

REVIEW OF APPLICATION FOR RECERTIFICATION BY THE LOW IMPACT HYDROPOWER INSTITUTE OF THE RICE RIPS PROJECT

Prepared by Stephen Byrne

July 13, 2021

I. INTRODUCTION

This report summarizes the review findings of the application submitted by Messalonskee Stream Hydro, LLC¹ (Applicant or licensee) to the Low Impact Hydropower Institute (LIHI) for recertification of the Rice Rips Hydroelectric Project FERC (P-2556). The Project, LIHI #59 is a 1.6-MW facility that operates in a modified run-of-river mode and is located on Messalonskee Stream approximately 7.7 miles upstream of the confluence with the Kennebec River near Oakland, Maine. On April 29, 2021 LIHI received a complete application package for recertification of the Project. This current review was conducted using the new 2nd Edition LIHI Certification Handbook.

II. RECERTIFICATION PROCESS AND MATERIAL CHANGE REVIEW

Under the current LIHI Handbook (Revision 2.04: April 1, 2020), recertification reviews are a two-phase process starting with a limited review of a completed LIHI application, focused on three questions:

- (1) Is there any missing information from the application?
- (2) Has there been a material change in the operation of the certified facility since the previous certificate term?
- (3) Has there been a change in LIHI criteria since the Certificate was issued?

In accordance with the Recertification Standards, all Projects currently applying for renewal must go through a full review unless their most recent certification was completed using the 2016 version of the Handbook. While there were no material changes at the Project, the LIHI Handbook was materially changed, thus, this Stage II report was required for the Project.

A review of the initial application, dated February 2021, resulted in a Stage I Report dated March 26, 2021 that indicated additional data was needed, which was sent as a supplement to the application on June 11, 2021.

This Stage II assessment included review of the application package, public records in FERC's eLibrary since the last LIHI certification in 2015, and annual compliance statements received by

¹ A subsidiary of Essex Hydro Associates, LLC

LIHI during the past term of Certification.

III. PROJECT'S GEOGRAPHIC LOCATION

The Project is located at river mile 7.7 on Messalonskee Stream in Kennebec County, Maine (Figure 1). The Rice Rips Project is one of three hydroelectric projects, along with the upstream Oakland and downstream Union Gas hydroelectric projects, on the lower Messalonskee Stream that were collectively licensed by FERC on July 28, 1999 as the Messalonskee Project. The 1999 FERC license also includes Messalonskee Lake (a.k.a. Snow Pond) and dam that does not have generating equipment, but releases flows for generation purposes at the downstream projects. Immediately downstream of the Rice Rips Project is the Automatic Project (LIHI #72) that was issued a separate license by FERC concurrently with the Messalonskee Project, on July 28, 1999 (Figure 2).

IV. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

Construction of the Rice Rips Project was completed in 1908 and the Project was operated as an unlicensed facility from that time until February 24, 1969, when FERC issued it a 30-year license. Project works consist of a 220-foot-long Ambersen (buttress) dam with 5-foot-high flashboards; a 10-foot diameter wood stave penstock that is 2,292-feet long and empties into a surge pond that is 150 feet in diameter; a powerhouse containing one 1.6-MW vertical Francis turbine and generator; and a 1.6-mile-long impoundment with a gross storage capacity of 1,000 acre-feet. (see Figures 3 - 5).

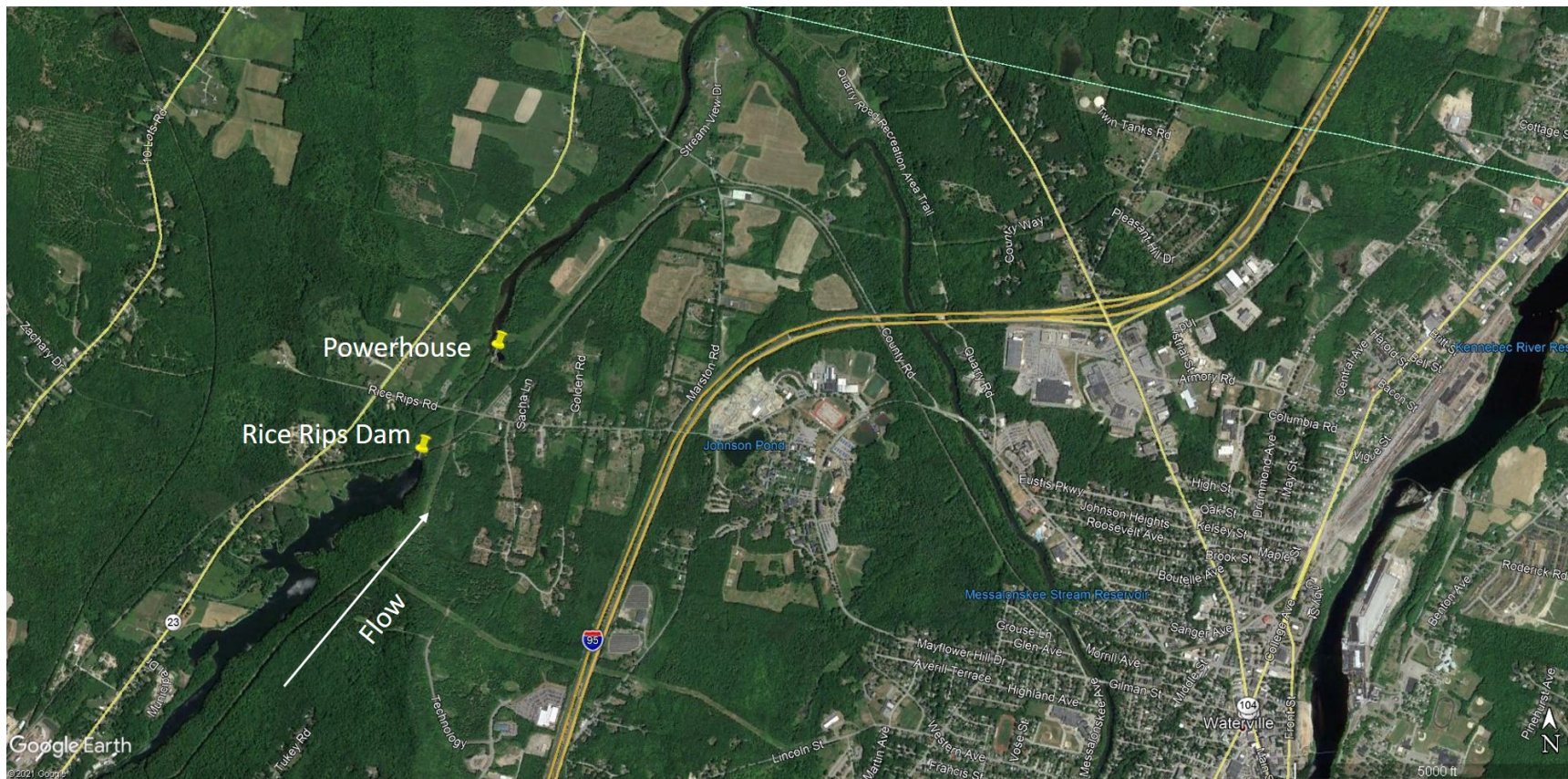


Figure 1 – Rice Rips Project Location



Figure 2 – Messalonskee Stream Project

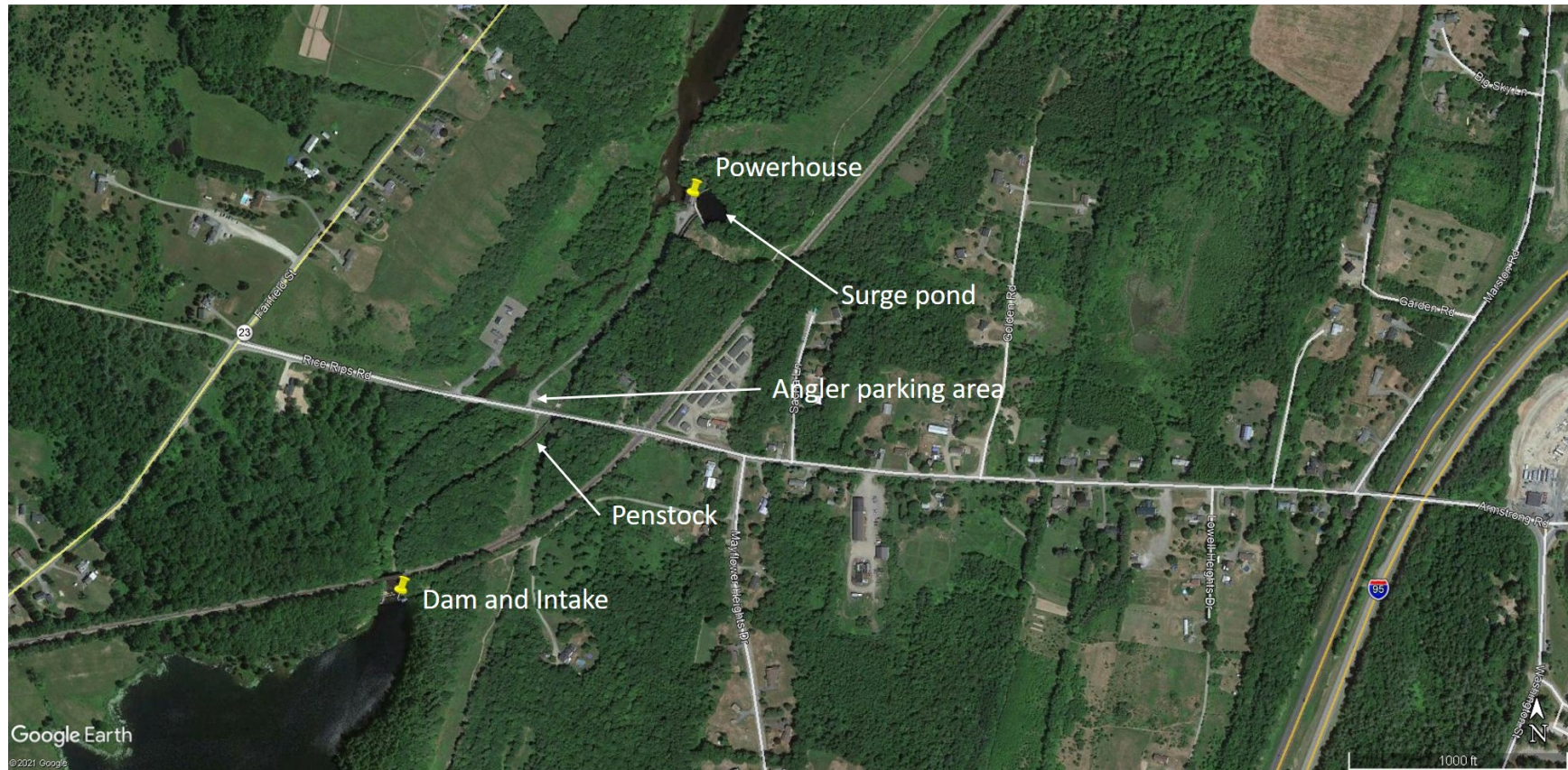


Figure 3 – Rice Rips Project Features



Figure 4 –Project dam and bypassed reach



Figure 5 –Upstream eel ramp

V. ZONES OF EFFECT AND STANDARDS SELECTED

Three Zones of Effect (ZOE) were designated by the Applicant and were determined to be appropriate. Zone 1 includes the Rice Rips impoundment; Zone 2 includes the bypassed reach from the dam to the Project tailrace; and Zone 3 includes the tailrace and downstream reach. Table 1 shows the Standards selected for each criterion for the three ZOE. Where applicable, reviewer recommendations for alternate standards are shown in **red**.

Table 1. Standards Matrix for the Rice Rips Project.

Zone:		1: Impoundment Reach	2: Bypass Reach	3. Downstream Reach
River Mile Extent:		RM 9.3 – 7.7	RM 7.7 – 7.3	RM 7.3 – 6.5
Criterion		Standard Selected		
<i>A</i>	<i>Ecological Flows</i>	1	2	2
<i>B</i>	<i>Water Quality</i>	2	2	2
<i>C</i>	<i>Upstream Fish Passage</i>	2 , 1	2	2
<i>D</i>	<i>Downstream Fish Passage</i>	2 , 4 , PLUS	2 , 4 , PLUS	2 , 1 , PLUS
<i>E</i>	<i>Shoreline and Watershed Protection</i>	1	1	1
<i>F</i>	<i>Threatened and Endangered Species</i>	2	2	2
<i>G</i>	<i>Cultural and Historic Resources</i>	1	1	1
<i>H</i>	<i>Recreational Resources</i>	2	2	2

VI. REGULATORY AND COMPLIANCE STATUS

The Project was issued a license order from the Federal Energy Regulatory Commission (FERC) in 1999. The Maine Department of Environmental Protection (Maine DEP) issued a Water Quality Certificate (WQC) for the operation of the Project on August 28, 1995. The FERC license initially required a minimum flow of 100 cubic feet per second from the Project. However, following a request for rehearing submitted by the licensee arguing that the Maine DEP required minimum flow of 15 cfs was adequate to protect aquatic resources, FERC modified the license in October 2000 to require a minimum flow of 15 cfs.

The current LIHI certification was issued effective May 9, 2015 expiring on May 9, 2020. It was subsequently extended three times, most recently to July 31, 2021. The certification includes the following condition:

- Condition 1. On the Owner's Annual Compliance Statements, the Owner will update LIHI on the status of downstream eel passage at the site. The Owner will notify LIHI

within 45 days of when DMR determines there is a sufficient number of eel to present in the river to conduct the studies needed to determine the best location to install downstream passage. A summary of those study results, along with a DMR approved plan and schedule for downstream eel passage installation, shall be included in that year's Annual Compliance Statement.

A review of annual compliance statements indicate that the Applicant has submitted required documentation under Condition 1. To date, no studies have been required.

VII. PUBLIC COMMENT RECEIVED OR SOLICITED BY LIHI

The application was posted for public comment on May 3, 2021 and the notice was forwarded to agencies and stakeholders listed in the application. The deadline for submission of comments was July 2, 2021. No formal comments were submitted. Based on the completeness of the application and documents available on the FERC elibrary, I did not need to contact resource agencies.

VIII. DETAILED CRITERIA REVIEW

A. ECOLOGICAL FLOW REGIMES

Goal: The flow regimes in riverine reaches that are affected by the facility support habitat and other conditions suitable for healthy fish and wildlife resources.

Assessment of Criterion Passage: The Applicant correctly selected Standard A-1, Not Applicable/De Minimis Effect for the impoundment zone and A-2, Agency Recommendation for the Bypass and Downstream Zones.

The Project operates in a modified run-of-river mode with outflow equaling inflow when inflow into Messalonskee Lake upstream is greater than 570 cubic feet per second (cfs). When inflow is less than 570 the Project is cycled. The project has negligible usable storage capacity and the impoundment water surface elevation is maintained at 139.1 feet (ft). The FERC license article 402 does allow for the maximum draw-down of water levels in the Rice Rips impoundment to 1.0 foot below full pond elevation of 139.1 ft.

A minimum bypass flow of 15 cfs is released downstream of the dam into the bypass reach at all times. This minimum flow is required pursuant to the 1995 WQC Condition 1 and subsequently incorporated into the FERC License by an October 2000 order on rehearing (affirmed in an April

2001 order on rehearing)². The minimum flow was based on a hydrologic analysis of the Messalonskee Stream drainage and on a bypass habitat flow study submitted to Maine DEP as part of the WQC application. Maine DEP concluded in its WQC that the flow level along with restricted impoundment fluctuations were adequate to protect fish and aquatic habitat and meet Class C dissolved oxygen standards.

Additionally, license article 404 required a streamflow and water level monitoring plan that was developed in consultation with resource agencies and submitted in November 2001 and subsequently approved by FERC. In its supplemental information sent to LIHI on June 11, 2021, the Applicant states that no deviations from the required minimum flow have occurred in the past 5 years and that the bypass gate is in a fixed position and the gate control is chained to prevent it from being changed.

Based on my review of the application, supporting documentation, and publicly available information, the Project is operated in a manner such that it does not adversely affect fish and wildlife resources under its limited flow regime. As such, the Project continues to satisfy the Ecological Flow Regimes criterion.

B. WATER QUALITY

Goal: Water Quality is protected in waterbodies directly affected by the facility, including downstream reaches, bypassed reaches, and impoundments above dams and diversions.

Assessment of Criterion Passage: The Applicant appropriately selected Standard B-2, Agency Recommendation for all Zones.

The entire Messalonskee Stream is listed as a Category 2: Rivers and Streams Attaining Some Designated Uses and Insufficient Information for Other Uses in Maine DEP’s 2016 Integrated Water Quality Monitoring and Assessment Report.³ The WQC notes that waters from the outlet of Messalonskee Lake to its confluence with the Kennebec River are designated Class C by Maine DEP. Class C waters are of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation; navigation; and as habitat for fish and other aquatic life.

In support of its WQC application, the Applicant conducted a study entitled “Hydrologic Analysis of the Messalonskee Stream Drainage.” The purpose of this study was to provide an understanding of the watershed and examine the availability of water in Messalonskee Stream.

² https://elibrary.ferc.gov/eLibrary/docinfo?document_id=2095775

³ https://www.maine.gov/dep/water/monitoring/305b/2016/28-Feb-2018_2016-ME-IntegratedREPORT.pdf

The water quality in Messalonskee Stream was characterized as poor, since the levels of dissolved oxygen (DO) observed had in many instances violated state water quality standards. The cause of this dissolved oxygen impairment was determined to be phosphorus loading from the Union Gas wastewater treatment facility, existing dams and hydroelectric facilities, and algal blooms.

As noted previously in Criterion A – Ecological Flow Regimes, a minimum bypass flow of 15 cfs is released downstream of the dam into the bypass reach at all times. This minimum flow is also released at the upstream Oakland dam and into the Rice Rips impoundment. Maine DEP commented in the WQC that “there is a reasonable assurance that Class C dissolved oxygen standards in Messalonskee Stream will be met if the applicant passes a minimum flow of 15 cfs through all project developments, including the Rice Rips bypass, provided the applicant monitor water quality in Messalonskee Stream.”

WQC Condition 3 and Article 407 of the Project’s FERC license required a water quality monitoring plan that included monitoring, for a 5-year period, of DO, water temperature, and chlorophyll-a concentrations in Rice Rips impoundment, in the upper section of the bypass reach, and downstream of the Rice Rips tailrace and bypass reach confluence. FERC approved the plan on March 30, 2001. The collected data sufficiently demonstrated that water quality standards for dissolved oxygen are met throughout the Project reach.

The Rice Rips bypass reach is managed for a seasonal put-and-take fishery for brown trout. Article 413 of the FERC license required a plan to enhance habitat in the bypass reach by adding shade and instream cover. Summer water temperatures in the bypass reach were in excess of brown trout tolerances due to removal of most the streamside vegetation in an effort to control vegetation growth under the transmission lines. The Fisheries Habitat Enhancement Plan was modified and approved by FERC on June 12, 2000 and included the establishment of a 25-foot-wide “no-cut zone” along the bypass reach shoreline that is not located within one of the transmission line corridors. Those areas beneath the corridors, are subject to “sensitive area” management practices that allow vegetation that is not capable of growing tall enough to interfere with the transmission lines, to grow up to 10 feet within the 25-foot buffer zone.

Additionally, the Project received a renewed Maine Pollutant Discharge Elimination System Permit and Maine Waste Discharge License from Maine DEP, Bureau of Land and Water Quality on June 10, 2019 (Permit No. ME0001252). So long as the permit conditions are met, Maine DEP concluded that the discharge, either by itself or in combination with other discharges, would not lower the quality of any classified body of water below such classification or the quality of any unclassified body of water below the classification which the Department expects to adopt in accordance with state law. Maine DEP also concluded that the provisions of Maine’s antidegradation policy would be met.

The consistent impoundment levels, run-of-river operation, and minimum flow requirement minimize Project-impacts on water quality. A review of the FERC eLibrary and the Applicant's annual compliance letters to LIHI, indicated that no issues related to water quality have occurred at the Project during the previous LIHI certification period.

Based on my review of the application, supporting documentation, and publicly available information, the Project does not appear to impact water quality in the river and therefore continues to satisfy the Water Quality criterion.

C. UPSTREAM FISH PASSAGE

Goal: The facility allows for the safe, timely, and effective upstream passage of migratory fish. This criterion is intended to ensure that migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the facility.

Assessment of Criterion Passage: The Applicant selected Standard C-2, Agency Recommendation for all zones. However, for reasons discussed below, this review finds that Standard C-1, Not Applicable/De Minimis Effect is more appropriate for the Impoundment zone.

The Project waters support a mix of coldwater and warmwater fish species. The application states that there is no available evidence to support the historical presence of anadromous fish species in Messalonskee Stream. The only migratory species is the catadromous American eel. Resident species include: silvery minnow, fallfish, golden shiner, white sucker, rainbow smelt, brown bullhead, northern pike, chain pickerel, threespine stickleback, largemouth bass, smallmouth bass, pumpkinseed sunfish, white perch, and yellow perch. Maine Department of Inland Fisheries and Wildlife (Maine DIFW) annually stocks brown and brook trout and splake (lake trout and brook trout hybrid).

There are no barriers to upstream fish passage in the impoundment zone. As such, this review finds that Standard C-1, Not Applicable/De Minimis Effect is appropriate for this zone of effect.

Article 406 of the FERC license includes reservation of authority to prescribe upstream and downstream fishways. To date, that authority has not been exercised.

During the initial 2010 LIHI certification review process, Maine Department of Marine Resources (Maine DMR) commended that it was concerned with the lack of upstream and downstream eel passage at the Union Gas, Rice Rips, and Oakland Projects. In response, the Applicant worked with Maine DMR and FWS and completed the installation of upstream eel ramp in 2015. In 2015, eels migrated upstream via the ramp from June 11 to August 13 with the biggest volume of eels passing from June 11 to June 24. The application did not include more recent passage counts than the 2015 data and so a request was made to the Applicant to provide

any additional passage count data. In response, the Applicant stated that after Maine DNR’s acceptance of the upstream eel passage, the agency has not required any data collection or auditing of the efficiency of the ramp since the original efficiency testing in 2015 that showed 90-92 percent passage efficiency. The Applicant also noted that the ramp is inspected at the start of every season and repairs are made as necessary.

Based on my review of the application, supporting documentation, and publicly available information, the Project continues to satisfy the Upstream Fish Passage criterion.

D. DOWNSTREAM FISH PASSAGE AND PROTECTION

Goal: The facility allows for the safe, timely, and effective downstream passage of migratory fish. For riverine (resident) fish, the facility minimizes loss of fish from reservoirs and upstream river reaches affected by Facility operations. Migratory species are able to successfully complete their life cycles and maintain healthy populations in the areas affected by the Facility.

Assessment of Criterion Passage: The Applicant selected Standard D-2, Agency Recommendation for all zones. However, for reasons discussed below, this review finds that Standard D-4, Acceptable Mitigation is more appropriate for the Impoundment and Bypass Reach Zones, and Standard D-1, Not Applicable/De Minimis Effect is more appropriate for the Downstream Reach Zone because once in this zone there are no Project-related barriers to hinder downstream movement.

As noted previously in Criterion C - Upstream Fish Passage, the only migratory species that uses the Project area is the catadromous American eel. The Rice Rips Dam acts as a barrier to fish in the impoundment zone that attempt to move downstream. However, the 15-cfs minimum bypass flow facilitates downstream movement past the Project. Article 406 of the FERC license includes reservation of authority to prescribe upstream and downstream fishways. To date, that authority has not been exercised.

From 2012 through 2019, eels were trapped at the Messalonskee Lake Dam and trucked down past all four Messalonskee Stream Projects to the Union Gas tailrace. At the time, resource agencies agreed to this mitigation approach in lieu of providing downstream passage at each Project. However, this practice had limited success (often one or no eels per year, and never more than four) and following consultation with Maine DMR, the Applicant voluntarily agreed that the Rice Rips Project, along with the Union Gas, Automatic, and Oakland Projects, would instead, annually shut down between 6pm and 2am from September 1 through October 30. This new practice resulted in 11 eels being trapped, measured, and released downstream of the lowest, Union Gas Project.

The Applicant provided supplemental information to LIHI on June 11, 2021 that included Maine

DMR’s approval of the 2020 downstream passage results and support for additional Project nightly shutdowns in 2021 in order to continue evaluation of whether this method can be used for permanent downstream passage.

The powerhouse includes one vertical Francis turbine rated at 1.6 MW and a minimum and maximum hydraulic capacity of 324 cfs and 660 cfs, respectively. The powerhouse trashrack has 2-inch clear spacing between the bars. Fish survival estimates compiled by the Electric Power Research Institute show that immediate and 48-hour turbine survival estimates at sites with similar turbine characteristics as the Rice Rips Project range from 87 percent to 94 percent for immediate survival and 76 percent to 81 percent for 48-hour survival. In its supplemental information, the applicant states that no request to mitigate any entrainment has been made.

The Applicant also selected **Standard D-Plus** for all Zones, although it only applies to the Impoundment and Bypass Reach Zones. As noted above, the Applicant now voluntarily provides nighttime shutdowns at all four projects on Messalonskee Stream for eel downstream passage. This action also constitutes a basin-wide redevelopment strategy both within Messalonskee Stream and within the larger Kennebec River watershed where restoration of the diadromous fishery began with the removal of Edwards Dam at the head-of-tide in 1999 and allowed fish access to about 17 miles of river to Waterville, upstream of the Messalonskee Stream confluence. The Maine DMR issued the Kennebec River Management Plan Diadromous Resources Amendment⁴ in 2020, which updated a prior 1993 plan. The amendment includes American eel for the first time, with a stated goal “to provide safe, timely, and effective upstream and downstream passage for American eel throughout its historically accessible habitat.”

Based on my review of the application, supporting documentation, and publicly available information, the Project continues to satisfy the Downstream Fish Passage and Protection criterion and also satisfies the PLUS Standard.

E. SHORELINE AND WATERSHED PROTECTION

Goal: The Facility has demonstrated that enough action has been taken to protect, mitigate and enhance the condition of soils, vegetation and ecosystem functions on shoreline and watershed lands associated with the facility.

Assessment of Criterion Passage: The Applicant initially selected Standard E-2, Agency Recommendation for all Zones, but in its supplemental information indicated that it agreed with the Stage 1 review of the initial application that recommended Standard E-1, Not Applicable/De Minimis Effect is more appropriate for all Zones.

⁴ https://www.maine.gov/dmr/laws-regulations/documents/Final%20Amendment_12_22.pdf

The FERC Project boundary covers approximately 178 acres of which only 1.6 acres are owned in fee and the rest consist of flowage rights. The watershed area formed by the Rice Rips dam impoundment extends approximately 1.6 miles upstream from the Project to the Oakland dam. The Rice Rips Project has a gross reservoir volume of 1,000 acre-feet. The 200-foot boundary zone extending around the impoundment is bordered by a steep gradient and is undeveloped. The flows below the Project have minimal effect on shoreline erosion due to the predominantly granite and gravel substrates in the tailrace areas. There has been minimal colonization of exposed shorelines by emergent plants within the 200-foot boundary area due to the inhospitable landscape and steep slopes along 60 percent of the shoreline. There are no lands of ecological significance.

The Project is not required to have, nor does it have a shoreline management or similar plan. The run-of-river operations of the Project and consistent impoundment water surface elevations minimize the potential for the Project to negatively affect the shoreline.

A review of the FERC eLibrary indicated that no issues related to shoreline and watershed protection have occurred during the FERC licensing period.

Based on my review of the application, supporting documentation, and publicly available information, the Project's operations sufficiently protect shoreline and watershed lands. Therefore, the Project continues to satisfy the Shoreline and Watershed Protection criterion.

F. THREATENED AND ENDANGERED SPECIES PROTECTION

Goal: The facility does not negatively impact federal or state listed species.

Assessment of Criterion Passage: The Applicant appropriately selected Standard F-2, Finding of No Negative Effect, for all Zones.

A FWS IPaC report generated by the Applicant, included the federally-endangered Atlantic salmon and the federally-threatened Northern long-eared bat. No critical habitat is present for either species in the Project area. The Applicant reached out to Maine DIFW regarding state-listed species and was informed that the black tern is the only state-listed species associated with the Project. They nest in the freshwater emergent marsh associated with Messalonskee Lake but not near Rice Rips.

The FWS consistency letter included in the application states that Rice Rips Project operations are not likely to result in unauthorized take of Northern long-eared bat. Additionally, during the previous recertification, FWS informed the applicant that passage of salmon and sturgeon in the Kennebec River into the Messalonskee watershed is not desirable and the Union Gas Project does not affect these species. With the exception of the annual nighttime shutdowns for

downstream eel passage discussed above, Project operations have not changed since the previous recertification.

A review of the Project’s record on the FERC eLibrary indicated that no issues related to threatened and endangered species have occurred.

Based on my review of the application, supporting documentation, and publicly available information, the Project continues to satisfy the Threatened and Endangered Species criterion.

G. CULTURAL AND HISTORIC RESOURCE PROTECTION

Goal: The facility does not unnecessarily impact cultural or historic resources that are associated with the Facility’s lands and waters, including resources important to local indigenous populations, such as Native Americans.

Assessment of Criterion Passage: The Applicant initially selected Standard G-2, Approved Plan, for all Zones, but in its supplemental information indicated that it agreed with the Stage 1 review of the initial application that recommended Standard G-1, Not Applicable/De Minimis Effect is more appropriate for all Zones.

In its supplemental information sent to LIHI on June 11, 2021, the Applicant states that no cultural or historic resources exist at the Project. The Applicant does perform cultural resource monitoring as required by license article 414 and the Cultural Resources Monitoring Plan which only requires monitoring at sites around Messalonskee Lake and is not applicable to the Rice Rips Project. A review of the National Register of Historic Places database found three registered sites within the city of Oakland, but none are inside the Project boundary.

Based on a review of the application, supporting documentation, and publicly available information, the Project continues to satisfy the Cultural and Historic Resource Protection criterion.

H. RECREATIONAL RESOURCES

Goal: The facility accommodates recreation activities on lands and waters controlled by the facility and provides recreational access to its associated lands and waters without fee or charge.

Assessment of Criterion Passage: The Applicant appropriately selected Standard H-2, Agency Recommendations for all zones.

No fee is charged for public access to recreational facilities at the Project. License Article 410 and 412 required a plan to develop and monitor recreation sites at the Project. Recreation sites to

be included at the Project included: 1) designating the corridor between the Oakland and Rice Rips Projects as a greenbelt or multi-use area on the east side of the stream and the Project impoundment from the Oakland Dam to the Rice Rips Dam; 2) a parking area; and 3) carry-in boat access to the Rice Rips impoundment. The boat access is provided and maintained by the Town of Oakland on land leased to the Town for that purpose. The Project's Messalonskee Stream Trail runs 2.5 miles along the river between Rice Rips and Oakland Projects and is maintained by the Town of Oakland (Figure 7).

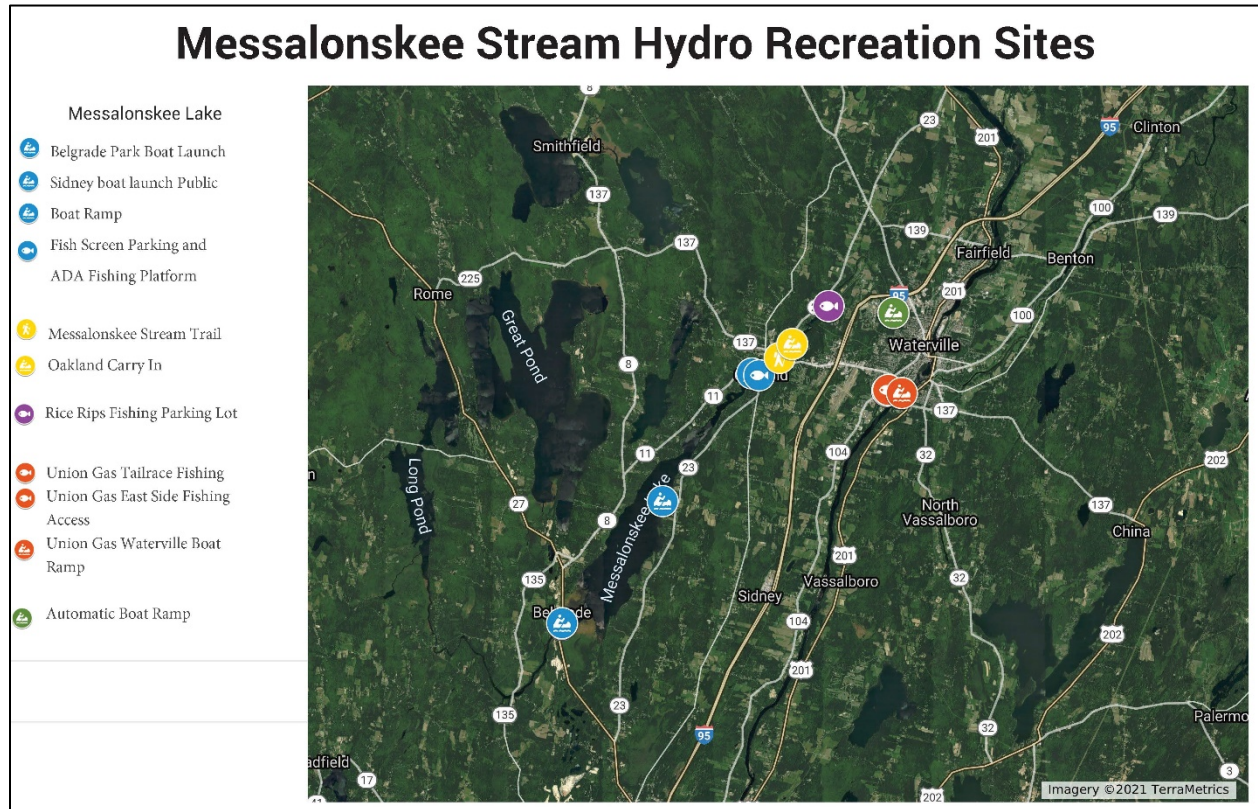


Figure 7 – Recreational resources

A review of the FERC eLibrary indicated that no issues related to recreation have occurred during the FERC licensing period.

Based on my review of the application, supporting documentation, and publicly available information, the Project continues to satisfy the Recreational Resources criterion.

IX. GENERAL CONCLUSIONS AND REVIEWER RECOMMENDATION

Based on my review, I believe that the Project continues to meet the requirements of Low Impact Certification and recommend it be recertified for an eight-year period including a three-year

extension for satisfying the PLUS Standard for downstream passage. Given the history of compliance with the existing certification Condition 1, and the implementation of project shutdowns to facilitate downstream eel passage, that condition is no longer warranted.