple potential sites for upstream migrating eels to congregate. Site-specific data are necessary to understand project effects and support the decision process for properly designing and siting eel passage facilities.

Methodology Consistent with Accepted Practice

This study request consists of two parts: (a) an initial survey for presence and identification of areas where juvenile eels congregate and (b) a site evaluation for permanent eel passage. The methodologies described here are consistent with commonly accepted practices.

1. Objective 1: Systematic Surveys

Surveys of eel presence and relative abundance should be conducted at regular intervals (as described below) throughout the eel upstream migratory season (approximately April 1 to November 30). Surveys should consist of visual inspection and trapping in likely areas where eels may concentrate. Areas of quiescent water and leakage points along the downstream face of the dams should be targeted. Methods should include visual surveys (on foot, from a boat, or snorkeling) and trapping using small mesh (< 1/8" clear opening) baited eel pots. Visual surveys should be performed once per week, at night, preferentially during precipitation events. Trap sets should be performed once per week, with an overnight soak time. Recorded data should include location, observation of eels (presence, absence, relative numbers, relative sizes, behaviors, time/date of observation), and survey method.

2. Objective 2: Trap/Pass Collections

Areas identified from the systematic surveys as having significant number of eels present should be targeted as potential areas for permanent eel trap/passes and should be initially assessed using temporary/portable trap passes. Temporary trap/passes should be purpose-designed and built for each location and operated throughout the eel upstream migratory season in the year following the survey. Ramp-type traps with supplementary attraction flow are preferred temporary trap/pass designs (Solomon and Beach 2004). Traps should operate daily, with catches quantified every 2-3 days. Data recorded should include location, trapping interval, absolute numbers of eels trapped, relative eel sizes, and hydraulic and environmental conditions during the trapping period.

All collected eels from surveys should be released at their point of capture; those eels collected from trap/pass collections should be transported to and released above each respective dam.

Level of Effort/Cost, and Why Alternative Studies Will Not Suffice

The level of cost and effort for the survey component of the study would be low; a minimal number of personnel may be able to conduct the weekly surveys. The trap/pass component would require low to moderate cost and effort. We estimate the cost will be approximately $50,000 for the study. No alternatives are proposed.

REFERENCES

ASMFC. 2014. Addendum IV to the Interstate Fishery management Plan for American Eel.

Machut, L.S., Limburg, K.E., Schmidt, R.E., and Dittman, D. 2007. Anthropogenic impacts on American eel demographics in Hudson River tributaries, New York. Transactions of the American Fisheries Society 136: 1699-1713.

Solomon, D.J., and Beach, M.H. 2004. Manual for provision of upstream migration facilities for Eels and Elver. Environment Agency, Bristol, UK.

Study Request #3
Downstream Adult American Eel Passage Assessment

Goals and Objectives
The goal of this study is to determine the impact of the Lewiston Falls Project on the outmigration of silver eels in the Androscoggin River. Project operations can result in delay, mortality or injury during emigration. It is important to understand the passage routes at the project and the potential for delay, injury, and mortality to determine measures and recommendations to increase survival and improve fish passage at the project.
The objectives of this study are:

1. Quantify the movement rates, including delays, and relative proportion of eels passing via various routes at the project (i.e., through the turbines, via spill at the dams, through the gatehouse, through the downstream canal system, etc.).
2. Quantify the relative proportion of eels passing each potential emigration route (spill over dam sections, powerhouse, through gatehouse) at the project during various project operations.
3. Evaluate instantaneous and latent mortality and injury of eels passed via each potential route.

Resource Management Goals
MDMR is a cabinet level agency of the State of Maine. MDMR was established to regulate, conserve, and develop marine, estuarine, and diadromous fish resources; to conduct and sponsor scientific research; to promote and develop marine coastal industries; to advise and cooperate with state, local, and federal officials concerning activities in coastal waters; and to implement, administer, and enforce the laws and regulations necessary for these purposes. MDMR is the lead state agency in the restoration and management of diadromous (anadromous and catadromous) species of fishes.

NOAA Fisheries developed the Androscoggin River Watershed Comprehensive Plan for Diadromous Fish in 2020[15], which was accepted by the Commission as a comprehensive plan[16]. The comprehensive plan states:
"The restoration goals for the Androscoggin River Watershed are to provide access to historical spawning, rearing, and migration habitats necessary for diadromous species to complete their life cycles and to make accessible seasonal habitats necessary to support the enhancement of the stocks." The comprehensive plan also notes that the "restoration approach for American eel includes installing and maintaining upstream eel ways at hydroelectric facilities within the Androscoggin River Watershed."

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1. Interstate Fishery Management Plan for American Eel. April 2000. Atlantic States Marine Fisheries Commission.
2. Addendum II to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved October 23, 2008. 8 pp.
3. Addendum III to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved August 2014. 19 pp.

Objectives of the management plan include: (1) protect and enhance American eel abundance in all watersheds where eel now occur; and (2) where practical, restore American eel to those waters where

[15] Accession Number: 20200414-5171.
[16] Accession Number: 20200618-3041.

they had historical abundance, but may now be absent, by providing access to inland waters for glass eel, elvers, and yellow eel, and adequate escapement to the ocean for pre-spawning adult eel. Addendum II contains specific recommendations for improving upstream and downstream passage of American eel, including requesting that member states and jurisdictions seek special consideration for American eel in the Commission's relicensing process.

Addendum II contains specific recommendations for improving upstream and downstream passage of American eel, including requesting that member states and jurisdictions seek special consideration for American eel in the Federal Energy Regulatory Commission relicensing process.

MDMR's management goal is to restore American eel to their historic habitat in the Androscoggin River. The waters upstream of the Project represent significant habitat for American eel. The protection, enhancement, and restoration of this species relies on safe, timely, and effective passage at the Project.

In addition, the National Marine Fisheries Services (NMFS) developed the Androscoggin River Watershed Comprehensive Plan for Diadromous Fish in 2020.[17] This plan was accepted by the Federal Energy Regulary Commission as a comprehensive management plan on June 18, 2020.[18] This plan is explicit in regards to the need for downstream protective measures to prevent turbine entrainment and mortality. Specifically, the plan notes that "downstream protection measures and bypasses are necessary at hydroelectric facilities, as turbine mortality is a significant threat to pre-spawn silver eels (Shepard 2015, ASFMC 2013)."

Public Interest
The requester is a state natural resource agency.

Existing Information and the Need for Additional Information
The PAD does not contain information on the route of passage or the amount of delay that occurs for emigrating adult eels. To date, no directed studies of eel entrainment or mortality have been conducted at the projects. These information gaps need to be filled so the natural resource agencies can assess the relative and cumulative impacts of project operations on outmigrating eels and develop adequate passage and protection measures to meet management goals and objectives.

Nexus to Project Operations and Effects
The Lewiston Falls Project does not have entrainment prevention measures in place at their respective turbine intakes, nor are there designated spillway passage routes or fish bypass systems. To determine overall project survival, we need to understand the routes of emigration, the potential for delay under different river flow conditions and project operations, and the level of injury and/or mortality resulting from each potential passage route (i.e., the turbines, the sections of the dam, the Canal, etc). This study will contribute information in support of the licensing process, and development the administrative record in support of potential mitigation measures under Section 10(j) of the Federal Power Act.

Methodology Consistent with Accepted Practice
In order to understand the movements of outmigrating silver eels as they relate to operations at

[17] Accession Number: 20200414-5171.
[18] Accession Number: 20200618-3041.

the Lewiston Falls Project, radio telemetry technology should be utilized. Radio- and PIT-tagging is an accepted technology which has been used for a number of studies associated with hydropower projects, including at projects in the mainstem Penobscot River and the Merrimack River.

Studies should be designed to investigate the size class among the full spectrum of silver eels at each project, route selection (i.e., entrainment vs. spill vs. Canal) independently from estimation of mortality/injury, because these metrics require different methodologies. Studies will also likely benefit from data collected over two study years to account for differences in environmental conditions and natural variation in eel migration (especially route selection studies, which may be more significantly affected by environmental conditions during a given season than mortality/injury studies). It is also envisioned that results from route selection studies can guide design of turbine mortality studies. Therefore, it is proposed, at a minimum, route selection studies be conducted in multiple years, but mortality/injury studies may be conducted after the first year of route selection studies have been completed.

Objective 1: Route Selection

This study will involve systematic releases of radio- and PIT-tagged silver phase eels at strategic points above areas of interest, to assess general routes of passage (i.e., via spill, bypass, or turbines). Active downstream migrants should be collected within-basin if possible, but fish sourced from out-of-basin may be acceptable to meet sample size demands. Experimental fish must meet morphometric (e.g., eye diameter relative to body size) criteria to ensure they are migrant silver phase. Collections should be made within the migratory season, and eels should be tagged and released within 21 days after capture, but preferably within 7 days (particularly if the test eels are from out-of-basin).

A minimum number of 150 telemetered eels (e.g., five separate groups of approximately 30 eels each) per development will be required to maximize the data return. Tagged eels should be released at an appropriate distance upstream of the Project Facilities. Groups of eels should be released during spill and non-spill and during periods of low, moderate, and high generation conditions. All operational measures during these releases must be documented included releases from the Gatehouse into the Canal system. Since fish can drift a considerable distance downstream after they have died (Havn et al. 2017), a minimum of 25 dead eels should also be released as a control group in this study. Additionally, a control is needed to allow comparisons of movement rate and success of passed and non-passed eels in reaching the detection point downstream. Therefore, an additional 20 telemetered (uninjured) eels should be released below each project and tracked as they emigrate.

Telemetry receivers and antennas should be located upstream and downstream of the each section of the dam, upstream and downstream of the Main Gatehouse, above and below the decommissioned generation facilities in the canal system at turbine intakes, the station tailrace, downstream of the confluence of the Androscoggin River and the canal system, and downstream of the Brunswick Project (FERC No. 2284). These locations will permit assessment of passage via the following potential routes: A) four stone masonry sections (Dams No. 1, 2, 3, and 4), B) concrete dam section (Dam No. 5), C) the Island Spillway, D) the Powerhouse, E) the Main Gatehouse, and F) the lower gatehouses on the canal or other identified obstructions to passage in the bypass canal. While the canal system is no longer part of the Project facilities, water is released through the Main Gatehouse and creates the potential for adult eels to migrate via this route. The final placement of receivers and antennas should be developed in consultation with the fisheries agencies.

Mobile tracking (i.e., via boat or streambank) in the river and canal between release sites and several kilometers downstream will be performed at regular intervals during and after releases to confirm routes and fates of passed fish or lost fish.

Movement rates (time between release and detection at radio antenna locations, and between additional radio antenna locations) of eels passing the projects by various routes will also be quantified.

The route selection portion of this study should occur in both study years to capture variation in flow and spill conditions at the Project facilities.

Objective 2: Spill, Bypass, and Turbine Mortality/Injury Studies
Spill, gatehouse/canal, and turbine mortality will be assessed using a radio-telemetric balloon tag method. A minimum number of 70 tagged eels will be required to assess impact of relevant project facilities: one group of 30 eels to assess passage via spill at each section of the dam, a separate group of 20 eels to assess the Main Gatehouse and canal system, and a final group of 20 eels to assess turbine passage at the project.

For spill mortality sites (dam spillways and downstream bypasses), tagged eels will be injected or released into spill flow at points where water velocity exceeds 10 ft/sec to minimize the possibility of eels swimming upstream into the headpond or canal. Passed balloon-tagged eels will be recovered below areas of spill and held for 96 hours in isolated tanks for observation of injury and latent mortality; unrecovered balloon-tagged eels will be censored from the data. Passed eels should be x-rayed for any potential injuries per Muller et al. 2020.

For turbine mortality sites, tagged eels will be injected into intakes of all units associated with the projects, operating at a full range of settings where intake water velocity exceeds 10 ft/sec to minimize the possibility of eels swimming back upstream through the intakes. Passed balloon-tagged eels will be recovered in the tailrace(s) and held for 96 hours in isolated tanks for observation of injury and latent mortality; unrecovered balloon-tagged eels will be censored from the data.

X-ray imaging should be used to assess internal injuries of recovered balloon-tagged eels. Mueller et al. 2020 demonstrated that 29 percent of individuals with vertebral fractures did not present externally visible signs of severe injury and x-ray imaging showed that skeletal fractures were most pronounced for eel. Therefore, this method will ensure accurate documentation of injuries sustained during passage.

If the balloon-tag mortality component of the study occurs in study year one, all possible route selection sites would need to be evaluated. If the balloon-tag mortality component of the study occurs in study year two, results from the route selection study could be used to inform which sites need to be evaluated for mortality. Eels recovered from balloon-tag studies should not be used for route selection studies.

Data analyses of route selection and mortality (instantaneous and latent) will follow standard methodology.

Project operation (flows, levels, gate openings, number of units operating and operation level) and environmental conditions (river flow, temperature, turbidity, air temperature, precipitation) will be monitored regularly (hourly measurements if possible) throughout the duration of the studies and assessed for potential relationships to passage route selection, migratory delay, and/or passage survival.

These methodologies are consistent with accepted practice.

Level of Effort/Cost, and Why Alternative Studies Will Not Suffice

The level of cost and effort for the downstream eel passage study will be moderate to high; silver eels would need to be collected, tagged, and released in several locations over the course of the migration season. Data would need to be retrieved periodically, then analyzed. A multi-site route selection study conducted by the USGS Conte Lab on the Shetucket River in Connecticut cost approximately $75,000 for the first year of study. Costs are estimated at $100,000 per year for the route selection study and $50,000 to $75,000 for the mortality/injury study. No alternatives are proposed.

REFERENCES

Havn, T. B., F. Økland, M.A. Teichert, L. Heermann, J. Borcherding, S.A. Sæther, O.H. Tambets and E.B. Thorstad. 2017. Movements of dead fish in rivers. Animal Biotelemetry, 5: 7.

Kleinschmidt. 2018. 2017 Adult American Eel Downstream Passage Study; West Enfield Hydroelectric Project. Prepared for Bangor-Pacific Hydro Associates, West Enfield Maine. Kleinschmidt, Pittsfield, Maine. 20 pp.

Mueller M, K Sternecker, S Milz, J. Geist. 2020. Assessing turbine passage effects on internal fish injury and delayed mortality using X-ray imaging. PeerJ 8:e9977 DOI 10.7717/peerj.9977.

Yoder, C.O., Rankin, E.T., and Hersha, L.E. 2015. Development of Methods and Designs for the Assessment of Fish Assemblages of Non-Wadeable Rivers in New England. Midwest Biodiversity Institute, Columbus, OH.

Study Request #4
Downstream Eel Passage Alternatives Study

Goals and Objectives
The first goal of this study is to determine conceptual options, and expected performances for, improved downstream passage that will reduce delay, increase passage efficiency, and increase survival for adult American eel as they attempt to pass the Lewiston Falls Project. The second goal of this study is to determine conceptual options, and expected performances for, improved downstream passage that will reduce delay, increase passage efficiency, and increase survival for downstream migrating adult and juvenile Atlantic Salmon, juvenile Sea Lamprey, adult eels, adult and juvenile alewife, and adult and juvenile blueback herring as they attempt to pass the Lewiston Falls Project.

Resource Management Goals
MDMR is a cabinet level agency of the State of Maine. MDMR was established to regulate, conserve, and develop marine, estuarine, and diadromous fish resources; to conduct and sponsor scientific research; to promote and develop marine coastal industries; to advise and cooperate with state, local, and federal officials concerning activities in coastal waters; and to implement, administer, and enforce the laws and regulations necessary for these purposes. MDMR is the lead state agency in the restoration and management of diadromous (anadromous and catadromous) species of fishes.

NOAA Fisheries developed the Androscoggin River Watershed Comprehensive Plan for Diadromous Fish in 2020[19], which was accepted by the Commission as a comprehensive plan[20]. The comprehensive plan states:
"The restoration goals for the Androscoggin River Watershed are to provide access to historical spawning, rearing, and migration habitats necessary for diadromous species to complete their life cycles and to make accessible seasonal habitats necessary to support the enhancement of the stocks." The comprehensive plan also notes that the "restoration approach for American eel includes installing and maintaining upstream eel ways at hydroelectric facilities within the Androscoggin River Watershed."

The Atlantic States Marine Fisheries Commission (ASMFC) has developed three documents related to the management of American eel and hydropower facilities:

1. Interstate Fishery Management Plan for American Eel. April 2000. Atlantic States Marine Fisheries Commission.
2. Addendum II to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved October 23, 2008. 8 pp.
3. Addendum III to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved August 2014. 19 pp.

Objectives of the management plan include: (1) protect and enhance American eel abundance in all watersheds where eel now occur; and (2) where practical, restore American eel to those waters where they had historical abundance, but may now be absent, by providing access to inland waters for glass eel, elvers, and yellow eel, and adequate escapement to the ocean for pre-spawning adult eel. Addendum II contains specific recommendations for improving upstream and downstream passage of American eel, including requesting that member states and jurisdictions seek special consideration for American eel in the Commission's relicensing process.

[19] Accession Number: 20200414-5171.
[20] Accession Number: 20200618-3041.

MDMR's management goal is to restore Atlantic Salmon, American shad, American Eel, Alewife, Blueback herring, and Sea Lamprey to their historic habitat in the Penobscot River. The waters upstream of Projects represent significant habitat for American eel. The protection, enhancement, and restoration of this species relies on safe, timely, and effective downstream fish passage at the Projects.

Public Interest
The requester is a state natural resource agency.

Existing Information and the Need for Additional Information
Several studies document the presence of American eels upstream and downstream of the Lewiston Falls Project. The American eel is a native migratory fish species of the Androscoggin River watershed with a catadromous life cycle. Eels are widely recognized as a species of high ecological value and significance in its native habitats and has a significant commercial value in certain markets. In addition, eels were important historically to the Penobscot Indian Nation and other tribes for spiritual sustenance as well as physical subsistence.

In the PAD the Applicant states that downstream passage is not provided at the Lewiston Falls Project. This statement is accurate and the current configuration at the Project is not designed to today's fish passage design criteria and is likely insufficient to adequately pass American eel as they attempt to migrate downstream past the Project. An alternatives analysis of the existing configuration the Project Facilities and the subsequent impact(s) on adult eels is needed to evaluate the existing Project as well as potential future project design and operation(s).

Nexus to Project Operations and Effects
Hydropower project related mortality and delay has a direct effect on migratory fish populations. The Lewiston Falls Project lacks guidance structures to keep fish out of project turbines. Therefore, eels in the Androscoggin River are likely not realizing their full juvenile production and adult escapement potential. Data derived from this study will facilitate evaluation of various fish passage alternatives, inform the Commission's licensing process, and contribute to the development of an administrative record in support of protection and enhancement opportunities related to American Eel.

Methodology Consistent with Accepted Practice
Fish Passage Engineering Alternative studies are a common way to explore various options in the decision-making process and have been used by the Commission in several licensing proceedings.

This study will require a review of existing downstream fish passage technologies that meet FWS fish passage criteria (USFWS 2019 or the most recent version, as they become available) and should consist of conceptual engineering designs of downstream fish passage options that include physical screening of fish, adequate flows for attraction, and adequate relative velocities directing fish to downstream passage structures. Expected performance of each alternative should also be included in any report developed for this study.

The alternatives the Applicant proposes to study for each project, the depth and breadth of the conceptual design, and the itemization and source of costs (as well as any potential lost generation modeling) should be agreed upon by the resource agencies prior to the Applicant conducting the study.

Level of Effort/Cost, and Why Alternative Studies Will Not Suffice

The level of cost and effort for this study would be low to moderate; we estimate the cost will be approximately $20,000. No alternatives are proposed.

REFERENCES

USFWS (U.S. Fish and Wildlife Service). 2019. Fish Passage Engineering Design Criteria. USFWS, Northeast Region R5, Hadley, Massachusetts.

Study Request #5
Evaluation of the Size of American Eels and the Timing of their Downstream Migratory Movements

Goals and Objectives
The goal of this study is to understand the size range of eels moving past the Project as well as the migration timing of adult, silver-phase American eels in relationship to environmental factors and operations of hydropower projects on the Androscoggin River.

The objective of this study is to quantify and characterize (1) the full spectrum of silver eel sizes at the Project; and (2) the general migratory timing and presence of adult, silver-phase American eels in the Androscoggin River relative to environmental factors and operations of the Lewiston Falls Project.

Resource Management Goals
MDMR is a cabinet level agency of the State of Maine. MDMR was established to regulate, conserve, and develop marine, estuarine, and diadromous fish resources; to conduct and sponsor scientific research; to promote and develop marine coastal industries; to advise and cooperate with state, local, and federal officials concerning activities in coastal waters; and to implement, administer, and enforce the laws and regulations necessary for these purposes. MDMR is the lead state agency in the restoration and management of diadromous (anadromous and catadromous) species of fishes.

NOAA Fisheries developed the Androscoggin River Watershed Comprehensive Plan for Diadromous Fish in 2020[21], which was accepted by the Commission as a comprehensive plan[22]. The comprehensive plan states:
"The restoration goals for the Androscoggin River Watershed are to provide access to historical spawning, rearing, and migration habitats necessary for diadromous species to complete their life cycles and to make accessible seasonal habitats necessary to support the enhancement of the stocks." The comprehensive plan also notes that the "restoration approach for American eel includes installing and maintaining upstream eel ways at hydroelectric facilities within the Androscoggin River Watershed."

The Atlantic States Marine Fisheries Commission (ASMFC) has developed three documents related to the management of American eel and hydropower facilities:

1. Interstate Fishery Management Plan for American Eel. April 2000. Atlantic States Marine Fisheries Commission.
2. Addendum II to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved October 23, 2008. 8 pp.
3. Addendum III to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved August 2014. 19 pp.

Objectives of the management plan include: (1) protect and enhance American eel abundance in all watersheds where eel now occur; and (2) where practical, restore American eel to those waters where they had historical abundance, but may now be absent, by providing access to inland waters for glass eel, elvers, and yellow eel, and adequate escapement to the ocean for pre-spawning adult eel. Addendum II contains specific recommendations for improving upstream and downstream passage of American eel, including requesting that member states and jurisdictions seek special consideration for American eel in the Commission's relicensing process.

[21] Accession Number: 20200414-5171.
[22] Accession Number: 20200618-3041.

MDMR's management goal is to restore Atlantic Salmon, American shad, American Eel, Alewife, Blueback herring, and Sea Lamprey to their historic habitat in the Penobscot River. The waters upstream of Projects represent significant habitat for American eel. The protection, enhancement, and restoration of this species relies on safe, timely, and effective downstream fish passage at the Projects.

Public Interest
The requester is a state natural resource agency.

Existing Information and the Need for Additional Information
The Pre-Application Document does not contain any information about (1) the size range of American eels in the Androscoggin River; or (2) timing of downstream migratory movements and rates of eels in the Androscoggin River. This information gap needs to be filled, as it relates directly to (1) more fully understanding survival estimates which will be provided via the requested *Downstream American Eel Passage Assessment*; and (2) when downstream passage and protection measures need to be operated.

Nexus to Project Operations and Effects
The timing of downstream migration of adult eels is not defined for the Androscoggin River and there is no information about the size of the eels attempting to move downstream past the Lewiston Falls Project Facilities. Therefore, the general effects of hydroelectric project operations on eel survival to the ocean are unknown. Although separate study requests have been submitted to address project-specific downstream passage route selection, delays, and mortality of eels, general characteristics (size) of eels moving downstream and of river flow and environmental conditions may have significant relationships with project operation and eel migratory success and survival. For example, eels may tend to move immediately before or during periods of significant precipitation (or consequently river flow), times at which projects may be generating at maximum capacity or spilling, which may, or may not, present a higher passage risk to eels. Conversely, periods of low flow may be associated with a significant proportion of total river flow passing through turbine units, which present additional, or different, passage risk to eels. If discrete conditions which promote eel downstream migration are known, it may be possible to take actions with respect to project operations which reduce or minimize passage risk (i.e., reduction of intake approach velocities, directed spillage through a particular route at a project, etc). These studies should provide baseline information on river-specific downstream migration to predict when silver-phase eels are expected to migrate downstream in the Androscoggin River, from which project operations could be modified to minimize passage risks.

Methodology Consistent with Accepted Practice
Quantification of downstream movements of American eels in river systems requires systematic sampling of migrants throughout the migratory season. This can be accomplished with traditional active trapping methods (i.e., fyke or stow net sampling, weirs, or eel racks). Passive monitoring of migrant eels using hydroacoustic methods offers an alternative to active trapping. However, this form of passive monitoring requires verification of potential acoustic targets with some level of active (collection) or visual (traditional optical or acoustic video) sampling.

The Applicant will need to identify at least two potential locations that offer opportunities to conduct simultaneous passive and active sampling. Each location will need to possess a route of downstream passage which conducts a significant proportion of river flow and each would need a proximal bypass equipped with a sampler so that fish can be concentrated/collected from the passage route and identified to species. Project operations will influence the relative proportion of flow (and thus numbers

of downstream migrant eels) in each passage route, so numbers of eels sampled in each route represent only a proportion of the total number of eels migrating downstream within the entire river. Since the absolute proportion of eels using a specific route at any one time is unknown, the numbers of eels quantified within a route must serve as a relative index of the degree of migratory movement.

This study should quantify eel movements for two consecutive years since environmental conditions strongly influence migratory timing of eels, which can vary significantly from year to year (Haro 2003). Eels should also be measured during both study seasons, throughout the downstream passage season.

Eels should be quantified using methods similar to Haro et al. (1999), by continuously monitoring a fixed location at the projects with hydroacoustics. Since eels tend to concentrate in areas of dominant flow (Brown et al. 2009; EPRI 2001), the zone to be monitored should pass a dominant proportion of project flow throughout most periods of operation (i.e., forebay intake areas). Hydroacoustic monitoring shall encompass the entire potential migratory season, beginning in mid-August and ending in mid-December, and shall operate 24 hours per day. Data will be recorded for later processing and archiving.

Systematic active quantification of eels at downstream bypass samplers shall be performed simultaneously with passive hydroacoustic monitoring, to verify presence of eels and relative abundance of eel-sized hydroacoustic targets from the hydroacoustic data as well as the sizes of the eels collected.[23] Although daily operation of the bypass sampler could be performed, a more comprehensive technique is to monitor eels entering the bypass with an acoustic camera (i.e., DIDSON, BlueView, etc.). The acoustic camera will afford positive visual identification of eels as they enter the bypass, which is a concentration point for migrating eels. Acoustic camera monitoring will also allow monitoring to be performed 24 hours a day, and will be relatively unaffected by water turbidity (which influences effectiveness of traditional optical video monitoring). The acoustic camera system will be operated during the same time period as acoustic monitoring, and images will be recorded for later processing and archiving.

Data analyses of size of eels, hydroacoustic, acoustic camera, bypass sampling, and environmental/ operational data will follow standard methodology.

The Project's operations (flows, levels, gate openings, number of units operating and operation level) and environmental conditions (river flow, temperature, turbidity, air temperature, precipitation) will be monitored regularly (hourly measurements if possible) throughout the duration of the studies.

Level of Effort/Cost, and Why Alternative Studies Will Not Suffice

The level of cost and effort for the downstream migrant eel migratory timing study would be moderate, given the level of cost for instrumentation, deployment, and data review/analysis. Cost is estimated at $20,000 per year for the study. No alternatives are proposed.

REFERENCES

Brown, L., A. Haro, and T. Castro-Santos. 2009. Three-dimensional movement of silver-phase American eels in the forebay of a small hydroelectric facility. Pages 277-291in: J. Casselman et al. editors. Eels at the Edge: Science, Status, and Conservation Concerns. American Fisheries Society, Bethesda, MD.

[23] If all eels are not sampled, and a subset are measured for morphometrics, a power analysis will need to be performed that determines the most suitable sample size for this effort. 23

EPRI (Electric Power Research Institute). 2001. Review and documentation of research and technologies on passage and protection of downstream migrating catadromous eels at hydroelectric facilities. EPRJ Technical Report No. 1000730, Palo Alto, California 270 pp.

Haro, A. 2003. Downstream migration of silver-phase anguillid eels. Pages 215-222 in: Aida, K., K. Tsukamoto, and K. Yamauchi, eds. Eel Biology. Springer, Tokyo.

Haro, A., D. Degan, J. Horne, B. Kulik and J. Boubee. 1999. An investigation of the feasibility of employing hydroacoustic monitoring as a means to detect the presence and movement of large, adult eels (Genus Anguilla). S. 0. Conte Anadromous Fish Research Center Internal Report No. 99-01. Turners Falls, Massachusetts. 36 pp.

Study Request #6
Project Flow Reregulation Study

Goals and Objectives
The goal of this study is to determine the headpond and project operations that are feasible to reduce the influence of peaking received inflows on outflows of the project. The outcome of this study would be one or several operational plans that will reduce the artificial flow regime characterized by sudden increases and decreases in flow.

The objectives of the study are:

- When project inflows are within the range of minimum and maximum hydraulic capacity of the project, determine if 1,600-acre feet of headpond storage and four feet of allowed headpond fluctuation can reregulate received inflows
- Evaluate whether battery storage could aid in the reregulation of flows to offset generation losses from reregulating flows

Resource Management Goals
Dams disrupt the natural characteristics and ecological integrity of rivers (Juracek, 2016). The PAD describes Project operation coordination with the upstream Gulf Island-Deer Rips Project (P-2283), which operates as a store and release facility. Downstream hydrographs indicate a departure from the natural flow regime downstream of the Project which is essential for providing the diversity of habitat conditions required to maintain the ecological integrity of rivers. (Poff et al. 1997).

NMFS is a federal resource agency with a mandate to protect and conserve fisheries resources and associated habitat. Resource management goals and plans are codified in our regulatory statutes. We rely on the best available data to support conservation recommendations and management decisions. This study is an appropriate request for the pre-application period.
The Androscoggin River downstream of Lewiston Falls is listed as critical habitat for Atlantic salmon. American shad, river herring, sea lamprey and American eel are all present in the Androscoggin River downstream of Lewiston Falls and use this section of the river as migratory habitat.

The goal of this study is to determine the ways in which operational changes to the Project can improve the overall aquatic habitat of the Androscoggin River by dampening the effects of upstream storage and release projects, reducing the flashiness and number of flow reversals that result from hydropower peaking.

Public Interest
The requestor is a state resource agency.

Existing Information and the Need for Additional Information
The PAD states that the Lewiston Falls impoundment is approximately 2.5 miles long, covers an area of 200-acres and has a gross storage volume of 1,600-acre-feet at the full pond elevation. In addition, the Project is licensed to operate with up to four feet of impoundment fluctuation. The PAD does not state the downramping restriction for the Gulf Island-Deer Rips Project (P-2283), which directly relates to the inflow rate to the Lewiston Falls headpond.
The 2016 Flow Demonstration study showed that all four transects downstream of the project fluctuated by approximately 2.5 feet as flows in the mainstem Androscoggin River went from allowed project minimum flow to maximum hydraulic capacity of the Monty Station at 6,600 cfs. NMFS reviewed

the station, depth and velocity measurements made at Transects 1-4 and calculated discharge at each of these transects under the minimum flow and maximum generation conditions. We acknowledge the limitations of the equipment to measure velocity in the deep pool at Transect 3 and do not include it our summary below.

Scenario	T1	T2	T4
Minimum Flow (cfs)	1,652	2,545	3,849
Maximum Generation (cfs)	9,088	8,306	6,178
Delta in scenario	7,436	5,761	2,329

The above data indicate that at Transect 1, the difference in flows conditions was in excess of 7,400 cfs whereas at Transect 4, the difference was less than 2,400 cfs. Based on these differences, the depth and velocity comparisons that were presented should be reconsidered. We do not know the depth and velocity fluctuations that fish in the river experience between the required minimum flow and maximum generation capacity in the mainstem Androscoggin River below the project. We do know, however, that depth and velocity can rapidly change in the mainstem Androscoggin River which in turn is rapidly changing the habitat characteristics for our trust species that are using the river as a migration corridor to get to spawning habitat.

The modeling effort in (Olivares et al. 2021) suggests that re-regulation reservoirs can significantly reduce the flashiness of a river. The information derived from this study request is necessary to determine if the Lewiston Falls headpond can be operated in such a way as to reduce the flashiness and overall habitat of the Androscoggin River downstream of the project.

An understanding of ways the project can feasibly change to a reregulation project so that rapid changes in outflow are not imposed on Atlantic Salmon Critical Habitat downstream of the project is important. Changes in depth and velocity can limit the amount of persistent habitat that remains intact between two flow conditions. These results were evident in the persistent habitat analyses that were conducted at the Turners Falls Project (P-1889).[24]

Nexus to Project Operations and Effects

A clear nexus exists between project operations, downstream releases, and aquatic habitat (e.g., depth and velocity) in the mainstem Androscoggin River. The project's headpond has a volume of 1,600-acre feet and the project is allowed to fluctuate the headpond by up to four feet. Endangered Atlantic Salmon, in addition to other diadromous and resident species, use the Androscoggin River as migratory habitat, which includes holding in tributary mouths or other side-channel habitat until they move into spawning habitat. The literature review in Olivares et al. (2021) points out several hydropeaking impacts including stranding of juvenile fish.

Improved flow releases from the project have the potential to improve upstream migration conditions for Atlantic salmon, river herring, American shad and sea lamprey that use the fishways at Brunswick, Pejepscot, and Worumbo. The latter two of which have concerns of stranding below the projects resulting from rapid changes in flow conditions that produce and then shut off spill over the project flashboards/rubber dams.

[24] Accession Number: 20161017-5012.

Methodology Consistent with Accepted Practice

McManamay et al. (2016) would classify the Lewiston Falls project as a run-of-river/upstream peaking project. The methods in this study request will determine the ways in which the project can feasibly be converted to a reregulating project whereby the received inflows are reregulated to diminish the upstream peaking signal.

The licensee should use the U.S. Army Corps of Engineers Hydrologic Engineering Center's HEC-ResSim to develop an existing condition model1. After that model is developed, the licensee should develop models that evaluate reregulation scenarios that the Lewiston Falls project is operationally capable of executing. The 2016 Flow Demonstration Study indicated that water surface elevations below Lewiston Falls rose approximately 2.4 feet as the project went from the minimum flow condition to maximum hydraulic capacity. The HEC-ResSim model should develop scenarios whereby the change in downstream water surface elevations from minimum to maximum hydraulic capacity is reduced on a sub-daily basis. The input and output should use hourly data. The developed metrics should be based on those developed in Zimmerman et al. (2010) for existing conditions and reregulated conditions:

- Richards-Baker Flashiness Index
- Number of Reversals
- Percent of Total Flow
- Coefficient of Diel Variation

As part of this study, the Applicant should review the costs and benefits of installing battery storage. Installation of a battery, such as what was proposed at the Bonny Eagle project (P-2529) and two separate battery storage systems that were installed at the Ripogenus (P-2572) and Penobscot Mills Project (P-2458)[25], could yield an increase in revenue from the ISO real time energy market as well as from the capacity market. The study should review the potential revenue gains and how the installation of a battery could allow the headpond to serve as tool to reregulate the received inflows while also meeting other regulatory requirements and management goals.

Level of Effort/Cost, and Why Alternative Studies Will Not Suffice

The level of effort of a study of this type is commensurate with a project that has an installed capacity of 28.44 MW. HEC-ResSim is a standard piece of software for dam owners to evaluate different operational release regimes. Brookfield Renewable Energy Group filed a non-capacity license amendment for the Bonny Eagle Project indicating that it is fully capable of conducting a cost benefit analysis for this type of technology.[26]

Federally licensed hydropower projects upstream of Lewiston Falls are allowed to operate as storage and release facilities. The mainstem Androscoggin River downstream of Lewiston Falls is listed Critical Habitat for Atlantic salmon. This study is necessary to determine the ways the Project can reregulate its received inflows for the term of the new license. Other alternative studies will not determine if the observed two and half feet of water surface elevation fluctuation downstream of the project can be diminished.[27]

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[25] Accession Number: 20200324-3006.
[26] Accession Number: 20210323-5253.
[27] Accession Number: 20160329-5151.

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1 Software is available for download from the U.S. Army Corps of Engineers Hydrologic Engineering Center here: https://www.hec.usace.army.mil/software/hec-ressim/downloads.aspx

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STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
BUREAU OF PARKS AND LANDS
22 STATE HOUSE STATION
AUGUSTA, MAINE 04333

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

December 23, 2021

Luke Anderson
Manager, Licensing
Brookfield White Pine Hydro, LLC
150 Main Street
Lewiston, ME 04240

RE: Comment on Pre-Application Document and Proposed Studies, Lewiston Falls Project (FERC No. 2302)

Dear Mr. Anderson,

The Bureau of Parks and Lands has reviewed the Pre-Application Document (PAD) for the Lewiston Falls Project and offers the comments below. We preface these comments by noting that the recreation opportunities available on the Androscoggin River are generating increasing interest due to greatly improved environmental conditions, far different from conditions when the current license was issued in 1986. We encourage Brookfield White Pine Hydro, LLC (BWPH) to work through the relicensing process to develop with the local communities a common vision for the river-oriented recreation and access sites, including the several non-project recreation facilities, managed for a high-quality experience. The Bureau supports a partnership approach for the management of BWPH project facilities along the river and the adjacent community-based facilities.

The Bureau of Parks and Lands (BPL) is a division of the Maine Department of Agriculture, Conservation and Forestry (MDACF), a cabinet level agency of the State of Maine. As authorized under Section 10 of the Federal Power Act, BPL reviews hydropower projects and provides recommendations to licensees with a focus on the adequacy of existing public recreation facilities and access to meet public needs, the effects of Project operations on recreation and aesthetics, the adequacy of flow releases to provide for downstream boating opportunities, and the effect, if any, on public lands and private lands if available for public recreation.

Based on these responsibilities we have prepared the following comments on the PAD and proposed studies:

ANDREW R. CUTKO, DIRECTOR
BUREAU OF PARKS AND LANDS
18 ELKINS LANE, HARLOW BUILDING

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Comments on PAD

Recreation and Land Use: Section 5.7 Recreation and Land Use alludes to boating activity on the Project impoundment. However, the presence of a boat barrier above the Project dam (visible in aerial imagery) is not mentioned. The location of the barrier is of particular relevance to potential canoe/kayak take out locations and potential portage trail, discussed below in reference to the proposed Recreation Study.

Aesthetic Resources: Section 5.8 Aesthetic Resources describes Great Falls as the dominant aesthetic feature of the Project, with a close relationship to parks and trails developed by the Cities of Lewiston and Auburn (one of which incorporates the West Pitch Park Overlook, a Project recreation site, described in section 5.7.3.2). However, no information is provided on historic or current flows at the falls, which is a primary factor in the aesthetic value of the falls. We note that during the Nov. 4, 2021 Joint Agency and Public Meeting/Virtual Site Visit, a representative of Grow L+A, a local community organization, asserted that water flowed over the falls 40% of the time (146 days/year) prior to the development of the Monty powerhouse, and that has been reduced to 12% of the time (43 days/year).

We understand that flows at the falls are affected at certain times by Project operations, but the information provided to-date in the TLP is limited. During the Nov. 4, 2021 Joint Meeting, we were informed that flows are spilled into the bypass reach (i.e., the falls) only when the 6,600 cfs capacity of the Monty powerhouse is exceeded. River flow data provided in the PAD indicates average flows above 6,600 cfs occur only during the March-May period. We were also informed that the inflatable rubber dams on top of dam sections 1-4 provide only limited control on flows over the falls because they can be operated only in the fully up or down positions.

We request additional information on 1) the timing and magnitude of flows at the falls, prior to the 1990 development of the Monty powerhouse, and more recently (e.g., past 10 years), 2) how river flows greater than the capacity of the powerhouse effect flows over the falls, and 3) how operation of the inflatable bladders and flashboards on the Project dam sections effect flows over the falls.

Comments on the Proposed Recreation Study

The Bureau recommends that the proposed Recreation Study, as described in section 6.2.7.2 of the PAD, include robust data collection methodology that goes beyond inventory and general observation of site use. In particular, we believe that collecting data through focus groups or interviews, and to include all recreation sites in the project vicinity that provide physical or visual access to the Project, not just those owned or operated by BWPH, are necessary to acquire adequate data for assessing recreation needs.

The Bureau also recommends that the Recreation Study include consideration of means to establish a canoe/kayak portage around the Project dam, including existing and potential canoe/kayak put-in and take-out locations above and below Great Falls and the dam, and necessary portage trail(s). As mentioned in the PAD (p. 5-116), the Project area is part of the Androscoggin River Trail, which extends the full length of the river, from Umbagog Lake in New Hampshire to Merrymeeting Bay. Existing take-out and put-in sites above and below the Project dam appear to be approximately one mile apart, by road, with no designated or

formalized portage route (as acknowledged during the Nov. 4 Joint Meeting). In contrast, designated portage trails exist around the two hydro dams immediately upstream of Great Falls, a requirement of the Gulf Island - Deer Rips Project (P-2283) license. Portage routes also exist at the downstream Worumbo (P-3428), Pejepscot (P-4784), and Brunswick (P-2284) Projects. Brunswick is notable in that the distance between the take-out and put-in and the primarily developed urban setting are similar to the Lewiston Falls Project. The marked portage route there follows city sidewalks.

The Bureau further recommends that the assessment portion of the study should incorporate the scenic and aesthetic values associated with each site, particularly as regards Great Falls where appropriate. The falls have special importance as a scenic feature in the community and attraction to those from outside the community and a close relation to or visibility from the West Pitch Park Scenic Overlook, the Auburn Riverwalk, and other Project and non-Project recreation sites. The results will help the Bureau determine whether opportunities may exist to enhance aesthetics at Project and non-Project recreation sites.

The Bureau takes note that local community organizations have in the past commented, in connection to proposed Project boundary revisions, on a need for more flows over Great Falls to improve aesthetics (e.g., Grow L+A comment letter, submitted to FERC December 15, 2016), as well as commenting during the TLP (as noted above) on the reduction in flows over the falls.

Additional Comments

The PAD alludes to an updated Recreation Management Plan that will be prepared for the Project. The Recreation Study should be conducted with the objective to fully inform such an update. The updated plan should address the full range of parks, paths, viewing opportunities and aesthetics, powered and non-powered boating, fishing, and other recreational uses of the Lewiston Falls Project vicinity.

Thank you for the opportunity to submit these comments. Please feel free to contact me at (207) 287-2163 or via email at Jim.Vogel@maine.gov if you have any questions regarding these comments.

Sincerely,

Jim Vogel

Jim Vogel, FERC Coordinator
Bureau of Parks and Lands

Cc: Amanda Beal, Commissioner, Department of Agriculture, Conservation and Forestry
Andrew Cutko, Director, Bureau of Parks and Lands
Wendy Bley, Kleinschmidt Associates
John Perry, Maine Department of Inland Fisheries and Wildlife
Eric Cousens, City of Auburn
David Hediger, City of Lewiston
Peter Rubins, Grow L+A River Working Group

December 30, 2021

Luke T. Anderson
Manager, Relicensing
Brookfield White Pine Hydro LLC
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Transmitted via e-mail

Subject: **City of Auburn, City of Lewiston, American Whitewater, Appalachian Mountain Club, Grow L-A, Maine Council of Trout Unlimited Comments & Study Requests In Response to the Notice of Intent to File a License Application, Filing of Pre-Application Document (PAD), Commencement of Pre-Filing Process, and Scoping; Request for Comments on the PAD And Scoping Document, and Identification of Issues and Associated Study Requests Regarding the Lewiston Falls Hydroelectric Project (FERC No. 2302)**

Dear Mr. Anderson:

The City of Auburn, City of Lewiston, American Whitewater, Appalachian Mountain Club, Grow L-A, and Maine Council of Trout Unlimited submit the following Comments and Study Requests in response to the filing of the Pre-Application Document (PAD) for the Lewiston Falls Hydroelectric Project (FERC Project No. 2302) by Brookfield White Pines Hydro LLC (BWPH) dated August 4, 2021.

The City of Auburn, located in central Maine, an industrial center and the ninth largest city by land area in the United States with 67 square miles, is a corridor to the western recreational mountains of Maine and is home to more than 25,000 residents. Daily, upwards of 100,000 people live, work, and play in our city. Auburn's critical infrastructure includes: 2 high schools, a middle school and 9 elementary schools; 2 regional post offices; Lake Auburn - the only water supply for the City of Auburn and surrounding communities; Lewiston/Auburn Municipal Airport; Central Maine Community College (5,000 students); Customs Zone for freight arriving by air and rail; two railroad lines; 2 large and 6 small hydroelectric dams; an underground petroleum pipeline; 5 large commercial factories; an acetylene production plant; 3 propane storage and underground pipes carrying natural gas to the community; 8 medium to large hazmat facilities; a 2-sheet ice arena that also hosts concerts and trade shows; a waste-burning electric power plant; a retail hub and recreation areas.

There are 11,965 residents in Auburn who qualify for Community Development Block Grant (CDBG) assistance for being under 80% HUD Area Median Family Income (HAMFI). This number encompasses 46% of the total 25,530 residents in Auburn. Of the total households within Auburn, 7,850 households (or 30%) are qualified for the HOME program for being under 50% HAMFI. These qualifying households are largely located within a 1-mile area surrounding the project and many depend on walking and public transit to access recreational opportunities along the Androscoggin River.

The City of Lewiston is located in Androscoggin County in south-central Maine, less than an hour drive from the ocean, the western mountains, and from Portland, Augusta, and Freeport. The area's interstate highway access places 50% of Maine's population within a half hour of the community. Together, the cities of Lewiston and Auburn are home to approximately 61,000 residents with Lewiston's population being 37,121. Lewiston-Auburn is the region's economic and cultural center, serving Androscoggin County and the large trade area of central and western Maine. Given its size alone, Lewiston-Auburn's success is important to Maine's economic development.

Lewiston is a regional center for healthcare, education, culture and shopping. Lewiston is also an employment center. Within 1.2 miles of the Lewiston Falls project boundary are Central Maine Medical Center (one of the state's three largest medical facilities), St. Mary's Regional Medical Center, Bates College, University of Southern Maine's Lewiston-Auburn College, financial and professional service companies, as well as hotels and retail. Within a five-minute drive of the Lewiston Falls project boundary area are approximately 9,500 households and 7,000 employees.

The character of Lewiston and Auburn is influenced by both the striking natural environment of central Maine, and Lewiston's history as a great industrial center powered by the Androscoggin River. Lewiston Falls, which once fueled production of textiles, shoes and more before an era of decline that began in the 1950s, continues to provide a dramatic focal point for both Lewiston and Auburn downtowns. The Androscoggin River, once polluted by the industry it fueled, now rolls cleanly between the two downtowns, past emerging riverfront parks. Kayakers and fisherman have begun to discover this stretch of the Androscoggin, and a growing network of trails link the downtown riverfronts.

Historic mill buildings remain a strong presence in Lewiston. Within a 5-minute walk of the riverfront, over 1 million square feet of mill space remains within three major mill facilities: the Bates Mill Complex, the Continental Mill, and the Hill Mill. The network of canals that once powered the mills remains in place.

Lewiston's compact downtown neighborhoods occupy the area east of the river. Multifamily housing that once served millworkers is now occupied by a new generation of residents, including Somali and Bantu immigrants. A mix of small businesses, multifamily housing, the Continental Mill and vacant lots characterize the area between the redeveloping Bates Mill Complex and the river. Just 1/3 of a mile east of the river is Lisbon Street, Lewiston's "main street." Once a grand shopping destination that drew visitors from across the region, Lisbon Street's 2- to 4-story buildings are beginning to see new activity. However, this same area is subject to some the state's highest poverty rates. Immediately abutting the project boundary, 45% of Census Tract 201 and 25% of Census Track 202 live in poverty in comparison to City's rate of 18% and Maine's of 11%. Lewiston also has 28,350 households that qualify for CDBG representing 78% of total 36,409 households of which 11,620 (32%) households qualify for the HOME program. These qualifying households are largely located within a 1-mile area surrounding the project and many depend on walking and public transit to access recreational opportunities along the Androscoggin River.

American Whitewater is a national non-profit 501(c)(3) river conservation and recreation organization founded in 1954. With approximately 6,000 members and 100 affiliate clubs, representing tens of thousands of whitewater paddlers across the nation, American Whitewater's mission is to protect and restore our nation's whitewater resources and to enhance opportunities to enjoy them safely. Our

members are primarily conservation-oriented kayakers and canoeists, many of whom live and/or engage in recreational boating in the New England region within easy proximity of the Androscoggin River. American Whitewater has long been involved with the FERC licensed hydropower projects in the Maine, including hydropower projects located on the Penobscot, Kennebec, Rapid, and Magalloway rivers, and is party to settlement agreements that provide for whitewater boating opportunities that partially mitigate for project impacts.

Since 1876, the Appalachian Mountain Club has promoted the protection, enjoyment, and understanding of the mountains, forests, waters, and trails of the Appalachian region. AMC is the largest conservation and recreation organization in the Northeast with more than 90,000 members, supporters, and advocates, many of whom visit the lands and waters upstream and downstream of the project for recreation.

Grow L-A is dedicated to Lewiston-Auburn to promote responsible development, sustainable growth, social responsibility, healthy community and economic progress. The Grow L+A River Working Group coordinates with Androscoggin Land Trust, the City of Lewiston and the City of Auburn, Friends of Merrymeeting Bay, Bates College, and the Androscoggin River Water Council to promote a healthy river system that aesthetically flows right through the center of Lewiston-Auburn and is the reason the two cities exist where they do today.

Maine Council of Trout Unlimited represents six local chapters with over 2,000 fisher-conservationists in Maine. The mission of the organization is to bring together diverse interests to care for and recover rivers and streams so our children can experience the joy of wild and native trout and salmon. The waters from Lewiston Falls downstream to the Gulf of Maine are critical Atlantic salmon habitat under the Endangered Species Act, so the health of the river is vitally important to the recovery of the species. TU's membership enjoys the fishing opportunities both above and below the project and the aesthetics of Lewiston Falls contributes to their enjoyment of the resource that Lewiston Falls can provide. When watered, these falls also provide increased oxygenation to the waters below to the benefit to both trout and salmon species and improve the ability of American eels to ascend the falls to the benefit of the greater Androscoggin Watershed ecosystem.

A great river, once harnessed to produce the power that drew industry to the twin cities, can now again be the spark that defines the communities. The Lewiston Falls area can become the region's great urban destination, a place for recreation, cultural activities, work and urban living. A solid foundation for the area exists; however, not yet a strong, vibrant urban riverfront destination. The downtown riverfront and canal system needs a critical mass of more housing, public amenities, and jobs to improve quality of life and to support economic development that extends beyond the riverfront and benefits the center cities of both communities. The river and Lewiston's canal system are the backbone of these objectives.

Comments

The Androscoggin, once a mighty fast-flowing river, unites the cities of Auburn and Lewiston that, with a combined population of over 62,000, make up the second largest metropolitan area in the state. The

hydroelectric facility located atop the dramatic 37-foot Lewiston Falls, also known as Great Falls, impedes the natural flow of the river, degrading a once majestic natural waterfall to dry rock much of the year, hampering the public's use and enjoyment of the defining natural resource of the area, and impacting the water quality of the lower Androscoggin River.

If the dam is relicensed, Brookfield White Pines Hydro LLC must compensate the owners of the river, the citizens of Lewiston and Auburn and of the State of Maine, for their loss of the use of it in its natural state. The facility severs through-paddling options and floods the natural floodplain to create steep inaccessible banks along the impoundment, making it difficult to access the water. The facility reduces the amount of time that water flows over the falls by redirecting flows through turbines. The cities of Auburn and Lewiston lose the iconic falls that define our communities and are the reason the cities grew along the banks of the Androscoggin River.

Any mitigation must first and foremost meet the needs of the immediate community. The poverty rate for Lewiston is 19.5%, nearly double the state rate. Forty percent of downtown residents do not own a car, and therefore do not have access to the river at distant locations. Many cannot afford specialized recreation equipment. Similarly, 46% of Auburn residents qualify for public assistance due to their income levels. These qualifying households are largely located within a 1-mile area surrounding the project and many depend on walking and public transit to access recreational opportunities along the Androscoggin River.

Project Facilities and Operations

The Lewiston Falls project consists of 5 dams, the Charles E. Monty Station powerhouse, a gatehouse, an island spillway, the upper canal, the impoundment stretching 2.5 miles upstream, and a 75' x 400' tailrace excavated into the bedrock of Lewiston Falls, permanently altering the natural geology. The project also includes the Durham boat launch located 7 miles downstream.

The project drains an area of 2,907 square miles and discharges a minimum flow of 1,430 cubic feet per second or inflow, whichever is less, out of a total potential maximum flow of 6,600 cfs. Of the discharge, 50 cfs is released into the Lewiston Canal System, with periodic refreshment flows of 300 cfs, and 1,380 is released from Monty Station through the tailrace. The project generates 28.44 MW of electricity.

Impact of Project Facilities & Operations

The Lewiston Falls Hydroelectric Project impedes the flow of water over Great Falls. Since the opening of the Charles E. Monty Station in 1990, flows over Great Falls have been reduced by 40%, from approximately 146 days of the year to approximately 43 days, or from about 40% of the year to about 12%. The dewatering of the falls has a severe negative impact on the Twin Cities, hampering their evolution from an industrial past to a vibrant future based on attracting activity to the urban riverfront. The facility severs through-paddling options and floods the natural floodplain to create steep inaccessible banks along the impoundment, making it difficult to access the water. The facility reduces the amount of time that water flows over the falls by redirecting flows through turbines. The Cities of Auburn and Lewiston lose the iconic falls that define our communities and are the reason for the cities grew along the banks of the Androscoggin River.

Visual impact

A 37-foot drop without water flowing over it is the dominant visual element in Lewiston-Auburn. No man-made effort can compensate for the loss of that natural feature but understanding the effects of facility operations is necessary for a NEPA finding on the relicensing. The lack of water reveals the permanent scar of the raceway, the dry rocks of Lewiston Falls have attracted graffiti and trash, the lack of water flow in the canal system invites litter and imparts a sense of stagnation. Without water flow, there is less reason to visit the trails, parks or overlooks near the area. Chain link fence surrounding the viewing platform adjacent to West Pitch adds to the overall sense of indifference. Until the visual impact changes, Lewiston-Auburn cannot meet its full potential as a vibrant urban center focused on its riverfront.

Recreation Impact

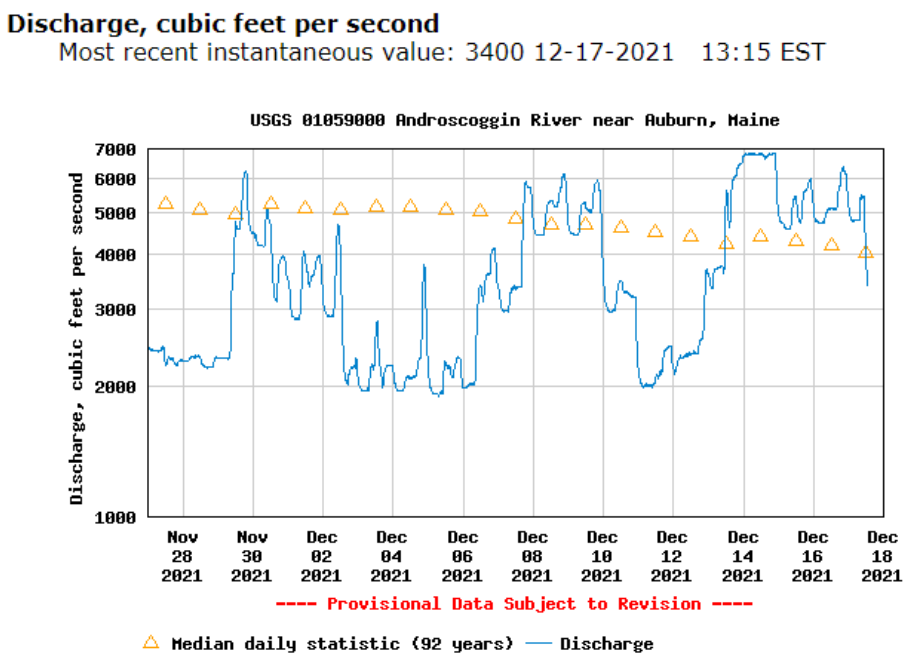
The Lewiston Falls Hydropower Project seriously impacts recreation in Lewiston-Auburn. The presence of the facility, including the powerhouse, blocks access to Great Falls from the Lewiston side. The absence of water leaves less reason to visit adjacent amenities such as parks, trails, or viewing platforms, which suffer from underuse at times. The facility severs through-paddling options and floods the natural floodplain to create steep inaccessible banks along the impoundment, making it difficult to access the water difficult to access the water. Access to the river for fishing, boating, and other water-based activity is relatively limited, and the lack of water flow over the falls contributes to an absence of human activity in the downtown area. The project currently provides only 3 recreation facilities: the West Pitch viewing platform, the impoundment boat launch, located ½ mile upstream, and the Durham boat launch located 7 miles downstream. There currently is no portage around the falls and a lack of connectivity between recreational facilities. The nature of the impoundment further restricts access to the river as the pond has flooded the formerly accessible natural flood zone to a pond elevation that meets steep embankments in many areas.

Operational water levels and especially flows fluctuate often and this significantly affects different recreational user groups in different ways. Fluctuating flows shown below are measured downstream of the facility.

Further, the dam blocks upstream access for fish. Of the seven diadromous species identified in the *Androscoggin River Watershed Comprehensive Plan for Diadromous Fishes*, only the American Eel is found upstream of the dam. No fishway exists and no anadromous species are trucked or stocked upstream. The last fisheries survey was conducted in 2003, 19 years ago.

Ecological and water quality impact

The project alters the ecosystem both upstream and downstream of the dams. First, the 2.5-mile impoundment upstream slows the natural flow of a once fast-moving river, warming the waters and resulting in the accumulation of silt and sediment. In turn, these changes alter the ecosystem in and along the river. Fluctuating water levels in the artificial pond created by the impoundment further degrade the ecosystem there. Downstream of the dams, the lack of water also alters the ecosystem by resulting in lower than natural water levels and may affect dissolved oxygen levels. The Maine Department of Environmental Protection classifies this river reach as Class C. Water quality monitoring was terminated in 1994, 28 years ago. As mentioned above, the last fisheries survey was conducted in 2003, 19 years ago. Notably, the waters below Lewiston Falls are classified as Critical Atlantic Salmon Habitat.



Study Requests

This phase of the FERC process is dedicated to identifying the studies needed to inform the licensing process so that licensing decisions can be based on current information and the best available science. We request three studies that we deem essential to the future management of the Lewiston Falls Project. They follow below in FERC study request format. These study requests are consistent with the comments submitted by Maine Bureau of Parks and Lands on December 23, 2021. We are confident that additional agency support will be forthcoming and trust that agreement will be reached that results in the accomplishment of effective studies that fully inform the project. In addition to these three studies, we also support:

- The Phase I Archaeological Survey requested by the Maine Historic Preservation Commission. The Great Falls were a trading and fishing center for indigenous peoples prior to European settlement. The Great Falls dam powered the establishment of the community as an industrial center. Today, with a combined population of nearly 60,000, Lewiston-Auburn is Maine's second-largest urban area and one of the most diverse communities of its size in New England. We support Maine Historic Preservation's

request for architectural and archeological resource surveys to ensure that mitigation for the Lewiston Falls project is fully integrated with existing plans for the community. An architectural survey is recommended to identify and record information on all resources within the area of potential effect (APE) that are at least 50 years old. With regards to archaeological resources, the impoundment margins must be subject to a Phase I archaeological survey, including subsurface testing in appropriate locations to identify all archaeological sites around the impoundment margin that might erode over the term of the license. Phase II (site assessment) fieldwork might also be necessary depending on the results from the Phase I survey.

- Eel studies requested by the National Marine Fisheries Service and Maine Department of Marine Resources. American eels are known to occur upstream of the project, even above the next major falls in Rumford. The more Lewiston Falls are watered, the greater opportunity the eels have to ascend the falls to access preferred habitats. American eels are an important species to the overall ecology of Maine rivers, and in some reaches, make up the greatest part of the biomass. The species is considered threatened throughout its range.
- Flow studies requested by the National Marine Fisheries Service in their December 22, 2021 filing. Integration with the aesthetic study and river access and recreational flow study outlined below may be possible and could result in cost savings.

Study request #1: Aesthetic study

Goals and objectives

The goal of this study is to evaluate the effect of the project's operation on aesthetics of the river, falls and canals and to identify potential measures that can mitigate those impacts. The cities endeavor to restore their natural beauty in order to draw more human activity to the river and adjacent communities, as would exist without the impacts of the facility. The study will:

- Determine the range of flows needed to maintain water flows over the falls at all times;
- Determine the flows needed to maintain water flows in the canal system;
- Examine the feasibility of attractive, creative, well-designed lighting of the falls, river, and canal crossings as a potential mitigation effort to enhance the pedestrian experience and highlight the unique environment in the absence of natural flows that are directed through generating turbines;
- Evaluate other investments that could mitigate impacts and restore the overall aesthetics of the project area, including, but not limited to, fencing upgrades, increased river access for pedestrians, and tree planting.

Resource management goals

The cities are not a resource management agency, but we represent the public that lives, works and plays within our municipal boundaries. The Androscoggin Riverfront remains a critical resource for the Lewiston-Auburn community and the falls are a defining feature, so much so that the images of Great Falls are used in marketing and economic development and displayed prominently on front pages of our websites. In an era when communities across the country have reclaimed urban waterfronts as vibrant community destinations, Lewiston and Auburn have the potential to create a unique and special place;

the effort to do so is impacted by the facility. A destination riverfront with water over the falls will benefit Lewiston and Auburn most directly if it is strongly connected to the rest of the community and especially to the core of the downtowns. Lewiston's canal network, open spaces, and connecting streets can strengthen the potential of the riverfront to enhance the community as a whole**.** All of this, however, requires adequate water flows over the falls and downstream of the project.

Public interest

The Androscoggin River is a public trust resource for the community and the people of the State of Maine, licensed to Brookfield White Pines Hydro LLC for power generation. The public has the right to access it for all forms of recreation and to experience the visual effects of natural water flows over the falls. The cities have invested in long range planning efforts that center on the river as a critical quality-of-life asset and have a strong interest in its aesthetics. In Auburn alone, there are 11,965 residents who qualify for Community Development Block Grant assistance for being under 80% HUD Area Median Family Income (HAMFI). This number encompasses 46% of the total 25,530 residents in Auburn. Of this total households within Auburn, 7,850 households (or 30%) are qualified for the HOME program for being under 50% HAMFI. These qualifying households are largely located within a 1- mile area surrounding the project and many depend on walking and public transit to access recreational opportunities along the Androscoggin River. Lewiston has 28,350 households that qualify for CDBG representing 78% of total 36,409 households of which 11,620 (32%) households qualify for the HOME program. These qualifying households are largely located within a 1-mile area surrounding the project area.

The Lewiston Falls Hydroelectric Project impedes the flow of water over Great Falls. Since the opening of the Charles E. Monty Station in 1990, flows over Great Falls have been reduced by 40%, from approximately 146 days of the year to approximately 43 days, or from about 40% of the year to about 12%.

When water is flowing over the falls, it attracts public interest and enjoyment and media attention that reflects positively on the communities. Understanding project impacts on the amount of water and duration of visible flows is necessary to inform the NEPA analysis that FERC is charged with completing.

Existing information and additional information needed

Androscoggin Greenway Health Impact Assessment
Microsoft Word - ALT HIA Report FINAL (lewistonmaine.gov)

Androscoggin Greenway Plan
https://issuu.com/wrightp/docs/androscoggin_greenway_plan_wright-pierce

City of Lewiston *Riverfront Island Master Plan:*
https://www.lewistonmaine.gov/413/Riverfront-Master-Plan

City of Lewiston Comprehensive Plan, *Legacy Lewiston*

https://www.lewistonmaine.gov/603/Lewiston-Comprehensive-Plan

City of Lewiston, Parks and Recreation Comprehensive Plan
http://www.lewistonmaine.gov/DocumentCenter/View/807/1993---Parks--Recreation-Comp-Plan---Intro-Sectio?bidId=

Lewiston Riverside Greenway Feasibility Study
http://www.lewistonmaine.gov/DocumentCenter/View/789/6-2002---Lewiston-Riverside-Greenway-Feasiblity-S?bidId=

Twin Cities Riverfront Concept Plan
http://www.lewistonmaine.gov/DocumentCenter/View/793/10-1988---Twin-Cities-Riverfront-Concept-Plan?bidId=

A study would evaluate the degree to which the facility operations impact aesthetics and specify opportunities for mitigating impacts on the aesthetics of the project area.

Nexus between project effects and resource; how study results will inform license requirements

The negative aesthetic impact of the Lewiston Falls Project exists when water is redirected to generators. All of the studies and plans for Lewiston-Auburn's future focus on an adequate amount of water in the river. A lack of water flow hampers the ability of the state's second largest metropolitan area to evolve from its industrial past to a more vibrant future. The Androscoggin Riverfront remains a critical resource for the Lewiston-Auburn community and the falls are a defining feature, so much so that the images of Great Falls are used in marketing and economic development efforts and displayed prominently on front pages of our websites. Lewiston and Auburn have the potential to highlight a unique and special place with water over the falls; the effort to do so is impacted by the facility channeling water through turbines.

The Lewiston Falls Hydroelectric Project impedes the flow of water over Great Falls. Since the opening of the Charles E. Monty Station in 1990, flows over Great Falls have been reduced by 40%, from approximately 146 days of the year to approximately 43 days, or from about 40% of the year to about 12%. **Since the amount of water flowing over the falls is largely dependent on how much of the available flow is being directed through the turbines, the nexus could not be clearer or more direct.**

To inform the NEPA analysis, it is necessary to identify and explain the project impacts and examine strategies for countering those impacts, including increased water flow and/or investments in the aesthetics of the community. The Lewiston Falls Dam powered the establishment of the community as

an industrial center and allowed for thousands of people to earn a living working in the mills. Today, with a combined population of nearly 60,000, Lewiston Auburn is Maine's second-largest urban area and one of the most diverse communities of its size in New England. **The power from the facility is no longer powering jobs in the community as it once did, but continues to impact the river and flows over the Great Falls.**

Study methodology

Established practices for Aesthetic Flow Studies would be employed for this study. All Key Observation Points (KOP) are easily accessible and the applicant has the ability to control and modify flow to some extent. A component of the study is to determine the extent to which the applicant currently has the ability to control and/or modify flows, how the upstream facilities controlled by the applicant impact flows to the facility and any cumulative impacts, what measures might be necessary to enable the applicant to better control flows and thus be better able to provide specific timing, duration and magnitude of flows, as well as how and to what extent modifications to project works could allow for increased control of flows and how that might affect project operations, power generation, and revenues.

The study should be designed to identify minimum flows that produce visual water over the falls and in the canals and identify the range of flows that can be directed over the falls and test flows within that range for desirable visual impacts. The actual methodology should closely follow the Doug Whittaker, Bo Shelby, & John Gangemi publication, *Flows and Recreation, Guide to Studies for River Professionals* (npshistory.com/publications/rtca/nri/flows-recreation.pdf) modified to assess visual impacts from KOPs including Veterans Park, the Auburn Riverwalk, West Pitch Park, Longley Bridge and Festival Plaza. The study should explain the impacts of generation on available flows over the falls and in the canals.

In addition to generally accepted aesthetic flow study practices, we request that water quality data be collected below the falls for 24 hours leading up to the study, at various flows during the study, and for 24 hours after the study to determine the extent to which flows over the falls impact dissolved oxygen levels in the river. **This request will be included in the water quality study, but the connection to flows over the falls is needed to ensure data is collected during the flow study.**

Consideration of effort and cost

This type of study is routinely conducted during FERC proceedings and in this case can be done at a reasonable cost and time frame. Several KOPs are easily accessible. Conducting an AFS, using photo, video, and personal observation at various documented flows is the simplest way to provide the information needed. Costs should not exceed $25,000.

Study request #2: River Access and Recreational Flow study

Goals and objectives

This study should include an evaluation of existing project operations, including cumulative effects of this project's operation in conjunction with flows provided by the operation of upstream facilities (see P-2283 filing https://elibrary.ferc.gov/eLibrary/filelist?accession_num=20210903-5157) controlled by the

applicant, and future on-water and on-shore recreation use along the river, canal, and abutting areas while protecting habitat, public safety, and water quality. The study will:

- Determine which facilities and access points such as trails, parks, boat launches, portage sites and picnic areas need to be developed or improved to make the river accessible to people across the region. This includes ADA compliance;
- Identify how and where a Canal Walk and River Walk network with new pedestrian and bicycle connections along the canals will improve connections from the riverfront to Lewiston's downtown Lisbon Street to ensure that Lewiston's riverfront functions as a cohesive urban destination where the whole is greater than the sum of its parts;
- Determine how the Riverwalk should extend through Vetrans Park and along Island Point, linking back to Main Street at the Upper Canal;
- Evaluate Pedestrian Railroad Bridge as a project facility for river view access;
- Determine how restoration and use of the canals would create high-value spaces for people to recreate and gather, generating interest and economic development facing these unique cultural and physical assets;
- Identify areas where high-quality walkways, seating, lighting and signage throughout the riverfront and canal area will contribute directly to the area's appeal and success;
- Determine how to create connections for pedestrians and bicyclists to unlock the riverfront and canal's many assets for the Lewiston-Auburn community to fully enjoy by providing an easily walkable, inviting, and well-connected environment;
- Determine the feasibility of use of the canals themselves for water-based recreation—in small boats, for ice skating, and other purposes—further enhancing the appeal of canal edges for pedestrians;
- Determine flows needed by different user groups and suggest strategies for addressing conflicts;
- Evaluate and plan for portage around Dresser Rips and from North River Road boat launch to hand carry access below the Lewiston Falls.
- Evaluate river access improvements throughout the project area
- Evaluate and Identify flows that serve on-the-water users (kayakers and canoeists, whitewater at Dresser Rips, rowing teams)
- Evaluate ways to inform the public when ideal conditions exist or will exist.

Resource management goals

The cities are not a resource management agency, but we represent the public that lives, works and plays within our municipal boundaries.

Public interest

The Androscoggin River is a public trust resource for the communities of Auburn and Lewiston and the people of the State of Maine, licensed to Brookfield White Pines Hydro LLC for power generation. The public has the right to access it for all forms of recreation. The cities have invested in long range planning efforts that center on the river as a critical quality-of-life asset. In Auburn alone, there are 11,965 households that qualify for Community Development Block Grant assistance for being under 80% HUD Area Median Family Income (HAMFI). This number encompasses 46% of the total 25,530 households in Auburn. Of the total households within Auburn, 7,850 households (or 30%) are qualified for the HOME program for being under 50% HAMFI. Lewiston has 28,350 households that qualify for

CDBG representing 78% of total 36,409 households of which 11,620 (32%) households qualify for the HOME program. These qualifying households are largely located within a 1-mile area surrounding the Project and many depend on walking and public transit to access recreational opportunities along the Androscoggin River. Understanding project impacts as they relate to access to the river is necessary to promote environmental justice in the project area and surrounding LMI neighborhoods during the FERC NEPA Analysis and ensure access to a high quality of life despite the impacts of project operations. Thus, the study must:

- Determine which facilities and access points such as trails, parks, boat launches, portage sites and picnic areas need to be developed or improved to make the river accessible to people across the region. This includes ADA compliance. The public has an interest in accessing the river that is a public trust resource. Improved public access is necessary to mitigate the flooding of natural flood plains and to overcome the flooding in the impoundment as well as fluctuating flows below the facility caused by operation of applicant-controlled facilities and their cumulative impacts;
- Identify how and where a Canal Walk and River Walk network with new pedestrian and bicycle connections along the canals will improve connections from the riverfront to Lewiston's downtown Lisbon Street to ensure that Lewiston's riverfront functions as a cohesive urban destination where the whole is greater than the sum of its parts;
- Determine how the Riverwalk could extend through Heritage Park and along Island Point, linking back to Main Street at the Upper Canal. The public has an interest in accessing the river that is a public trust resource. Improved public access is necessary to mitigate the flooding of natural flood plains and to overcome the flooding in the impoundment as well as fluctuating flows below the facility caused by operation of applicant-controlled facilities and their cumulative impacts;
- Evaluate Pedestrian Railroad Bridge as a project facility for river view access;
- Determine how restoration and use of the canals would create high-value spaces for people to recreate and gather, generating interest and economic development facing these unique cultural and physical assets;
- Identify areas where high-quality walkways, seating, lighting and signage throughout the riverfront and canal area will contribute directly to the area's appeal and success;
- Determine how to create connections for pedestrians and bicyclists to unlock the riverfront and canal's many assets for the Lewiston-Auburn community to fully enjoy by providing an easily walkable, inviting, and well-connected environment;
- Determine the feasibility of use of the canals themselves for water-based recreation—in small boats, for ice skating, and other purposes—further enhancing the appeal of canal edges for pedestrians;
- Determine flows needed by different user groups and suggest strategies for addressing conflicts; Evaluate and Identify flows that serve on the water users including kayakers and canoeists, whitewater at Dresser Rips, rowing teams. The public has an interest in accessing the river that is a public trust resource. This study is necessary to understand how fluctuating flows below the facility caused by operation of applicant-controlled facilities and their cumulative impacts affect the ability of all paddling user groups;

- Evaluate and plan for portage around Dresser Rips and from the North River Road boat launch to hand-carry access below the Lewiston Falls. The public has an interest in accessing the river that is a public trust resource. This is necessary to mitigate the flooding of natural flood plains and to overcome the flooding in the impoundment as well as fluctuating flows below the facility caused by operation of applicant- controlled facilities and their cumulative impacts. This is further necessary because the impoundment and the hydro facility operations sever the opportunity for through-paddling and pedestrian access along the naturally occurring river. Through-paddling portages and pedestrian access might be restored above the impoundment pond elevation from the North River Road Boat Launch to the lower side of the facility, but it is necessary to understand options to mitigate this impact and consider the impacts in the NEPA Analysis;
- Evaluate river access improvements throughout the project area. The public has an interest in accessing the river that is a public trust resource. This is necessary to mitigate the flooding of natural flood plains and to overcome the flooding in the impoundment as well as fluctuating flows below the facility caused by operation of applicant-controlled facilities and their cumulative impacts. This is further necessary because the impoundment and the hydro facility operations sever the opportunity for through-paddling and pedestrian access along the naturally occurring river. Through-paddling portages and pedestrian access might be restored above the impoundment pond elevation from the North River Road Boat Launch to the lower side of the facility, but it is necessary to understand options to mitigate this impact and consider the impacts in the NEPA Analysis;
- Evaluate ways to inform the public when ideal conditions exist or will exist. This is necessary to ensure the public knows when project impacts are minimized and/or safe enjoyable conditions will naturally exist and can be enjoyed when available. The project and its cumulative impacts on river flows affects the timing and duration of varying water conditions in the river in and below the project area.

<u>Existing information and additional information needed</u>
The cities have invested in long range planning efforts that center on the river as a critical quality-of-life asset.

Androscoggin Greenways: Benefits of a River Corridor was produced by the Androscoggin Land Trust in 1996. An Access and Recreational Study will evaluate the progress made toward that vision in the past 26 years and map opportunities for increased public access to the river in the greater Lewiston Auburn area.

The McLaughlin Whitewater Design Group prepared a *Vision for Recreation on the Lewiston Historic Canal* for the Androscoggin Land Trust in 2014. An Access and Recreational Study will evaluate the progress made toward that vision and map opportunities for enhancement of the canals.

Androscoggin Greenway Health Impact Assessment
Microsoft Word - ALT HIA Report FINAL (lewistonmaine.gov)

Androscoggin Greenway Plan https://issuu.com/wrightp/docs/androscoggin_greenway_plan_wright-pierce

Auburn Trails Feasibility Study
https://digitalcommons.usm.maine.edu/mdot-docs/1/

City of Auburn Strategic Plan
https://www.auburnmaine.gov/pages/government/strategic-plan

City of Auburn Comp Plan
https://www.auburnmaine.gov/pages/government/comprehensive-plan

City of Lewiston *Riverfront Island Master Plan*
https://www.lewistonmaine.gov/413/Riverfront-Master-Plan

City of Lewiston Comprehensive Plan, *Legacy Lewiston*
https://www.lewistonmaine.gov/603/Lewiston-Comprehensive-Plan

Lewiston Riverside Greenway Feasibility Study
http://www.lewistonmaine.gov/DocumentCenter/View/789/6-2002---Lewiston-Riverside-Greenway-Feasiblity-S?bidId=

City of Lewiston, Parks and Recreation Comprehensive Plan
http://www.lewistonmaine.gov/DocumentCenter/View/807/1993---Parks--Recreation-Comp-Plan---Intro-Sectio?bidId=

Twin Cities Riverfront Concept Plan
http://www.lewistonmaine.gov/DocumentCenter/View/793/10-1988---Twin-Cities-Riverfront-Concept-Plan?bidId=

Nexus between project effects and resource; how study results will inform license requirements

The nexus is clear and direct because the amount of water going over the falls is directly controlled by project operations. The study will inform the volume of water needed to support a range of both upstream and downstream recreation ranging from boating to fishing and passive viewing of the river and falls. It will inform the demand for access points, including portage sites. The project includes 5 dams, a bypassed reach that contains a significant waterfall at certain flows, and a riverine reach below the project boundary surrounded by the state's second largest metropolitan area, which is inherently attractive for recreation close to home. An analysis of existing recreation use and access at the project would help form the basis for determining the project's impacts upon, and ability to enhance, public recreation access opportunities. The proximity to a large population center, being located at its center, creates greater recreational value potential and, inversely, negative impacts of project operations to a larger group of users than more rural facilities, with fewer potential visitors. Flow over the dam and in the bypass reach directly impacts aesthetics and recreation. Also, an assessment of the current level of recreation use would provide information necessary to develop a Recreation Management Plan for efficient management of the recreational components of the project over the term of a new license.

The facility has 800-acre feet of storage capacity (The applicant indicates this fluctuation is largely unused) but is operated as a run-of-river facility with the flows fluctuating based on flows allowed from upstream facility operations controlled by the applicant. Cumulative operational impacts must be understood to inform the NEPA Analysis. The recreational flow study is necessary to provide information that could inform a license condition and as part of the NEPA Analysis.

Study methodology

This study has a land-based access component and a Controlled Flow Stream Assessment for recreational boating.

Land Based Access Methodology:

1. Identify and assess usage, suitability and condition of existing project facilities.
2. Walk project boundary with stakeholder representatives present to identify access points based on evidence of foot traffic and to evaluate suitability and improvement potential.
3. Evaluate portage and trail connectivity options around the facility.

Controlled Flow Stream Assessment methodology for recreational boating:

Accepted practices for recreational flow studies would be employed for this study. Evaluated sections of river include the entire project area below the Great Falls extending through Dresser Rips to a recently completed portage in Lewiston at 521 River Road approximately 4.8 miles below the dams. The applicant has the ability to control and modify flow within this area and flows can be measured at the Dresser Rips Gauge (USGS Gauge 01059000). A component of the study is to determine the extent to which the applicant currently has the ability to control and/or modify flows; how the upstream facilities controlled by the applicant impact inflows to the facility and the river below it; what measures might be necessary to enable the applicant to better control flows and thus be better able to provide specific timing, duration, and magnitude of flows; as well as how and to what extent modifications to project

works to allow for increased control of flows might affect project operations, power generation, and revenues.

The study should be designed to identify minimum flows that produce desirable conditions for novice boaters and rowing skulls in the river below the dam and for whitewater boaters at Dresser Rips. The evaluation should also include novice boaters in the canals and identify the range of flows that can be directed to each asset and test flows within that range for desirable conditions. The actual methodology should closely follow the Doug Whittaker, Bo Shelby, & John Gangemi publication, *Flows and Recreation, Guide to Studies for River Professionals* (npshistory.com/publications/rtca/nri/flows-recreation.pdf) The study should explain the impacts of generation and operation of the facility and the cumulative impacts of facilities upstream affecting flows in the project area and how they affect available flows in the river and in the canals.

Consideration of effort and cost
This type of study is routinely conducted during FERC proceedings and in this case, can be done at a reasonable cost and time frame.

Study request 3: Special Dissolved Oxygen Level Study

Goals and objectives

- To monitor dissolved oxygen (DO) below the Lewiston Falls Project to gather data on the effects of water releases over the falls as opposed to through-run through the turbines. Before the Lewiston Falls project was licensed, the falls were watered about 40% of the year, as opposed to the current levels of the current about 12%. These are by far the most scenic falls in southwestern Maine and arguably the entire state. The cities of Lewiston and Auburn are requesting aesthetic resources and river access and recreational flow studies that will consider options for periods when additional flows are directed over the falls. Data on the effects of these releases on DO is needed. It should be noted that while the Lewiston Falls Project is operated as a run-of river project, it is in effect a run-of-release project with flows also dependent on releases from the Gulf Island Pond Project located two miles upstream.
- To monitor DO further downstream below where the industrial canal flows enter the river. Past flows were robust in order to power generation by the mills. Current flows are only 50 cfs with periodic higher flows to flush the canals.

While both of these waters are outside of the project area, both are affected by project operations and other projects operated by the Applicant.

Of additional note is the fact that The Maine Board of Environmental Protection recently recommended approval of the water quality classification of the reach from Worumbo Dam downstream from Class C, Maine lowest water quality classification, to Class B.

Resource Management Goals
The study of dissolved oxygen is important to the quality of the waters beyond the provisions of Maine environmental statutes and the study requests normally submitted by Maine Department of Environmental Protection (MDEP). This was recognized by studies conducted between 1988 and 1995 as required when the project was first licensed. Since then, the flow regimes through the industrial canal

have changed and this may be affecting DO levels downstream of where they rejoin the mainstem of the river. Both of these DO levels need to be monitored and studies undertaken to understand what is occurring, and how it relates to project operation, both of the generation facility and the flows through the industrial canal.

The reach downstream is currently being considered for upgrading the water quality classification from C to B, with C being Maine's lowest water quality classification. The upgrade is important to the cities because too many Mainers vividly recall the pre-Clean Water Act state of the river as one of the most polluted in the country. Upgrading would help dispel the old notion of the river as 'the dirty loo' and encourage utilization of the river as the amazing recreational asset, located in Maine's second largest metropolitan area, that it currently is. DO is an important consideration for the water classification upgrade. Optimizing OD levels is a major consideration for project operations going forward.

The waters from below the falls to the ocean are classified as critical Atlantic salmon habitat. DO levels should be optimized for Atlantic salmon at all life cycle stages. While there are no plans to restore Atlantic salmon above Lewiston Falls, there is documented Atlantic salmon habitat in the Little Androscoggin that is in the process of being reconnected and restored. The waters below the project will figure importantly into the eventual success or failure of this effort. More detail is included in the 2017 *Draft Fisheries Management Plan for the Lower Androscoggin, Little Androscoggin and Sabattus Rivers*.

American eels are documented above Lewiston Falls and indeed above Rumford Falls upstream. American eels are considered threatened throughout their range. Increasing the number of days when water is directed over the falls, especially during the spring, would directly benefit the species.

Management of the flows over the falls is key to so much: the aesthetics of the river, expanded whitewater and other recreational use of the resource, the oxygenation of the waters with resultant benefits to aquatic life, and American eel passage, enhancing the greater ecosystem of the watershed.

Public Interest

It is in the public interest for the study to be conducted. The health of the lower Androscoggin River is absolutely required for the public to maximize its utilization, enjoyment and property values.

The two cities, Lewiston and Auburn, the Androscoggin River Water Council, the Androscoggin Land Trust, Grow L+A, Bates College, Androscoggin Valley Congress of Governments, Trout Unlimited and Friends of Merrymeeting Bay along with other downriver towns all support a cleaner and healthier river.

Restoring and maintaining the healthiest river possible is key to the success of development plans currently under development plans being considered by the City of Lewiston. See: https://www.sunjournal.com/2021/12/14/lewiston-looking-to-update-riverfront-redevelopment-plan/?utm_source=Newsletter&utm_medium=email&utm_content=Daily+Headlines%3A+Lewiston+looking+to+update+riverfront+redevelopment+plan&utm_campaign=SJ+Daily+Headlines+%28HTML%29

River access is also a key part of the City of Auburn Development Plan, see https://www.auburnmaine.gov/Pages/Government/Plans-Projects

Existing information and additional information needed

DO Studies have been done over the past 20 years by Friends of Merrymeeting Bay under the auspices of the volunteer DEP program. Data gathered is available at http://cybrary.fomb.org/chemical.cfm DO data collected during the last licensing is summarized in the Pre-Application Document (PAD, page 5-25).

Current data will be needed to evaluate the effects of future changes to the flow regime to support to support recreation and aesthetics, as well as to already-implemented changes to the flow regime of the industrial canal.

Existing studies relevant to this request include:

Androscoggin Greenway Health Impact Assessment
Microsoft Word - ALT HIA Report FINAL (lewistonmaine.gov)
Androscoggin Greenway Plan https://issuu.com/wrightp/docs/androscoggin_greenway_plan_wright-pierce
Auburn Trails Feasibility Study
https://digitalcommons.usm.maine.edu/mdot-docs/1/

City of Auburn Strategic Plan
https://www.auburnmaine.gov/pages/government/strategic-plan

City of Auburn Comp Plan
https://www.auburnmaine.gov/pages/government/comprehensive-plan

City of Lewiston *Riverfront Island Master Plan*
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Twin Cities Riverfront Concept Plan
http://www.lewistonmaine.gov/DocumentCenter/View/793/10-1988---Twin-Cities-Riverfront-Concept-Plan?bidId=

Nexus between project effects and resource; how study results will inform license requirements

Operation of the project directly affects the DO levels above and below the project, and this is why DO studies are required by Maine DEP's standard suite of study requests. This request exceeds normal

MDEP requirements. It is acceptable and preferable that the features of the requested study are incorporated into the MDEP DO study.

Study Methodology

Sondes of the type normally used by the Maine DEP should be placed below Gulf Island Dam, below the Great Falls and Monty Outflow and below Dresser Rips (or whatever downstream location deemed most suitable by MDEP in accordance with MDEP DO sampling location protocols) and monitored for at least three years. Flow and DO should be monitored on a weekly basis and graphed and posted on a specific public web site. Analysis efforts should concentrate on the effects on DO levels during periods when flows are present over the falls and/or through the industrial canals. The last license was initially designed to record DO for the total extent of the license. It would be helpful for this to be the same.

Level of Effort and Cost

The estimated cost of the study is $25,000. This is commensurate with the scope of the project and its proposed license duration. Cost savings are likely if combined with the usual MDEP DO studies required for FERC relicensing.

Conclusion

The Androscoggin Riverfront remains a significant resource for the Lewiston-Auburn community. In an era when communities across the country have reclaimed urban waterfronts as vibrant community destinations, Lewiston and Auburn have the potential to create a unique and special place. A destination riverfront will benefit Lewiston and Auburn most directly if it is strongly connected to the rest of the community and especially to the core of downtown Lewiston along Lisbon Street. The hydro facility has lost its historic economic connection to the community and no longer powers the idle mills and canals, but it continues to impact the communities by severing access and redirecting flows from public trust resources and by hampering recreational activities. The above requested studies are necessary to provide information and understanding of the operational impacts of P-2302 to inform FERC's NEPA Analysis.

City of Auburn
Eric J. Cousens
Director of Planning and Permitting

City of Lewiston
David Hediger
Director of Planning and Code Enforcement

American Whitewater
Bob Nasdor
Northeast Stewardship & Legal Director

Trout Unlimited
Stephen G. Heinz
Maine TU Council FERC Coordinator

Grow L+A
Peter Rubins
Board member, Chair Grow L+A River Working Group

AMC
Eliza Townsend
Maine Conservation Policy Director

CC: Senator Susan Collins Office, Maine 2nd District Congressman Jared Golden's Office

From: Rideout, Megan M <Megan.M.Rideout@maine.gov>
Sent: Tuesday, February 1, 2022 11:22 AM
To: Mack, Karen E. <KEMack@trccompanies.com>
Subject: [EXTERNAL] FW: Question on the Lewiston Falls Hydro Project (FERC No. 2302) (MHPC#0616-21A)

Good Morning Karen,

After reviewing the PAD Cultural Section, it appears that there is no need for further architectural survey. I believe that the letter discussing survey was resent to capture the outstanding archaeological survey request.

My apologies for not providing clarification in December about the architectural survey request. It was my error.

Best,

Megan M. Rideout
Review & Compliance/CLG Coordinator
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine 04333
207.287.2992

From: Mohney, Kirk <Kirk.Mohney@maine.gov>
Sent: Monday, January 31, 2022 11:32 AM
To: Rideout, Megan M <Megan.M.Rideout@maine.gov>
Subject: FW: Question on the Lewiston Falls Hydro Project (FERC No. 2302) (MHPC#0616-21A)

From: Mack, Karen E. <KEMack@trccompanies.com>
Sent: Monday, January 31, 2022 11:03 AM
To: Mohney, Kirk <Kirk.Mohney@maine.gov>
Subject: Question on the Lewiston Falls Hydro Project (FERC No. 2302) (MHPC#0616-21A)

Kirk,

I am working with Brookfield & Kleinschmidt to determine the costs for complete the cultural studies for relicensing of the Lewiston Falls Hydro Project (FERC No. 2302) and in December Kleinschmidt received the attached letter from MHPC requesting both architectural and archaeological studies. Since the norther portion of the Project partially overlaps the northern end of the Lewiston Textile Mills and Waterpower System Historic District which was previously survey (Willis, K. 2012) and the Project facilities were built in the 1980s – could you elaborate on what additional architectural studies need to be done for the relicensing studies?

I have attached a copy of the MNPC letter and a copy of the cultural portion of the PAD.

I really appreciate you time and assistance,
Karen

Karen E Mack
Operations Manager/Principal Archaeologist

1356 Washington St, Suite A, Bath, ME 04530
C 207.215.2872 | kemack@trccompanies.com
LinkedIn | Twitter | TRCcompanies.com

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JANET T. MILLS
GOVERNOR

KIRK F. MOHNEY
DIRECTOR

December 8, 2021

Ms. Fatima Oswald
Kleinschmidt
141 Main Street
Pittsfield, ME 04967

Project: MHPC #0616-21A — Lewiston Falls Hydroelectric Project; FERC # 2302
PAD Questionnaire

Town: Auburn, ME

Dear Ms. Oswald:

In response to your recent request, I have reviewed the information received November 24, 2021 to continue consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended.

Please see an enclosed copy of our response to the PAD questionnaire that we sent to your office on June 29, 2021.

If you have any questions regarding archaeology, please contact Dr. Arthur Spiess of this office at Arthur.Spiess@maine.gov.

Please contact Megan M. Rideout of our staff at 287-2992 or megan.m.rideout@maine.gov if you have any questions regarding above ground resources.

Sincerely,

Kirk F. Mohney
State Historic Preservation Officer

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JANET T. MILLS
GOVERNOR

KIRK F. MOHNEY
DIRECTOR

June 29, 2021

Ms. Fatima Oswald
Kleinschmidt
141 Main Street
Pittsfield, ME 04967

Project: MHPC #0616-21A — Lewiston Falls Hydroelectric Project; FERC # 2302
PAD Questionnaire

Town: Auburn, ME

Dear Ms. Oswald:

In response to your recent request, I have reviewed the information received June 10, 2021 to initiate consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended.

An architectural survey is recommended to identify and record information on all resources within the area of potential effect (APE) that are at least 50 years old. Survey must be completed according to our "Revised Above Ground Cultural Resource Survey Manual Project Review Specific." All surveys must be submitted electronically via our on-line CARMA database. See our website for more information: https://www.maine.gov/mhpc/quick-links/forms-instructions

A list of historic preservation consultants who are qualified to conduct architectural survey and have been trained in the use of the CARMA database may be found at the following page of our website: https://www.maine.gov/mhpc/programs/survey/approved-consultants/carma-trained-consultants

With regards to archaeological resources, the impoundment margins must be subject to a Phase I archaeological survey including subsurface testing in appropriate locations to identify all archaeological sites around the impoundment margin that might erode over the term of the license. Phase II (site assessment) field work might also be necessary depending on the results from the Phase I survey.

A list of qualified prehistoric archaeologists has been can be found on our website: http://www.maine.gov/mhpc/project_review/consultants/prehistoric_archaeology.shtml.

When it comes to archaeological studies of hydro-power impoundments, the Commission defines the APE (area of potential effect) as all land around the margin of the impoundment that may be affected by erosion during the term of the future license. When the Project boundary is defined as an elevation, for example, the APE may extend above that elevation and laterally outside the Project boundary, if there is a potentially eroding land form that extends above the Project boundary elevation.

With regards to the architectural resources, the area of potential effects for the project should be defined in accordance with Section 106 and in consultation with MHPC. The Project APE is defined as the lands enclosed by the Project's boundary and the lands or properties outside of the Project's boundary where project construction and operation or project-related recreational development or other enhancements may cause changes in the character or use of historic properties, if any historic properties exist.

Please submit a draft APE for our office to concur with for architectural and archaeological properties prior to commencing either study.

If you have any questions regarding archaeology, please contact Dr. Arthur Spiess of this office at Arthur.Spiess@maine.gov.

Please contact Megan M. Rideout of our staff at 287-2992 or megan.m.rideout@maine.gov if you have any questions regarding above ground resources.

Sincerely,

Kirk F. Mohney
State Historic Preservation Officer

Dec. 30, 2021

To: Luke Anderson

Licensing Manager

Brookfield Renewable

The Cities of Lewiston and Auburn have been working with other stakeholders to draft Study Plan Requests for the P-2302 Lewiston Falls/Monty Hydro project that are Due by COB January 3rd. Largely focused on river and near-river based recreation and aesthetics at the falls for our residents and visitors, we are also supporting water quality and historic studies.

Before the Monty was licensed in 1986, water flowed over The Great Falls, Our Little Niagara, 40%(146 days per year) and diminished to 12%(43 days per year) for the past 40 years. We hope the study will find a way to run some water over the Great Falls on a daily basis. The Androscoggin was classified as one of the Top Ten polluted rivers in the country and now the population of the two cities enjoy the parks and trails surrounding the River with fishing, recreation and long term riverfront plans to access the river for an urban population of around 60,000 citizens.

Over the past 40 year license, the Monty has been built, bought and sold four times. Our study requests are meant to guarantee that owners of P-2302 provide recreation and aesthetics and maintain water quality of a minimum of 7PPM as stated in the Brookfield PAD, Table 5-5 on page 5-25.

GROW L+A is a 501 C-3 and is committed to helping create a vibrant urban environment.

The Androscoggin River is part of our Public Domain and we request respect for our River from the industries that surround us. Please endorse our requested study plans and help us continues the quest of our own Sen. Ed Muskie through the 1972 Clean Water Act and it's 50th anniversary.

Respectfully, Peter Rubins

GROW L+A

CHAIR, GROW L+A RIVER WORKING GROUP

December 30, 2021

VIA E-FILING
Luke T. Anderson
Manager, Relicensing
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

RE: AVCOG support of the Comments & Study Requests of the City of Auburn, City of Lewiston, American Whitewater, Appalachian Mountain Club, Grow L+A and the Maine Council of Trout Unlimited for FERC Project P-2302-099, Lewiston Falls/Monty Hydro

Dear Secretary Bose:

On August 4, 2021, Brookfield White Pine Hydro (BWPH) submitted a Pre-Application Document and Notice of Intent to seek a new license for the Lewiston Falls project on the Androscoggin River. The filing includes a period to provide Comments and Study Requests in response to the filing of the Pre-Application Document (PAD) for the Lewiston Falls Hydroelectric Project (FERC Project No. 2302-099) by Brookfield White Pines Hydro LLC (BWPH).

We have reviewed the submitted documents and the submitted requests for studies from the City of Auburn, City of Lewiston, American Whitewater, Appalachian Mountain Club, Grow L+A and the Maine Council of Trout Unlimited and from the National Oceanic and Atmospheric Administration and provide the following comments.

The project is located on the Androscoggin River in the cities of Auburn and Lewiston in Androscoggin County, Maine. For nearly 50 years, AVCOG has served as the Regional Planning Organization providing economic development, land-use planning, and environmental protection services for most municipalities along Maine's stretch of the Androscoggin River. The river drove the economic development of our historic mill towns and has supported further growth both above and below the project area. Centuries later this natural resource continues to be an epicenter for business, while improved water quality has enhanced community life, and significantly increased tourism and recreation to the area.

Since the mid-1970s, AVCOG has studied the river and worked on projects with many parties to improve water quality through federal and state-funded programs related to land use

management, industrial discharge, sewage treatment, forestry and farming practices, and recreation. Through these efforts, the river's water quality has dramatically improved, and now exceeds its Class C designation. As a result, communities are seeing an increase in paddling, boating, and fishing as well as a general interest in activities along the river. In addition, public access to the river continues to grow with the creation of riverwalk tours and the newly revived Androscoggin Riverfest. However, these gains continue to ebb and flow with the operations and management of the dam.

Water level management over the years has dramatically reduced the number of days water flows over the Great Falls, leaving the landmark high and dry most of the season. This negatively impacts the substantial pedestrian and park investment river-side communities have made. In addition, the reduced frequency of significant water releases is negatively impacting conditions for recreational boating.

Further, the project area is near a large low-income population center. We believe that the water quality improvements in recent decades, and the proximity to Maine's second largest metro area, warrants the study of a range of ways to improve water access to the immediate community, many of which lack personal vehicles. Increased local access to natural resources enhances quality of life significantly and attracts more local investment into the community.

The Androscoggin River is known for world-class bass fishing, and the corridor between Rumford and Canton was featured in *Field & Stream* for its story-sized catches. Fish passage and species diversity, especially cold water species, is critical to recreation and tourism in our region including the upper reaches of the river's watershed.

For the reasons stated above, AVCOG supports the comments and study requests provided in the Study Plan Request of Auburn and Lewiston for FERC Project P-2302-099, Lewiston Falls/Monty Hydro and the National Oceanic and Atmospheric Administration Comments on the Pre-Application Document and Requested Studies for the Lewiston-Falls Hydroelectric Project (P-2302-099).

Sincerely,

Amy M. Landry
Executive Director

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JANET T. MILLS
GOVERNOR

KIRK F. MOHNEY
DIRECTOR

February 23, 2022

Mr. Luke T. Anderson
Brookfield Renewables
150 Main Street
Lewiston, ME 04240

Project: MHPC #0616-21A Lewiston Falls Hydroelectric Project; FERC # 2302
Draft Study Plan

Town: Auburn, ME

Dear Mr. Anderson:

In response to your recent request, I have reviewed the information received February 15, 2022 to continue consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended.

The draft relicensing study plan for prehistoric and historic archaeology dated February 14, 2022 is inaccurate and does not reflect the scope of archaeological survey that we requested in SHPO Kirk Mohney's letter of June 29, 2021 to Fatima Oswald, Kleinschmidt, Pittsfield.

Paragraphs 4 and 6 request Phase I archaeological studies around the impoundment margin in locations "that might erode over the term of the license" and on "potentially eroding land form(s)" that extend above the Project boundary elevation. In contrast, pages 2-36 and 2-38 of the draft study plan commit to archaeological testing on sensitive land forms "and where erosion is occurring". We are requesting a broader archaeological survey on any land form that MIGHT erode over the term of the license. That includes ones that are currently eroding, obviously, but also any that are not protected or that might conceivably be affected by a major flood, ice scour or other (for example) extreme climate event.

We expect broad ranging Phase I prehistoric and historic archaeological surveys rather than ones narrowly focused on currently eroding locations.

If you have any questions regarding prehistoric archaeology, please contact Dr. Arthur Spiess of this office at Arthur.Spiess@maine.gov.

If you have any questions regarding historic archaeology, please contact Dr. Leith Smith of this office at Leith.Smith@maine.gov

Please contact Megan M. Rideout of our staff at 287-2992 or megan.m.rideout@maine.gov if you have any questions regarding above ground resources.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
State Historic Preservation Officer

From:	William McDavitt - NOAA Affiliate
To:	Anderson, Luke
Cc:	Casey Clark
Subject:	Re: Lewiston Falls Hydroelectric Project - draft Study Plan
Date:	Tuesday, March 8, 2022 12:56:33 PM

Luke,
Casey and I have reviewed the draft study plan. We are wondering if you could schedule a time next week to go over the proposed upstream and downstream eel studies and also to have a bit of a discussion about some of the studies that were not proposed. For example, with respect to the reregulation study, we would like to hear a bit more about this text: "Potential changes to Project operations, such as that suggested for this study, should be considered based on results of other resource studies that demonstrate ongoing resource impacts and identification of potential mitigation needs."
Given the narrow nature of the discussion, I do not think that other agencies need to be invited.
Regards,
-Bill

Bill McDavitt
Environmental Specialist
Integrated Statistics, Inc.

Under contract to National Marine Fisheries Service
Greater Atlantic Regional Fisheries Office
55 Great Republic Drive
Gloucester, MA 01930
978-675-2156
William.mcdavitt@noaa.gov

On Mon, Feb 14, 2022 at 4:58 PM Fatima Oswald <Fatima.Oswald@kleinschmidtgroup.com> wrote:

> Lewiston Falls Hydroelectric Project Distribution List:
>
> On behalf of Brookfield White Pine Hydro LLC (BWPH), the Licensee of the Lewiston Falls Hydroelectric relicensing Project (FERC No. 2302), please find attached the draft Study Plan which was developed in response to the study requests that were received by BWPH following the Joint Meeting held on November 4, 2021.
>
> Please provide any comments that you may have on this draft Study Plan by the week of March 14, 2022, allowing time in the schedule for further discussion or clarification through mid-April. The Study Plan will be finalized by the end of April in time to initiate the 2022 field study season. Please send your comments to Luke Anderson, Licensing Manager at Luke.Anderson@brookfieldrenewable.com.

If you would like to be removed from this distribution list or have updated contact information, please contact Fatima Oswald at Fatima.Oswald@kleinschmidtgroup.com.

Thank you,

Fatima Oswald

Licensing & Permitting Specialist

O: 971-337-3841

From: Isaac St. John
To: Fatima Oswald
Subject: RE: Lewiston Falls Hydroelectric Project - draft Study Plan
Date: Wednesday, March 9, 2022 6:40:28 AM

Good morning,

We do not have an immediate concern with your project or project site, and do not currently have the resources to fully investigate same. Should any human remains, archaeological properties or other items of historical importance be unearthed while working on this project, we recommend that you stop your project and report your findings to the appropriate authorities including the Houlton Band of Maliseet Indians.

Thank you,

Isaac St. John
Tribal Historic Preservation Officer
Houlton Band of Maliseet Indians
88 Bell Road
Littleton, ME 04730

From: Fatima Oswald [mailto:Fatima.Oswald@Kleinschmidtgroup.com]
Sent: Monday, February 14, 2022 4:54 PM
To: Fatima Oswald <Fatima.Oswald@Kleinschmidtgroup.com>
Cc: Anderson, Luke <Luke.Anderson@brookfieldrenewable.com>
Subject: Lewiston Falls Hydroelectric Project - draft Study Plan

Lewiston Falls Hydroelectric Project Distribution List:

On behalf of Brookfield White Pine Hydro LLC (BWPH), the Licensee of the Lewiston Falls Hydroelectric relicensing Project (FERC No. 2302), please find attached the draft Study Plan which was developed in response to the study requests that were received by BWPH following the Joint Meeting held on November 4, 2021.

Please provide any comments that you may have on this draft Study Plan by the week of March 14, 2022, allowing time in the schedule for further discussion or clarification through mid-April. The Study Plan will be finalized by the end of April in time to initiate the 2022 field study season. Please send your comments to Luke Anderson, Licensing Manager at Luke.Anderson@brookfieldrenewable.com.

If you would like to be removed from this distribution list or have updated contact information, please contact Fatima Oswald at Fatima.Oswald@kleinschmidtgroup.com.

Thank you,

Fatima Oswald
Licensing & Permitting Specialist
Kleinschmidt
O: 971-337-3841

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

Via Electronic Filing

March 14, 2022

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

Re: MDIFW Comments on Draft Study Plan for the Lewiston Falls Hydroelectric Project (FERC No. 2302)

Dear Secretary Bose:

On February 14, 2022, Brookfield White Pine Hydro (Brookfield, Licensee) submitted a Draft Study Plan for the Lewiston Falls Hydroelectric Project (FERC No. 2302). The Project is located on the Androscoggin River in Androscoggin County, Maine. The Maine Department of Inland Fisheries and Wildlife (MDIFW) provides the following comments on the Plan:

In our January 3, 2022 comments on the Pre-Application Document, MDIFW requested information on Project operations specifically related to impoundment fluctuation. To date, this information has not been provided but is fundamental to understanding the results of all proposed studies. The PAD states that the Project is licensed to operate with up to 4 feet of impoundment fluctuation, yet "*is normally operated as run-of-river with impoundment fluctuations of one foot or less.*" MDIFW requests clarification on the exact operational mode for the Project, as 4-foot impoundment fluctuations would be inconsistent with a run-of-river facility. To this end, we also request data on the frequency, magnitude, and duration of impoundment fluctuations over the last 5 years of Project operation, as well as Project outflow over the same time period. Without these data, it is unclear what is meant by the facility "normally" operating as run-of-river. The Maine Department of Environmental Protection (MDEP), the Maine Department of Marine Resources (MDMR), and the National Marine Fisheries Service (NMFS) have requested similar information and MDIFW further supports these inquiries.

MDIFW appreciates that both the Fish Assemblage and Bass Spawning Studies were included in the Draft Study Plan. We support the inclusion of seine netting as a supplemental component (along with boat electrofishing) of the Fish Assemblage Study, but MDIFW recommends that gillnetting also be included as neither electrofishing nor shallow water seine netting may be effective at collecting some important but difficult-to-capture species such as American eel and northern pike. Methodologies employed should also consider study requests from other natural resources agencies where applicable.

For the Bass Spawning Study, the Licensee should correct an inconsistency regarding the number of bass proposed for aging. These fish will be collected as part of the Fish Assemblage Study, which states that up to 100 largemouth bass and 100 smallmouth bass, across five size/age classes, will be aged. However, the Bass Spawning Study only proposes aging of up to 50 largemouth bass and 50 smallmouth bass. Up to 100 individuals of both species should be aged, consistent with the Fish Assemblage Study, and to provide additional depth of data at relatively low added investment.

Finally, MDIFW supports Draft Study Plan comments from other natural resource agencies, including but not limited to MDEP, MDMR, NMFS, and the U.S. Fish and Wildlife Service. Though the Reregulation Feasibility Study proposed by MDMR/NMFS was not adopted as part of the Draft Study Plan, MDIFW notes that gathering more information, particularly on potential Project operation modes, would enhance understanding of impacts to aquatic resources both upstream and downstream of the Project. Without additional details of what reregulation would entail, resource agencies are left with incomplete knowledge of potential impacts to both resident and diadromous species.

We appreciate the Licensee's ongoing commitment to work through these issues. Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

John Perry
Environmental Review Coordinator

Cc: Francis Brautigam, Joe Overlock—MDIFW Fisheries Division, Augusta Headquarters
Jim Pellerin, Nick Kalejs—MDIFW Fisheries Division, Region A
Casey Clark, MDMR
Kathy Howatt, MDEP
Julianne Rosset, USFWS
William McDavitt, NMFS
Luke Anderson, Brookfield

Lewiston Falls Project Relicensing (FERC No. 2302)
Agency Call to Discuss Potential Study Requests – March 17, 2022
Call Summary

Attendees:
Bill McDavitt, NMFS
Casey Clark, MDMR
Luke Anderson, BWPH
Drew Trested, Normandeau
Wendy Bley, Kleinschmidt

A call was requested and held to discuss the draft Study Plan for the Lewiston Falls Project, and to answer questions from National Marine Fisheries Service (NMFS) and the Maine Department of Marine Resources (MDMR). The following topics were discussed:

Upstream Eel Study:

- Casey (MDMR) requested that the upstream eel surveys be conducted for the period April through September to capture the entire potential upstream eel passage season.
- Casey asked why daytime electrofishing was being proposed. Drew (Normandeau) explained that backpack shockers are heavy, and the terrain is tricky, and so it would be too great a hazard to do night shocking with backpack shockers. Drew noted that Normandeau has had good success with daytime shocking elsewhere in New England.
- Casey suggested that the agencies may want to push the upstream eel survey until 2023, as they have recently become aware of some problems with upstream eel passage at the Worumbo Project. They'd rather the Lewiston Falls upstream eel study be done once the Worumbo eel passage issues have been resolved. MDMR said they'd let Brookfield know soon about status of Worumbo eel passage and whether the Lewiston Falls upstream eel study should be postponed until 2023.

Downstream Eel Study:

- Casey asked about the planned receiver array, and whether Normandeau would be able to distinguish between fish using dams 1 and 2, or between dams 3, 4, and 5. Drew indicated that Normandeau might be able to adjust the receiver array to better distinguish between fish using these various routes, but that he won't know that until they get into the field. Normandeau will do the best they can to try to be able to distinguish between dam section routes of passage.
- Casey asked why Hi-Z tag turbine survival study request was rejected. Luke (BWPH) explained it was not rejected, but that it seemed premature to do the turbine tag study until after the route of passage study is completed and we better understand what route the eels are using. Luke explained that BWHP would rather use a step-wise approach to these studies.
- Casey indicated that at Worumbo the licensee is skipping route of passage and turbine mortality studies and going right to consideration of appropriate mitigation for downstream eel passage.

Reregulation study request:

- Bill (NMFS) and Casey reiterated their request for and interest in a study that looks at the potential for doing some reregulation of flows at Lewiston Falls. Luke explained that BWHP understands the interest, but thinks that such an assessment is premature pending 1) a review of Project operations data and a better understanding of how the Project currently operates and uses inflows that are controlled by upstream projects; and 2) a review of resource study results to understand if there are impacts to downstream resources that require mitigation.
- Luke indicated that BWPH will provide Lewiston Falls operations data (as requested) in the near future, either as part of the revised study plan or in a separate memo.
- Luke reiterated that the study request was not being rejected, but that, as with the eel studies, BWPH would like to do the studies in a phased approach. Luke suggested that the study plan could be revised to make it clearer that certain study requests are not being rejected, but that they will be considered as potential year two studies, in consultation with agencies and other stakeholders.
- Casey and Bill indicated their support for further clarity in the revised study plan regarding a phased or step-wise approach.

Timing of Eel Migration:

- The group circled back to the eel studies, and there was a brief discussion about what is currently known about the timing of upstream and downstream eel migration, and that much of the basis is from commercial eel fishing data.

From:	Eric Cousens
To:	Anderson, Luke; Fatima Oswald
Cc:	David Hediger; John Blais; Phil Crowell; Brian Wood
Subject:	Comments In Response to the Draft Study Plan (DSP) for the Lewiston Falls Hydroelectric Project (FERC No. 2302)
Date:	Friday, March 18, 2022 5:50:01 AM
Attachments:	Outlook-1wt4dxuj.png MontyHydroLewistonFallsP2302StakeholderResponsetoDSP3.18.22.pdf

Luke and Fatima,

Hope you are well. Attached are the City of Auburn, City of Lewiston, American Whitewater, Appalachian Mountain Club, Grow L-A, Maine Council of Trout Unlimited Comments in response to the Draft Study Plan (DSP) for the Lewiston Falls Hydroelectric Project (FERC No. 2302). We look forward to working with you on the relicensing.

Eric J. Cousens
Director of Planning and Permitting

March 18, 2022

Luke T. Anderson
Manager, Relicensing
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Sent via email to Luke.Anderson@brookfieldrenewable.com

RE: **City of Auburn, City of Lewiston, American Whitewater, Appalachian Mountain Club, Grow L-A, Maine Council of Trout Unlimited Comments In Response to the Draft Study Plan (DSP) for the Lewiston Falls Hydroelectric Project (FERC No. 2302)**

Dear Mr. Anderson:

The City of Auburn, City of Lewiston, American Whitewater, Appalachian Mountain Club, Grow L-A, and Maine Council of Trout Unlimited ("Cities and NGOs") submit the following Comments in response to the filing of the Draft Study Plan for the Lewiston Falls Hydroelectric Project (FERC Project No. 2302) by Brookfield White Pines Hydro LLC (BWPH) dated February 14, 2022.

The above named Cities and NGOs submitted our Comments and Study Requests In Response to the Notice of Intent to File a License Application, Filing of Pre-Application Document (PAD), Commencement of Pre-Filing Process, and Scoping; Request for Comments on the PAD And Scoping Document, and Identification of Issues and Associated Study Requests Regarding the Lewiston Falls Hydroelectric Project (FERC No. 2302) on December 30, 2021. Our questions and concerns are keyed to the study requests under consideration.

Study Requests DSP Comments

This phase of the FERC process is dedicated to identifying the studies needed to inform the licensing process so that licensing decisions can be based on current information and the best available science. We appreciate that Brookfield has responded with a Draft PSP that incorporates some of our requests for information that will inform the NEPA process. The three study requests that we submitted are essential to understanding operational impacts of the future management of the Lewiston Falls Project. The study requests submitted by resource protection agencies that we supported are important as well. We respectfully request that Brookfield consider further comments and modifications as you prepare your final study plan.

Phase I Archaeological Survey

Thank you for proposing Phase I Archaeological Survey requested by the Maine Historic Preservation Commission, Eel studies requested by the National Marine Fisheries Service and Maine Department of Marine Resources, and the flow studies requested by the National Marine Fisheries Service. This stakeholder group sees substantial value in those studies as they relate to quality of life for our residents, recreational fisheries, and overall public health.

Special Dissolved Oxygen Level Study

The Cities and NGOs proposed a Special DO Study. [Lewiston Falls Hydroelectric Project (FERC No. 2302) dated December 30, 2021] Its goals and objectives are:

- "*To monitor dissolved oxygen (DO) below the Lewiston Falls Project to gather data on the effects of water releases over the falls as opposed to through-run through the turbines. Before the Lewiston Falls project was licensed, the falls were watered about 40% of the year, as opposed to the current levels of about 12%. These are by far the most scenic falls in southwestern Maine and arguably the entire state. The cities of Lewiston and Auburn are requesting aesthetic resources and river access and recreational Flow studies that will consider options for periods when additional flows are directed over the falls. Data on the effects of these releases on DO is needed. It should be noted that while the Lewiston Falls Project is operated as a run-of-river project, it is in effect a run-of-release project, with flows also dependent on releases from the Gulf Island Pond Project located two miles upstream.*

- *To monitor DO further downstream below where the Industrial Canal flows enter the river. Past flows were robust in order to power generation by the mills. Current flows are only 50 cfs with periodic higher flows to flush the canals*."

The study request went on to note:

- "While both of these waters are outside of the project area, both are affected by project operations and other projects operated by the Applicant.

- Of additional note is the fact that The Maine Board of Environmental Protection recently recommended approval of the water quality classification of the reach from Worumbo Dam downstream from Class C, Maine lowest water quality classification, to class B."

Brookfield chose not to include this study in its Draft Study Plan, stating:

- "Downstream DO conditions will be monitored as part of the MDEP-requested water quality study and therefore not proposed as a separate study [DSP, page 3-1].

Project relicensing studies normally incorporate DO studies at two locations: in the impoundment and at a location agreed upon by the applicant and MDEP below the dam. The DSP proposes three locations: the impoundment, a tailwater location and a ledge pool site [DSP, page 2-3]. The Cities and NGOs do not object to these locations.

In addition to a site in the impoundment and one below the dam, DO studies are required in bypass reaches as well: "*Sampling should also occur in any bypassed segment of the river created by the project.*" [DEP SAMPLING PROTOCOL FOR HYDROPOWER STUDIES December 2017 provided as Attachment A] The Lewiston Falls Project has two bypass reaches, one is Great Falls that the ledge pool sonde will cover, the other the Industrial Canal. While it is arguable that the Industrial Canal is outside the project area, its flows are clearly interconnected with project operations. As previously noted [City of Auburn Letter dated January 11, 2022, Subject: Comments of the Cities of Lewiston and Auburn Maine Regarding the Gulf Island - Deer Rips/Androscoggin No. 3: Article 407: Project Operation and Flow Monitoring Revised Plan Project (P- 2283) and operational connection to the relicensing of Lewiston

Falls/Monty Hydro (P-2302)] the Lewiston Falls Project is run-of-release, not run-of-river, because its operation is so affected by operations at the Gulf Island Project with its large storage capacity.

For these reasons, the Cities and NGOs request that sondes should be deployed at two additional locations: the outflow below Gulf Island dam and above Dresser Rips near the Maine Turnpike Overpass. These locations are imperative for true ambient DO from Gulf Island Dam on down for the next 3-year period and confirmed with DEP. The sampling period should extend to low flow July, August, September and October. Without this information in addition to that from the sondes from the three other sites, analysis of DO cannot be formulated without consideration of Gulf Island Dam releases that actually controls "run-of-river" down river to Brunswick.

The analysis of the DO data included in the Special DO Study is essential to informing the relicensing. The Lewiston Falls Project dams are not proposed for removal and will remain in operation for the foreseeable future. The central challenge of the relicensing is to manage the project efficiently to ensure that the use of the resource is maximized and so that all project designated uses are served. For the Class C waters below Lewiston Falls, these are:

> *"Class C waters must be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; navigation; and as a habitat for fish and other aquatic life."* [MSRA 38 § 465 ¶ 4].

There is potential conflict between hydroelectric power generation, fishing, and habitat for aquatic life. Only by understanding how different flow conditions affect DO and overall water quality can these needs be balanced and use of the resource optimized. The test flows that will be conducted as part of the Aesthetic and Recreational Studies will provide a range of flow scenarios, and it makes little sense not to analyze how the different flow components affect DO and resultant water quality downstream. **Only by gaining a thorough understanding of the flow dynamics of this complex project and their effects on DO levels will the process be in a position to determine appropriate terms and conditions for continued project operations that will optimize the project's ability to accommodate all designated uses described by Maine Statue for Class C waters.**

The waters below Lewiston Falls are special because they are designated critical habitat for the federally endangered Atlantic salmon. The importance of this was recently emphasized by the recent NOAA Fisheries Biological Opinion that stated:

> *"It is possible that operation of the Lewiston Falls could affect migrating Atlantic salmon by inadvertently trapping or stranding them in the various pools downstream of the Projects, particularly during flashboard replacement and/or during and after spill events. To reduce the potential effects of stranding on Atlantic salmon and other fish species, the licensee will monitor downstream pools after significant spill events and during flashboard replacement and collect any stranded Atlantic salmon and release them back into the river.."* [NATIONAL MARINE FISHERIES SERVICE ENDANGERED SPECIES ACT BIOLOGICAL OPINION for Proposed amendment of the license for the Brunswick (FERC No. 2284) and Lewiston Falls (FERC No. 2302) Hydro Projects, pages 108 – 109 (Accession # 20211228-5096)

American eels are a species of concern and this is reflected in the study requests submitted by the Maine Department of Marine Resources (Accession # 20220114-5002). Eels are better able to ascend the Great Falls when water is being directed over them. This is another factor deserving consideration in deciding future terms and conditions for project operations.

Lastly, the reach downstream is currently being considered for upgrading the water quality classification from C to B, with C being Maine's lowest water quality classification. DO is an important consideration for the water classification upgrade. Optimizing DO levels is a major consideration for project operations going forward. The Cities and NGOs strongly support the upgrade of the water quality classification of the lower Androscoggin River.

For these reasons, it is essential that the additional sondes be deployed, DO data collected, and analyzed in relation to releases over Great Falls and through the industrial canals. The Special DO Study cannot be delayed because the test releases over Great Falls will likely not be done over more than one summer. We urge that Brookfield include the Special DO Study as a vital addition to the Aesthetic Study and the Recreational Study that you appropriately included in the DSP.

Aesthetic Study

We appreciate the proposed stakeholder group's level of involvement in structuring the study and look forward to working with you on this. We have the following comments and requests as you prepare a final plan.

1. Please confirm that this study can occur while the continuous water quality monitoring is in place below the falls. We ask that you monitor water quality during this study's release of water over the falls at station LF2 and provide an analysis of any changes during the releases as part of the water quality study proposed in the DSP.

2. BWPH states that the study "*does not include an aesthetic assessment…of the Lewiston Canal system, as the canal system is no longer owned by BWPH and is no longer part of the FERC-licensed project.*" The project has two bypassed reaches that are impacted by project operations. Those include the Lewiston Falls around water quality monitoring station LF-3 and the canals in Lewiston. Please modify the proposed Aesthetic Study to include consideration of impacts of operations on the canals. Studies and evaluations must not be limited to the license boundary area when operational impacts extend beyond the project area. The Project operations directly impact the canal system, as flow rates into the canals directly impact both the aesthetics of these waterways and the outflows to the Androscoggin River. The project is "run-of-release" NOT "run-of-river." The vast majority of flows and water levels are controlled upstream by the Island Pond Project. This fact was noted recently by the City of Auburn. [City of Auburn Letter dated January 11, 2022, Subject: Comments of the Cities of Lewiston and Auburn Maine Regarding the Gulf Island - Deer Rips/Androscoggin No. 3: Article 407: Project Operation and Flow Monitoring Revised Plan Project (P- 2283) and operational connection to the relicensing of Lewiston Falls/Monty Hydro [(P-2302)(Accession # 20220111-5111)] Planning efforts by the City envision the canal system as an integral part of providing economic and recreation opportunities. Simard-Payne Memorial Park is essentially surrounded by the canal system and river. The public has the right to experience the visual effects of water flows from

various vantage points. Therefore, the Aesthetics Study must include the canals to evaluate potential effects of Project operations on recreation sites, facilities and uses.

River Access and Recreational Flow Study

The Cities and the NGO's appreciate the proposed stakeholder group's level of involvement in structuring the study and look forward to working with BWPH. The stakeholders support this effort and request that evaluations and site visits be expanded to informal recreation sites not previously identified. Both Lewiston and Auburn are looking for the ability to consider other possible areas within and outside the project boundary that may be identified as areas to improve, expand, or create improved access. We have the following comments and requests as you prepare a final plan.

1. Please confirm that this study can occur while the continuous water quality monitoring is in place below the falls. We ask that you monitor water quality during this study's release of water over the falls at station LF2 and provide an analysis of any changes during the releases as part of the water quality study proposed in the DSP.

2. BWPH states "t*he primary goal of the proposed (recreation) study is to…evaluate potential effects of Project operations on recreation sites, facilities and use." However, it "does not include assessment of recreation use of, or sites and facilities associated with, the Lewiston canal system*" due to no longer being owned by BWPH or subject to a FERC license. The project has two bypassed reaches that are impacted by project operations. Those include the Lewiston Falls around water quality monitoring station LF-3 and the canals in Lewiston. Please modify the proposed Recreation Study to include consideration of impacts of operations on the canals. Studies and evaluations must not be limited to the license boundary area when operational impacts extend beyond the project area. Project operations directly impact the canal system, as flow rates into the canals directly impact the possible recreational use of these waterways. Planning efforts by the City envision the canal system as an integral part of providing economic and recreation opportunities. Simard-Payne Memorial Park is essentially surrounded by the canal system and river. The public has the right to access all waterways impacted by the Project, not just the river, for purposes of recreation and to experience recreational benefits of natural water flows. As with the Aesthetic Study, the Recreation Study must include the canals to evaluate potential effects of Project operations on recreation sites, facilities and use.

3. The Cities have experienced hindered emergency response to the river due to limited access to the project area, as well as downstream response to incidents that occur in the project area. The Recreation Study should consider an additional emergency access between the Durham Boat Launch and Dresser Rips, in the area of the Maine Turnpike to improve public safety and manage response times for river-based rescues. This area was within the project boundary until an amendment was made in 2020 and continues to be impacted by operational impacts to natural river flows.

4. The PSP Recreation Survey should include in-person and survey box response collection as well as an online survey tool, not either/or as proposed in the PSP. We request that the online survey take place for at least 3 months during the summer of 2022 with 14 days advance notice so that it can be shared among stakeholders and the public. In-person surveys should occur during at least two weekend days for 8 hours, including June 18th and one other day TBD by focus group. We also request a survey occur at least 2 project and 2 non-project sites in the

vicinity of project TBD by focus group. Stakeholders are willing to help with additional survey site collection if needed. Starting in May, there are currently 18 events occurring in or going through Simard-Payne Park including *YMCA-Fit Fest* in Festival Plaza June 5th, *Riverfest* in Simard Payne Park June 17-18, *Great Falls Brewfest* in Simard Payne June 25, *Great Falls Balloon Fest* in Simard Payne on August 18-21, *L-A Bridge Run* on August 28, *Dempsey Challenge* September 24-25. All of these events and others occur along the river and canal because of their natural beauty and ability to attract human activity to the river. The study schedule should take these events into consideration to document usage.

5. For clarification we offer the following details about the goals of a recreation study. The Licensee and stakeholders group should develop a study methodology with the goal of assessing the presence, quality, access, flow information, and flow ratings for paddling opportunities in a stepwise manner. Through this study, the Licensee should seek to:

a. identify recreational paddling opportunities in the project boundary and downriver in order to determine a full range of boating opportunities available under different modes of operation;
b. describe flow-quality relationships and identify acceptable and optimal ranges for boating using various craft;
c. describe potential effects of operations and identify boater's sensitivity to current operations and alternate flow regimes;
d. broadly characterize recreational paddling-relevant hydrology of the existing operating regime, and qualitatively describe the relationship between paddling opportunities and project operations;
e. determine whether current or future demand exists for whitewater and recreational boating within the context of regional opportunities and those provided through current operation;
f. determine the number of days flows for whitewater boating (Dresser Rips) and recreational boating are available under the projects' current operation;
g. identify resource needs (e.g., aquatic habitat) and competing recreational uses (e.g., canoeing, or fishing) that are or would be affected by flows suitable for boating;

h. identify public access obstacles; and, characterize effects on current project operations associated with providing various flows for recreational paddling.

Given the lack of information available about boating in the project boundary and downriver at Dresser Rips, the Licensee should take the following steps as part of the study:

1. Reach out to the whitewater boating community to assist with surveys of area boaters to assist in the development of the survey instruments and identify qualified boaters who will assist with the on-water assessment. During this initial phase, the Licensee should study the hydrology of the river reach to determine the gradient and identify the presence of ledges, boulders and other structural elements that would indicate a potential opportunity for whitewater boating at Dresser Rips as well as recreational boating downstream of the hydro facility.

2. The Licensee should conduct test flows in collaboration with representatives from the boating community to determine whether various flow levels create whitewater features such

as eddies, waves and holes that could be used for instruction, playboating if scheduled boating opportunities were provided.

3. The Licensee should study the extent to which the project operations effect valuable whitewater and recreational boating opportunities in order to develop protection, mitigation, and enhancement (PME) measures.

Denied NMFS Study

In its study request, NMFS states that the goal of this study "*is to determine if operational changes to the Project can improve the overall aquatic habitat of the Androscoggin River by dampening the effects of upstream hydropeaking projects, reducing the flashiness and number of flow reversals.*" [Accession # 20211223-5166] Brookfield's decision to not adopt this study puts this goal in jeopardy. While we and the agencies do not hold Brookfield responsible for the peaked inflows that it receives from upstream projects, we do think that the 1,600 acre-feet of headpond storage could play a role in reregulating the inflows the project receives. Improved recreational fisheries by minimizing negative impacts of project operations is important to the Cities. This study would address cumulative impacts and help inform decisions about project operations impacts on fisheries and is necessary for the NEPA analysis.

Bruder et. al. [Bruder, A., Tonolla, D., Schweizer, S.P., Vollenweider, S., Langhans, S.D., and Wüest, A. 2016. A conceptual framework for hydropeaking mitigation. Science of the Total Environment **568**: 1204-1212 DOI: 10.1016/j.scitotenv.2016.05.032] lists several structural and operational measures that could be evaluated to reregulate flows at Lewiston Falls. Just such an approach was enacted at the Gulf Island / Deer Rips project (P-2283). License Article 406 and Water Quality Certificate condition 3 requires the project to down ramp flows "*from full generating flow to the required minimum flow … be restricted to a rate no faster than linearly over 20 minutes*" [Accession # 20060823-3018]. Moreira et. al. [Moreira, M., Hayes, D.S., Boavida, I., Schletterer, M., Schmutz, S., and Pinheiro, A. 2019. Ecologically-based criteria for hydropeaking mitigation: A review. Science of the Total Environment **657**: 1508-1522 DOI: 10.1016/j.scitotenv.2018.12.107] reviewed the literature for stranding rates of rainbow trout and coho salmon under varying downramping velocities. The data suggest that as down ramping rates increase, a higher % of the population is stranded. The 2016 Flow Demonstration Study provided charts of depth differential over time [Accession # 20160329-5151] Figures 15, 16 and 17 in this report indicate that when generation ceases, a very rapid decline occurs, with depths dropping by approximately one foot in less than 15 minutes (~4 ft/hr, ~2 cm/min) which in turn suggests that fish can get stranded. Such a rapid decrease in depth also suggests that suitable habitat for various fish species can disappear rapidly.

This study is consistent with the objectives of our Special DO Study and the BIOP issued by the NMFS previously cited. We ask that Brookfield work cooperatively with the agencies to find creative solutions to reregulating the hydropeaked inflows the project receives.

Denied MDMR Eel Studies

The Cities and NGOs appreciate inclusion of the Upstream American Eel Study and Downstream American Eel Study in the DSP, and ask that you reconsider the Size and Timing of Downstream Eel Migration Study and Downstream Eel Passage Study that were submitted by the Maine Department of Marine Resources (MDMR).

Your acceptance of the first two studies acknowledges the importance of this threatened species that forms a major portion of the biomass in a number of reaches of Maine waters. We also note that eel passage will certainly be a feature of the Brunswick Project license downstream at head of tide that will be coming up in a few years, so the importance of eels to the Lewiston Falls Project will continue to grow.

The Lewiston Falls Project is a complex project, and as we have already stated, releases will have to be carefully coordinated to maximize the use of the resource for aquatic habitat, hydropower generation, recreation and aesthetics. Timing scenic releases with downstream eel migration may allow for maximum effectiveness and permit the project to operate without additional features such as narrower trashrack spacing or deep gate eel passage. Without information to inform the process, there will be no way to determine what measures are most appropriate. While the DSP included two references to eel timing information, neither reference includes information from the Androscoggin River and both references are dated. Since those references were published there has been substantial improvement in access to historic habits for eels by installation of eel specific passage structures. In addition, management of eels in the northeast has changed dramatically. Therefore, it is critically important to collect project specific information on eel size and timing to inform license conditions and the Commission's NEPA review.

As the Lewiston Canal System represents an alternative route of downstream migration that no longer involves turbines, this may also prove to represent another way to achieve eel passage without the need for narrower trashrack spacing or deep gate eel passage.

Please include these important studies in your Study Plan.

Note on MDIFW Comments

The Cities and NGOs would also like to note that the comments filed by the Maine Department of Fish and Wildlife (MDIFW) [MDIFW Letter dated March 14, 2022, Re: MDIFW Comments on Draft Study Plan for the Lewiston Falls Hydroelectric Project (FERC No. 2302) (Accession # 20220314-5070)] *"The PAD states that the Project is licensed to operate with up to 4 feet of impoundment fluctuation, yet "is normally operated as run-of-river with impoundment fluctuations of one foot or less." MDIFW requests clarification on the exact operational mode for the Project, as 4-foot impoundment fluctuations would be inconsistent with a run-of-river facility."* This assessment that the project is not "run-of-river" is consistent with ours, and further underlines the need for the additional sondes and analysis contained in our Special DO Study Request.

Conclusion

The situation surrounding the Lewiston Falls Project is complex. Unless water is provided from the Gulf Island Pond when watering the falls, water levels below may drop precipitously in the impoundments upstream, complicating recreational use of the impoundments, degrading water quality, impacting habitat, and the overall aesthetics of the project area. Information most relevant and important to future operations can only be gathered by careful coordination of flows from the dams upstream, the water going through the turbines at Monty Station, water through the industrial canal, and DO monitoring downstream at the locations specified in our Study Request. The failure to do so may result in a finding that the aesthetic releases most desired by the Cities and NGOs would be precluded due to the effects on temperature and DO levels on the impoundments above Great Falls.

Failure to accomplish the important studies as described above will render an informed NEPA analysis of the project impossible and may cause problems and possible delays with the relicensing. Furthermore, without proper studies that inform the process of determining future operations of the Lewiston Falls Project, the goals and objectives in the numerous community plans referenced in our December 30, 2021 filing stand to be significantly compromised. Without additional details of what reregulation would entail, the Cities and NGOs do not have a complete understanding of potential impacts.

The undersigned appreciate the opportunity to comment on the DSP, have confidence that FERC's trust in the Applicant expressed by authorizing use of the TLP for such a complex project has not been misplaced, and appreciate BWPH's commitment to work through these issues.

Please contact Eric Cousens at 207 333- 6601, extension 1154 if you wish to discuss our comments or schedule a stakeholder meeting for that purpose before the issuance of the final Study Plan.

Respectfully,

City of Auburn
Eric J. Cousens
Director of Planning and Permitting

American Whitewater
Bob Nasdor
Northeast Stewardship & Legal Director

Grow L+A
Peter Rubins
Board member, Chair Grow L+A River Working Group

City of Lewiston
David Hediger
Director of Planning and Code Enforcement

Trout Unlimited
Stephen G. Heinz
Maine TU Council FERC Coordinator

AMC
Eliza Townsend
Maine Conservation Policy Director

Additional Distribution:
Senator Susan Collins Office
Maine 2nd District Congressman Jared Golden's Office

FERC Docket P-2302
MDEP - Kathy Howatt, Robert Mohlar, Brian Kavanaugh, Nick Livesay
MDEP - Casey Clark
MDIFW - Jim Pellerin, John Perry
BPL - Jim Vogel
NOAA Fisheries - Bill McDavitt
NPS - Kevin Mendil, Julie Isbill
Androscoggin RIver Watershed Council
Androscoggin Valley Council of Governments

Attachments:

DEP SAMPLING PROTOCOL FOR HYDROPOWER STUDIES December 2017

ATTACHMENT A
DEP SAMPLING PROTOCOL FOR HYDROPOWER STUDIES December 2017

LAKES, PONDS, AND IMPOUNDMENTS

Trophic State Study

Sampling personnel must be certified annually for this sampling protocol by DEP's Division of Environmental Assessment Lakes Section.
Each basin shall be sampled at the deepest location twice each month for at least five consecutive months during one open water season as follows.

Parameter	Sampling method	Detection limits
Secchi disk	transparency water scope	0.1 meter
Temperature	profile*	0.1 C
Dissolved oxygen	profile*	0.1 mg/l
Total phosphorus	epilimnetic core	0.001 mg/L
Chlorophyll a	epilimnetic core	0.001 mg/L (trichromatic)
Color	epilimnetic core	1.0 SPU
pH	epilimnetic core	0.1 SU
Total alkalinity	epilimnetic core	1.0 mg/l

*Profiles shall consist of temperature and dissolved oxygen measurements taken every meter up to 15 meters, every other meter to 25 meters, then every 5 meters thereafter.

In addition, during late summer (mid to late August depending on latitude and weather conditions), water samples shall be collected and analyzed from up to three depths in the water column for the parameters below except Chlorophyll a. If the waterbody is thermally stratified ($\Delta T \geq 1$ C/m at any depth below the top 3 m depth), samples will be collected from an epilimnetic core, at the top of the hypolimnion, and at one meter above the sediment. If the waterbody is not thermally stratified, only one sample is needed, that being from an integrated core from the surface to two times the Secchi disk depth or within 1 m of the bottom whichever is less.

Parameter	Detection limit
Total phosphorus	0.001 mg/l
Nitrate	0.01 mg/l
Chlorophyll a (uncorrected)	0.001 mg/l (trichromatic determination)
Color	1.0 SPU
DOC	0.25 mg/l
pH	0.1 SU
Total alkalinity	1.0 mg/l
Total iron `	0.005 mg/l
Total dissolved aluminum	0.010 mg/l
Total calcium	1.0 mg/l
Total magnesium	0.1 mg/l
Total sodium	0.05 mg/l
Total potassium	0.05 mg/l

Total silica	0.05 mg/l
Specific conductance	1 ms/cm
Chloride	1.0 mg/l
Sulfate	0.5 mg/l

Additional sampling may be required due to the hydraulic or physical characteristics of a given waterbody or to the presence of significant water quality problems.

Habitat Study

For lakes, ponds, and riverine impoundments, determination of attainment of the designated use habitat for fish and other aquatic life' will be determined as follows. Using a depth of twice the mean summer Secchi disk transparency, determined from the Trophic State Study or historic DEP data, as the bottom of the littoral zone, the volume and surface area dewatered by the drawdown will be calculated to determine if at least 75% of the littoral zone remains watered at all times. Alternatively, studies of fish and other aquatic life communities, including freshwater mussels, may be conducted to demonstrate that the project maintains 'structure and function of the resident biological community' despite a drawdown that results in less than 75% of the littoral zone remaining watered at all times.

Fishing (Mercury Contamination) Study

To ensure that the project does not contribute to the Statewide Fish Consumption Advisory due to mercury, projects with excessive drawdowns (generally >10 feet) may be required to analyze sport fish from the project waterbody and one or more reference waters for mercury. Contact DEP for specific requirements for each project.

RIVERS AND STREAMS

Temperature and Dissolved Oxygen Study

Applicability

This rivers and streams sampling protocol shall apply to tailwater areas that are not impoundments where existing data are insufficient to determine existing and future water quality.

Sampling Stations

Sampling shall occur in the tailwater downstream from the turbine/gate outlet or dam at a location representative of downstream flow as agreed by DEP on a case by case basis. Initially, measurements of temperature and dissolved oxygen should be made along a transect across the stream at the first, second and third quarter points across the width. If there is no violation of dissolved oxygen criteria and no significant (<0.4 mg/l) difference in concentrations among the quarter points, subsequent measurements may be made at the location shown to be representative of the main flow. Otherwise, measurements should be made at the location of the lowest concentration and the location of the main flow. Sampling should also occur in any bypassed segment of the river created by the project. Additional sampling stations may be required in the upstream or downstream areas where significant point or

nonpoint sources exist or where slow moving or deep water occurs. The number and spacing of any additional stations will be determined by DEP on a case-by-case basis.

Parameters

Temperature and dissolved oxygen shall be sampled at mid-depth in rivers less than 2 m deep or in a profile of 1 meter increments of depth in rivers greater than 2 m deep. In rivers where it is already known that attainment of required statutory dissolved oxygen criteria is questionable, sampling for additional parameters (e.g. BOD, nitrogen, phosphorus) may be necessary.

Frequency and Timing

Sampling should be conducted during the summer low flow high temperature period, with the ideal conditions being the 7Q10 flow (the 7 day average low flow with a 10 year recurrence interval) combined with daily average water temperatures exceeding 24 oC. Measurements of temperature and dissolved oxygen shall be made every hour with a datasonde in remote unattended mode continuously during July and August, unless high flows well above seasonal median flows occur.

Alternatively, with concurrence by DEP, sampling could be undertaken one day per week for a minimum of ten weeks throughout the summer low flow, high temperature period. Each discrete grab sampling event for temperature and dissolved oxygen would consist of a minimum of two daily runs, the first of which should occur before 7 AM and the second of which should occur after 2 PM. Sampling results will not be considered complete unless a minimum of 5 sampling days meets the following conditions: The product of the water temperature (oC) and the flow duration (the percentage of the time a given flow is statistically exceeded) at the time of sampling exceeds 1500. For cycling hydropower projects, in addition to twice daily monitoring, continuous monitoring may be required at some locations for a duration equivalent to the period of one cycle of the storage and the release of flow.

For either method, a summer in which low flows and high temperatures are not experienced may result in additional sampling requirements for the next summer. Low flow conditions may occur naturally, as an unregulated river or may be artificially induced, as in the case of upstream flow regulation or flows downstream from a cycling or peaking power project or in the case of a bypassed segment which receives flow only by spillage, leakage or specific releases.

Available Data

The use of data already available is encouraged provided that adequate QA/QC procedures have been followed. Old data may not be acceptable for considerations of meeting minimum sampling requirements, but could still provide useful information. Acceptance/rejection of data will be determined on a case by case basis, but generally data more than 10 years old may be rejected.

Habitat and Aquatic Life Studies

For rivers and streams, determination of attainment of the designated use 'habitat for fish and other aquatic life' will be determined as follows. A Cross-Section Flow Study is required that measures width and depth at various flows to determine the flow at which at least 75% of the bank full cross-sectional area of the river or stream is continuously watered. At least three crosssections representative of the

river or stream must be measured. Alternately, a combination of ambient measurements in one cross-section, flow data from existing flow gages, and/or modelling may be approved by DEP.

In addition, to determine if the project 'attains the aquatic life criteria, i.e. 'maintains the structure and function of the resident biological community', biological monitoring of the benthic macroinvertebrate community must be conducted following DEP's standard protocol in Methods for Biological Sampling and Analysis of Maine's Rivers and Streams, DEP LW0387- B2002.

A copy can be found at www.maine.gov/dep/water/monitoring/biomonitoring/material.html

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JANET T. MILLS
GOVERNOR

KIRK F. MOHNEY
DIRECTOR

March 30, 2022

Ms. Karen Mack
TRC
1356 Washington St
Suite A
Bath, ME 04530

Project: MHPC # 0616-21A — Lewiston Falls Hydro Project; FERC 2302 Archaeological Survey

Town: Auburn, ME

Dear Ms. Mack:

In response to your recent request, we have reviewed the information received March 21, 2022 to continue consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act, as amended.

Our office has reviewed the scope of work dated March 2022 and we concur with the scope of work outlined for the archaeological survey.

We look forward to continuing consultation on this project. Please contact Megan M. Rideout of our office if we can be of further assistance in this matter.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
State Historic Preservation Officer

PHONE: (207) 287-2132 FAX: (207) 287-2335

From: Clark, Casey
To: Anderson, Luke
Cc: william.mcdavitt
Subject: RE: Lewiston Falls Hydroelectric Project - draft Study Plan
Date: Thursday, April 14, 2022 12:14:39 PM

Hello Luke,

Please proceed with the eel survey as you have proposed in 2022. The eel ramp at Worumbo seems to be in working order.

Regards,
Casey

Casey Clark
Resource Management Coordinator
Maine Department of Marine Resources
Cell: (207) 350-9791 (Preferred)
Office: (207) 624-6594
Email: casey.clark@maine.gov

From: Anderson, Luke <Luke.Anderson@brookfieldrenewable.com>
Sent: Thursday, April 7, 2022 8:58 AM
To: Clark, Casey <Casey.Clark@maine.gov>
Cc: william.mcdavitt <william.mcdavitt@noaa.gov>
Subject: RE: Lewiston Falls Hydroelectric Project - draft Study Plan

Good Morning Casey,

On our March 17th call to discuss the draft study plan for the Lewiston falls project, you informed us that the MDMR may want to delay the upstream eel survey until 2023, as the MDMR had recently become aware of some potential issues with upstream eel passage at the Worumbo Hydroelectric Project.

As we are in the process of scheduling fields activities, simply looking for confirmation as to whether or not the MDMR would prefer to delay the upstream eel until 2023.

Thank you,

Luke T. Anderson
Manager, Licensing

Brookfield Renewable
150 Main Street, Lewiston, Maine 04240
T 207-755-5613 **C** 207-577-4536
Luke.Anderson@BrookfieldRenewable.com
www.brookfieldrenewable.com

ATTACHMENT 2

DRAFT STUDY PLAN COMMENT AND RESPONSE SUMMARY

Lewiston Falls Project Relicensing (P-2302)
Summary Response to Comments on the Draft Study Plan

No	Commenter	Comment	Response
NMFS / MDMR			
1	NMFS 2022.03.08 email	NMFS/MDMR sent an email requesting a meeting to discuss the study plan.	A meeting between BWPH, NMFS, and MDMR was held on March 17, 2022 to discuss the upstream and downstream eel, eel outmigration, and Project reregulation study requests. Additional details of the meeting are provided in the final study plan consultation documentation. The final study plan has been revised in consideration of NMFS and MDMR's comments.
MDIFW			
2	MDIFW 2022.03.14 letter	In our January 3, 2022 comments on the Pre-Application Document, MDIFW requested information on Project operations specifically related to impoundment fluctuation. To date, this information has not been provided but is fundamental to understanding the results of all proposed studies. The PAD states that the Project is licensed to operate with up to 4 feet of impoundment fluctuation, yet "*is normally operated as run-of-river with impoundment fluctuations of one foot or less.*" MDIFW requests clarification on the exact operational mode for the Project, as 4-foot impoundment fluctuations would be inconsistent with a run-of-river facility. To this end, we also request data on the frequency, magnitude, and duration of impoundment fluctuations over the last 5 years of Project operation, as well as Project outflow over the same time period. Without these data, it is unclear what is meant by the facility "normally" operating as run-of- river. The Maine Department of Environmental Protection (MDEP), the Maine Department of Marine Resources (MDMR), and the National Marine Fisheries Service (NMFS) have requested similar information and MDIFW further supports these inquiries.	BWPH is compiling operations data for the Lewiston Falls Project for the past 5 years, including both impoundment elevation and discharge data. BWPH will provide the resulting data in a memo that will be distributed to interested stakeholders and will also be included in the first year study report.

No	Commenter	Comment	Response
3	MDIFW 2022.03.14 letter	MDIFW appreciates that both the Fish Assemblage and Bass Spawning Studies were included in the Draft Study Plan. We support the inclusion of seine netting as a supplemental component (along with boat electrofishing) of the Fish Assemblage Study, but MDIFW recommends that gillnetting also be included as neither electrofishing nor shallow water seine netting may be effective at collecting some important but difficult-to-capture species such as American eel and northern pike. Methodologies employed should also consider study requests from other natural resources agencies where applicable.	In the final study plan BWPH has modified the Fish Assemblage Study to include a gillnetting component, as requested by MDIFW. A total of 12 overnight experimental gill net sets will be conducted within the Lewiston Falls Project impoundment to help characterize the current fish community.
4	MDIFW 2022.03.14 letter	For the Bass Spawning Study, the Licensee should correct an inconsistency regarding the number of bass proposed for aging. These fish will be collected as part of the Fish Assemblage Study, which states that up to 100 largemouth bass and 100 smallmouth bass, across five size/age classes, will be aged. However, the Bass Spawning Study only proposes aging of up to 50 largemouth bass and 50 smallmouth bass. Up to 100 individuals of both species should be aged, consistent with the Fish Assemblage Study, and to provide additional depth of data at relatively low added investment.	In the final study plan BWPH has corrected the inconsistency within the study plan for the Bass Spawning Study. Scale samples from a total of 100 largemouth and 100 smallmouth bass, across five size classes will be collected as part of the Fish Assemblage Study and the resultant ages for those individuals will be reported as part of the Bass Spawning Study. The number of scale samples is now consistent across both study plans.
5	MDIFW 2022.03.14 letter	Finally, MDIFW supports Draft Study Plan comments from other natural resource agencies, including but not limited to MDEP, MDMR, NMFS, and the U.S. Fish and Wildlife Service. Though the Reregulation Feasibility Study proposed by MDMR/NMFS was not adopted as part of the Draft Study Plan, MDIFW notes that gathering more information, particularly on potential Project operation modes, would enhance understanding of impacts to aquatic resources both upstream and downstream of the Project. Without additional details of what reregulation would entail, resource agencies are left with incomplete knowledge of potential impacts to both resident and diadromous species.	As noted in the final study plan, BWPH believes that conducting a reregulation study, such as that requested, may be appropriate after first year studies have been completed and if the first year studies and further evaluation demonstrate that such reregulation would be beneficial as mitigation for demonstrated Project impacts to resources. BWPH will continue to consult with the resource agencies as part of the first year study evaluation on the need for further assessment.

No	Commenter	Comment	Response
City of Auburn, City of Lewiston, American Whitewater, Appalachian Mountain Club, Grow L-A, Maine Council of Trout Unlimited			
6	Cities/ NGOs 2022.03.18 Letter – **Special Dissolved Oxygen Study**	Project relicensing studies normally incorporate DO studies at two locations: in the impoundment and at a location agreed upon by the applicant and MDEP below the dam. The DSP proposes three locations: the impoundment, a tailwater location and a ledge pool site [DSP, page 2-3]. The Cities and NGOs do not object to these locations. In addition to a site in the impoundment and one below the dam, DO studies are required in bypass reaches as well: "*Sampling should also occur in any bypassed segment of the river created by the project.*" [DEP SAMPLING PROTOCOL FOR HYDROPOWER STUDIES December 2017 provided as Attachment A] The Lewiston Falls Project has two bypass reaches, one is Great Falls that the ledge pool sonde will cover, the other the Industrial Canal. While it is arguable that the Industrial Canal is outside the project area, its flows are clearly interconnected with project operations. As previously noted [City of Auburn Letter dated January 11, 2022, Subject: Comments of the Cities of Lewiston and Auburn Maine Regarding the Gulf Island - Deer Rips/Androscoggin No. 3: Article 407: Project Operation and Flow Monitoring Revised Plan Project (P- 2283) and operational connection to the relicensing of Lewiston Falls/Monty Hydro (P-2302)] the Lewiston Falls Project is run-of-release, not run-of-river, because its operation is so affected by operations at the Gulf Island Project with its large storage capacity. For these reasons, the Cities and NGOs request that sondes should be deployed at two additional locations: the outflow below Gulf Island dam and above Dresser Rips near the Maine Turnpike Overpass. These locations are imperative for true ambient DO from Gulf Island Dam on down for the next 3-year period and confirmed with DEP. The sampling period should extend to low flow July, August, September and October. Without this information in addition to that from the sondes from the three other sites, analysis of DO cannot be formulated without consideration of Gulf Island Dam releases that actually controls "run-of-river" down river to Brunswick.	The water quality studies proposed for the Project (impoundment trophic state study, bypass and tailwater DO and temperature study, impoundment habitat study, downstream habitat study, and macroinvertebrate study) are consistent with MDEP protocols for relicensing hydroelectric projects. As outlined in the final study plan, DO/temperature data will be collected in three locations: the impoundment, the tailwater, and in the large ledge pool. The ledge pool is located in the falls reach, which could also be described as a "bypass" reach. The Lewiston Canal is not a bypass reach and is not part of the FERC licensed Project. As such, no water quality monitoring is proposed to be conducted in the canal. For similar reasons, BWPH is not proposing to conduct DO/temperature monitoring below the Gulf Island Project (upstream of the Lewiston Falls Project) or at Dresser's Rips (downstream of the Lewiston Falls Project), as neither location is part of the FERC licensed Project, and water quality in both locations would be affected by a variety of factors unrelated to the Lewiston Falls Project or its operation. While BWPH recognizes that stakeholders have broader questions about the water quality of the lower Androscoggin River, such concerns are within the prevue of the state of Maine and are being addressed through other forums outside the scope of the Lewiston Falls Project relicensing effort.

No	Commenter	Comment	Response
		Lastly, the reach downstream is currently being considered for upgrading the water quality classification from C to B, with C being Maine's lowest water quality classification. DO is an important consideration for the water classification upgrade. Optimizing DO levels is a major consideration for project operations going forward. The Cities and NGOs strongly support the upgrade of the water quality classification of the lower Androscoggin River. For these reasons, it is essential that the additional sondes be deployed, DO data collected, and analyzed in relation to releases over Great Falls and through the industrial canals. The Special DO Study cannot be delayed because the test releases over Great Falls will likely not be done over more than one summer. We urge that Brookfield include the Special DO Study as a vital addition to the Aesthetic Study and the Recreational Study that you appropriately included in the DSP.	BWPH would note that the final locations for water quality monitoring will be determined in consultation with MDEP.
7a	Cities/ NGOs 2022.03.18 Letter – **Aesthetics Study**	Please confirm that this study [aesthetics study] can occur while the continuous water quality monitoring is in place below the falls. We ask that you monitor water quality during this study's release of water over the falls at station LF2 and provide an analysis of any changes during the releases as part of the water quality study proposed in the DSP.	BWPH will monitor DO and temperature in the impoundment, tailwater area, and in the large ledge pool located in the falls reach in July and August. The proposed monitoring is consistent with MDEP protocols for water quality studies at hydroelectric projects. The resulting data will be sufficient to determine if the Project meets applicable state water quality standards. Further, based on existing water quality information, there is no suggestion that the Project will not meet applicable water quality standards. Accordingly, BWPH is not proposing a separate special DO study to examine the water quality effects of flows over the falls. To the extent that there are periods of spill over the falls during the planned DO/temperature monitoring period, the effects of such spills on tailwater DO/temperature will be recorded at station LF2.

No	Commenter	Comment	Response
7b	Cities/ NGOs 2022.03.18 Letter – **Aesthetics Study**	BWPH states that the study "*does not include an aesthetic assessment…of the Lewiston Canal system, as the canal system is no longer owned by BWPH and is no longer part of the FERC- licensed project."* The project has two bypassed reaches that are impacted by project operations. Those include the Lewiston Falls around water quality monitoring station LF-3 and the canals in Lewiston. Please modify the proposed Aesthetic Study to include consideration of impacts of operations on the canals. Studies and evaluations must not be limited to the license boundary area when operational impacts extend beyond the project area. The Project operations directly impact the canal system, as flow rates into the canals directly impact both the aesthetics of these waterways and the outflows to the Androscoggin River. The project is "run-of-release" NOT "run-of-river." The vast majority of flows and water levels are controlled upstream by the Island Pond Project. This fact was noted recently by the City of Auburn. …Planning efforts by the City envision the canal system as an integral part of providing economic and recreation opportunities. Simard-Payne Memorial Park is essentially surrounded by the canal system and river. The public has the right to experience the visual effects of water flows from various vantage points. Therefore, the Aesthetics Study must include the canals to evaluate potential effects of Project operations on recreation sites, facilities and uses.	While BWPH recognizes stakeholders' interest in the Lewiston Canal system, BWPH does not propose to conduct an aesthetic assessment of the Lewiston Canal because the canal is not a bypass reach and is not part of the FERC licensed Project, and therefore is not within the scope of the relicensing process. Flows to the canal are provided in accordance with a separate agreement between BWPH and the City of Lewiston.
8a	Cities/ NGOs 2022.03.18 Letter – **River Access and Recreational Flow Study**	The Cities and the NGO's appreciate the proposed stakeholder group's level of involvement in structuring the study and look forward to working with BWPH. The stakeholders support this effort and request that evaluations and site visits be expanded to informal recreation sites not previously identified. Both Lewiston and Auburn are looking for the ability to consider other possible areas within and outside the project boundary that may be identified as areas to improve, expand, or create improved access.	The goals of the study include assessing if existing Project recreation sites and facilities are meeting current and future needs/demand and whether there is a need to enhance Project recreation sites and facilities. As outlined in the draft and final study plan, as part of the proposed recreation study, BWPH is proposing a recreation needs review. For the needs review, BWPH will convene a focus group to review the recreation facility and use information and to identify potential recreation site and facility needs.

No	Commenter	Comment	Response
			As requested, BWPH and the focus group will also make a site visit to Project recreation sites and key non-Project recreation sites to further discuss and assess the potential for recreation site and facility enhancements.
8b	Cities/ NGOs 2022.03.18 Letter – **River Access and Recreational Flow Study**	Please confirm that this study can occur while the continuous water quality monitoring is in place below the falls. We ask that you monitor water quality during this study's release of water over the falls at station LF2 and provide an analysis of any changes during the releases as part of the water quality study proposed in the DSP.	See response to 7a
8c	Cities/ NGOs 2022.03.18 Letter – **River Access and Recreational Flow Study**	BWPH states "the primary goal of the proposed (recreation) study is to…evaluate potential effects of Project operations on recreation sites, facilities and use." However, it "does not include assessment of recreation use of, or sites and facilities associated with, the Lewiston canal system" due to no longer being owned by BWPH or subject to a FERC license. The project has two bypassed reaches that are impacted by project operations. Those include the Lewiston Falls around water quality monitoring station LF-3 and the canals in Lewiston. Please modify the proposed Recreation Study to include consideration of impacts of operations on the canals. Studies and evaluations must not be limited to the license boundary area when operational impacts extend beyond the project area. Project operations directly impact the canal system, as flow rates into the canals directly impact the possible recreational use of these waterways. Planning efforts by the City envision the canal system as an integral part of providing economic and recreation opportunities. Simard-Payne Memorial Park is essentially surrounded by the canal system and river. The public has the right to access all waterways impacted by the Project, not just the river, for purposes of recreation and to experience recreational benefits of natural water flows. As with the	As previously noted, while BWPH recognizes stakeholders' interest in the Lewiston Canal system, BWPH does not propose to conduct any recreation assessment of the Lewiston Canal because the canal is not part of the FERC licensed Project, and therefore is not within the scope of the relicensing process. Flows to the canal are provided in accordance with a separate agreement between BWPH and the City of Lewiston.

No	Commenter	Comment	Response
		Aesthetic Study, the Recreation Study must include the canals to evaluate potential effects of Project operations on recreation sites, facilities and use.	
8d	Cities/ NGOs 2022.03.18 Letter – **River Access and Recreational Flow Study**	The Cities have experienced hindered emergency response to the river due to limited access to the project area, as well as downstream response to incidents that occur in the project area. The Recreation Study should consider an additional emergency access between the Durham Boat Launch and Dresser Rips, in the area of the Maine Turnpike to improve public safety and manage response times for river-based rescues. This area was within the project boundary until an amendment was made in 2020 and continues to be impacted by operational impacts to natural river flows.	BWPH understands that there are river access points on both sides of the river just downstream of the Project boundary that are available for emergency access. BWPH will consult with the cities regarding emergency access as part of the Recreation Facility Needs Review portion of the proposed Recreation Study.
8e	Cities/ NGOs 2022.03.18 Letter – **River Access and Recreational Flow Study**	The PSP Recreation Survey should include in-person and survey box response collection as well as an online survey tool, not either/or as proposed in the PSP. We request that the online survey take place for at least 3 months during the summer of 2022 with 14 days advance notice so that it can be shared among stakeholders and the public. (a) In-person surveys should occur during at least two weekend days for 8 hours, including June 18th and one other day TBD by focus group. We also request a survey occur at least 2 project and 2 non-project sites in the vicinity of project TBD by focus group. (b) Stakeholders are willing to help with additional survey site collection if needed. (c) Starting in May, there are currently 18 events occurring in or going through Simard-Payne Park including *YMCA-Fit Fest* in Festival Plaza June 5th, *Riverfest* in Simard Payne Park June 17-18, *Great Falls Brewfest* in Simard Payne June 25, *Great Falls Balloon Fest* in Simard Payne on August 18-21, *L-A Bridge Run* on August 28, *Dempsey Challenge* September 24-25. All of these events and others occur along the river and canal because	In response to this request, the final study plan has been modified to clarify that user surveys will be collected both in-person and via an online survey component. Signage with information on how to complete the online survey will be posted at the recreation sites at which in-person surveys will be conducted. (a) In-person surveys will occur on weekends and holiday weekends throughout the study period, and online surveys will provide for continuous data collection throughout the study period. Given this, BWPH does not see a need to increase the duration of the surveys. However, as noted in the final study plan BWPH will add the following two non-Project recreation sites to the user survey tasks: the Riverwalk

No	Commenter	Comment	Response
		of their natural beauty and ability to attract human activity to the river. The study schedule should take these events into consideration to document usage.	(between Court Street Bridge and West Pitch Park) and Veterans Park. (b) The Recreation Facility Needs Review task includes a focus group meeting to include representatives from the local municipalities, NGOs, resource agencies, and members of the public. Stakeholders are welcome to submit and/or share any data gathered to inform the discussions. (c) The study schedule will take special events into consideration. Additionally, the study methodology includes a Recreation Facility Needs Review, which will consist of compiling information gathered during the recreation site inventory, use assessment, and recreational user survey, and convening a focus group to evaluate identified needs and discuss options for meeting those needs. The focus group will include, to the extent that they are willing and able to participate, representative from the local municipalities, NGOs, resource agencies, and members of the public. It is anticipated that this group will have a general knowledge of the facilities available for use at the non-Project recreation sites. Additionally, the focus group will have a site visit to Project and non-Project sites to further assess recreation site needs and potential site enhancements.

No	Commenter	Comment	Response
8f	Cities/ NGOs 2022.03.18 Letter – **River Access and Recreational Flow Study**	For clarification we offer the following details about the goals of a recreation study. The Licensee and stakeholders group should develop a study methodology with the goal of assessing the presence, quality, access, flow information, and flow ratings for paddling opportunities in a stepwise manner. Through this study, the Licensee should seek to: a. identify recreational paddling opportunities in the project boundary and downriver in order to determine a full range of boating opportunities available under different modes of operation; b. describe flow-quality relationships and identify acceptable and optimal ranges for boating using various craft; c. describe potential effects of operations and identify boater's sensitivity to current operations and alternate flow regimes; d. broadly characterize recreational paddling-relevant hydrology of the existing operating regime, and qualitatively describe the relationship between paddling opportunities and project operations; e. determine whether current or future demand exists for whitewater and recreational boating within the context of regional opportunities and those provided through current operation; f. determine the number of days flows for whitewater boating (Dresser Rips) and recreational boating are available under the projects' current operation; g. identify resource needs (e.g., aquatic habitat) and competing recreational uses (e.g., canoeing, or fishing) that are or would be affected by flows suitable for boating; h. identify public access obstacles; and, characterize effects on current project operations associated with providing various flows for recreational paddling.	BWPH is proposing to evaluate downstream recreational boating activities. The study plan calls for a desktop analysis to gather information in general accordance with the Whittaker et al. Level 1 assessment, which will provide information on downstream boating use. BWPH will review the study results with stakeholders in a study report which will inform whether further assessment is necessary.
8g	Cities/ NGOs 2022.03.18 Letter –	Given the lack of information available about boating in the project boundary and downriver at Dresser Rips, the Licensee should take the following steps as part of the study:	See response to 8f

No	Commenter	Comment	Response
	River Access and Recreational Flow Study	1. Reach out to the whitewater boating community to assist with surveys of area boaters to assist in the development of the survey instruments and identify qualified boaters who will assist with the on-water assessment. During this initial phase, the Licensee should study the hydrology of the river reach to determine the gradient and identify the presence of ledges, boulders and other structural elements that would indicate a potential opportunity for whitewater boating at Dresser Rips as well as recreational boating downstream of the hydro facility. 2. The Licensee should conduct test flows in collaboration with representatives from the boating community to determine whether various flow levels create whitewater features such as eddies, waves and holes that could be used for instruction, playboating if scheduled boating opportunities were provided. 3. The Licensee should study the extent to which the project operations effect valuable whitewater and recreational boating opportunities in order to develop protection, mitigation, and enhancement (PME) measures.	
9	Cities/ NGOs 2022.03.18 Letter – **NMFS Reregulation Study**	In its study request, NMFS states that the goal of this study "*is to determine if operational changes to the Project can improve the overall aquatic habitat of the Androscoggin River by dampening the effects of upstream hydropeaking projects, reducing the flashiness and number of flow reversals.*" Brookfield's decision to not adopt this study puts this goal in jeopardy. While we and the agencies do not hold Brookfield responsible for the peaked inflows that it receives from upstream projects, we do think that the 1,600 acre-feet of headpond storage could play a role in reregulating the inflows the project receives. Improved recreational fisheries by minimizing negative impacts of project operations is important to the Cities. This study would address cumulative impacts and help inform decisions about project operations impacts on fisheries and is necessary for the NEPA analysis.	See response to 5.

No	Commenter	Comment	Response
		The 2016 Flow Demonstration Study provided charts of depth differential over time. Figures 15, 16 and 17 in this report indicate that when generation ceases, a very rapid decline occurs, with depths dropping by approximately one foot in less than 15 minutes (~4 ft/hr, ~2 cm/min) which in turn suggests that fish can get stranded. Such a rapid decrease in depth also suggests that suitable habitat for various fish species can disappear rapidly. This study is consistent with the objectives of our Special DO Study and the BIOP issued by the NMFS previously cited. We ask that Brookfield work cooperatively with the agencies to find creative solutions to reregulating the hydropeaked inflows the project receives.	
10	Cities/ NGOs 2022.03.18 Letter **MDMR Eel Studies**	The Cities and NGOs appreciate inclusion of the Upstream American Eel Study and Downstream American Eel Study in the DSP, and ask that you reconsider the Size and Timing of Downstream Eel Migration Study and Downstream Eel Passage Study that were submitted by the Maine Department of Marine Resources (MDMR). Your acceptance of the first two studies acknowledges the importance of this threatened species that forms a major portion of the biomass in a number of reaches of Maine waters. We also note that eel passage will certainly be a feature of the Brunswick Project license downstream at head of tide that will be coming up in a few years, so the importance of eels to the Lewiston Falls Project will continue to grow. While the DSP included two references to eel timing information, neither reference includes information from the Androscoggin River and both references are dated. Since those references were published there has been substantial improvement in access to historic habits for eels by installation of eel specific passage structures. In addition, management of eels in the northeast has changed dramatically. Therefore, it is critically important to collect project specific information on eel size and timing to inform license conditions and the Commission's NEPA review.	See response to 1 and reference to meeting summary of March 17, 2022 (meeting between BWPH, MDMR, and NMFS, see Attachment 1).

No	Commenter	Comment	Response
MHPC			
11	MHPC – 2022.02.28 letter	The draft relicensing study plan for prehistoric and historic archaeology dated February 14, 2022 is inaccurate and does not reflect the scope of archaeological survey that we requested in SHPO Kirk Mohney's letter of June 29, 2021 to Fatima Oswald, Kleinschmidt, Pittsfield. Paragraphs 4 and 6 request Phase I archaeological studies around the impoundment margin in locations "that might erode over the term of the license" and on "potentially eroding land form(s)" that extend above the Project boundary elevation. In contrast, pages 2-36 and 2-38 of the draft study plan commit to archaeological testing on sensitive land forms "and where erosion is occurring". We are requesting a broader archaeological survey on any land form that MIGHT erode over the term of the license. That includes ones that are currently eroding, obviously, but also any that are not protected or that might conceivably be affected by a major flood, ice scour or other (for example) extreme climate event. We expect broad ranging Phase I prehistoric and historic archaeological surveys rather than ones narrowly focused on currently eroding locations.	The final study plan has been modified to clarify BWPH's intent to include areas of shoreline erosion and potential erosion in their Phase 1 study. BWPH received a letter from MHPC on March 30, 2022 approving the revisions to the study plan which is included in the consultation record appendix to the final study plan.
Houlton Band of Maliseet Indians			
12	Houlton Band of Maliseet Indians 2022.03.09 email	We do not have an immediate concern with your project or project site, and do not currently have the resources to fully investigate same. Should any human remains, archaeological properties or other items of historical importance be unearthed while working on this project, we recommend that you stop your project and report your findings to the appropriate authorities including the Houlton Band of Maliseet Indians.	BWPH acknowledges the Houlton Band of Maliseet Indian's request.