Low Impact Hydropower Institute's (LIHI) Certification Review for Cataract Hydroelectric Project

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1. BACKGROUND

The Cataract Hydroelectric Project (CHP or Project) consists of four dams, two impoundments and a single-turbine/generator powerhouse located between river mile (RM) 6.3 and RM 6.0 on the Saco River in the cities of Saco and Biddeford and the towns of Dayton and Buxton, Maine. The Project is licensed with the Federal Energy Regulatory Commission (FERC), as Project No. 2528, and is owned by Brookfield White Pine Hydro LLC (BWPH), a subsidiary of Brookfield Renewable Partners (BRP). [1]

From upstream to downstream the four dams are: Spring Island, Bradbury, East Channel (or Cataract) and West Channel. The Spring Island, Bradbury and West Channel dams pre-date the present East Channel power development which was constructed in 1938. The dams were originally constructed around the turn of the 20th century to meet the hydro-mechanical and hydroelectric demands of industry along the Saco River. The four dams are operated to supply the powerhouse with an authorized installed capacity of 6.65 MW.

The impoundment formed by the Spring Island and Bradbury dams extends upriver about 9.3 miles to the Skelton Project (FERC No. 2527), also owned by BWPH.

A Section 401 Water Quality Certificate (WQC) was issued by the Maine Department of Environmental Protection (MDEP) on November 29, 1989 and amended by MDEP on March 15, 1995. FERC issued a 40 year major license for the Project to Central Maine Power Company (CMPC) on June 29, 1989, effective June 1, 1989, which expires on May 31, 2029[2]. License article 407 was amended in August of 1995 to consolidate recreational reporting. On December 23, 1998, CMPC transferred ownership to Florida Power and Light's Energy Maine Hydro LLC (FPLE) and on June 29, 2013, FPLE transferred ownership to BWPH. On May 16, 2019, the license was again amended to approve revised Project Exhibits A and F[3].

The Project has an authorized installed capacity of 6.65 megawatts (MW) that produced an average annual generation (AAG) of 30,868 megawatt-hours (MWh) for calendar years 2013 through 2018, which corresponds to an annual plant factor of 53.0%.

BWPH submitted an application for LIHI certification of the Project on December 30, 2019. On February 28, 2020, LIHI notified BWPH that the intake review for the Project was complete. The intake review found that only a small amount of supplemental information was needed. BWPH supplied supplemental documentation on March 25, 2020 and the 60-day public comment period was opened on April 7, 2020.

2. SACO RIVER BASIN

The Saco River is the fourth largest flowing river in the State of Maine and 134 miles long, draining a watershed area of 1,703 square miles (SQMI) of mostly forests and farmlands that originate in New Hampshire and terminate in Maine, discharging into the Atlantic Ocean at Saco Bay (see Figure 1).

[1] Kelly Maloney; Manager, Compliance – Northeast, Brookfield Renewable Partners, 150 Main Street, Lewiston, Maine 04240 -- (207) 755-5606 - Kelly.Maloney@brookfieldrenewable.com

[2] FERC License - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12797021

[3] Amended FERC License - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15248847

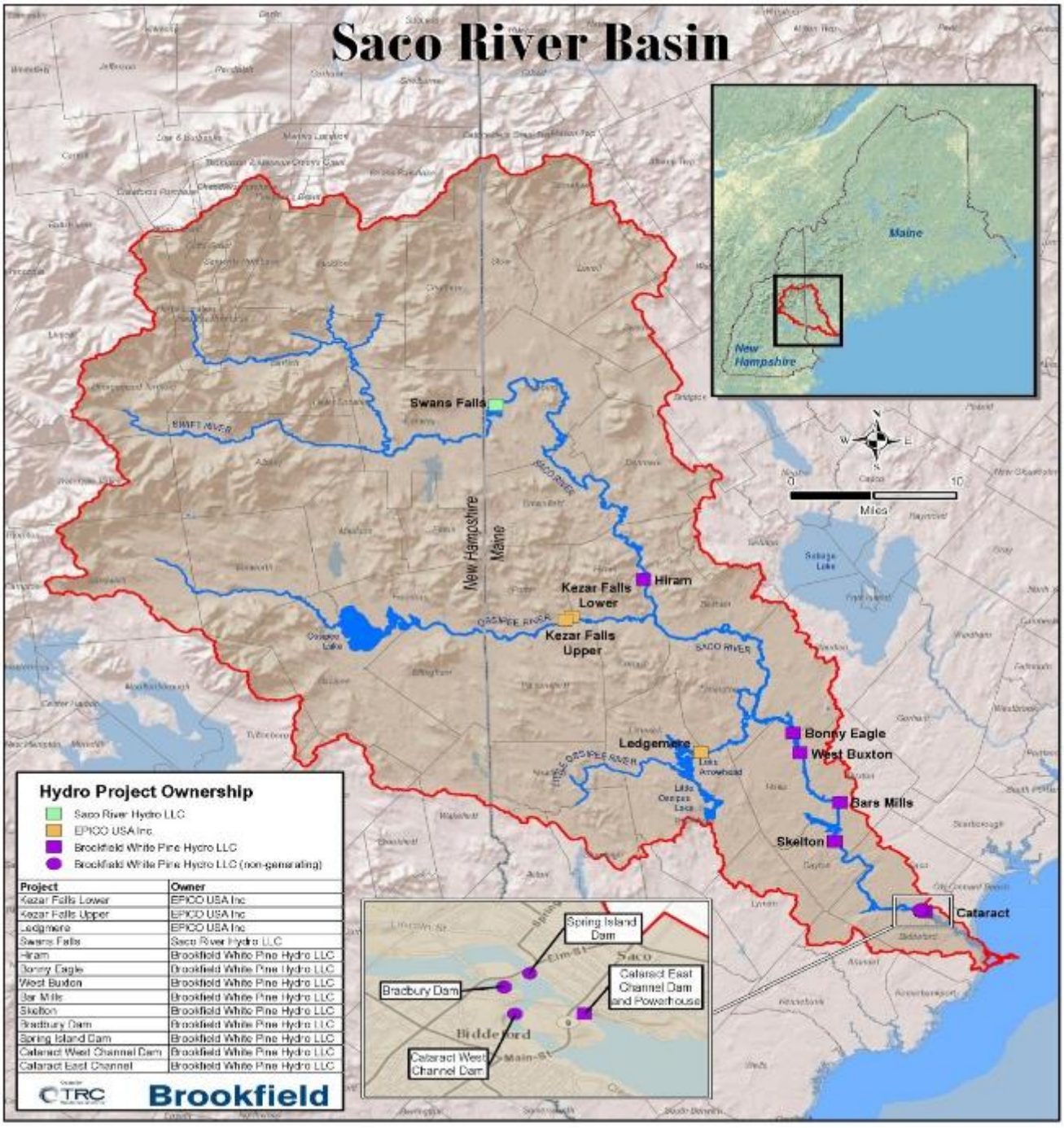

Figure 1 - Saco River Basin

The major tributaries to the Saco River are: Upper Saco River, Swift River, the Conway Tributaries, Bear Camp River, Pine River, Ossipee River, and Little Ossipee River.

The basin contains ten dams that generate hydroelectric power. Cataract is the first dam on the river. Dams upstream of the Project include:

- The Skelton Project at RM 15.6 owned by BWPH and licensed as FERC Project 2527.
- The Bar Mills Project at RM 20 owned by BWPH and licensed as FERC Project 2194.
- The Bonny Eagle Project at RM 22 owned by BWPH and licensed as FERC Project 2529.
- The West Buxton Project at RM 24 owned by BWPH and licensed as FERC Project 2531.
- The Hiram Project at RM 46 owned by BWPH and licensed as FERC Project 2530.
- The Swans Falls Project owned by Saco River Hydro, LLC (SRHP), FERC Exempt Project 11365.
- The Ledgemere Project owned by Ledgemere Hydro, LLC (LH), FERC Exempt Project 8788. The project is located on the Little Ossipee River, a tributary to the Saco River.
- The Kezar Falls Upper and Lower Project owned by Kezar Falls Hydro, LLC (KFH) and licensed as FERC Project 9340. The project is located on the Ossipee River, a tributary to the Saco River.

Fish passage facilities for Saco River dams are:

Project	FERC #	River Mile	Upstream Passage		Downstream Passage	
			Fish	Eel	Fish	Eel
Swans Falls	11365	unknown	Assumed there is no passage at this FERC Exemption Project, but the exemption does reserve the right for FERC to require passage[4].			
Hiram	2530	46	2032	2025	no	2032
Bonny Eagle	2529	26	2029	yes	yes	2030
West Buxton	2531	24	2027	yes	yes	2028
Bar Mills	2194	20	2025	yes	yes	2026
Skelton	2527	15.6	yes	yes	yes	2024
Cataract	2528	6.3	yes	yes	yes	yes

An aerial view of the main Project facilities is shown in Figure 2. Close up views of the Spring Island, Bradbury, West Channel and East Channel dams are shown in Figure 3, Figure 4, Figure 5 and Figure 6, respectively, in Section 5 below.

[4] Information noted in Bonny Eagle FERC license page 3.

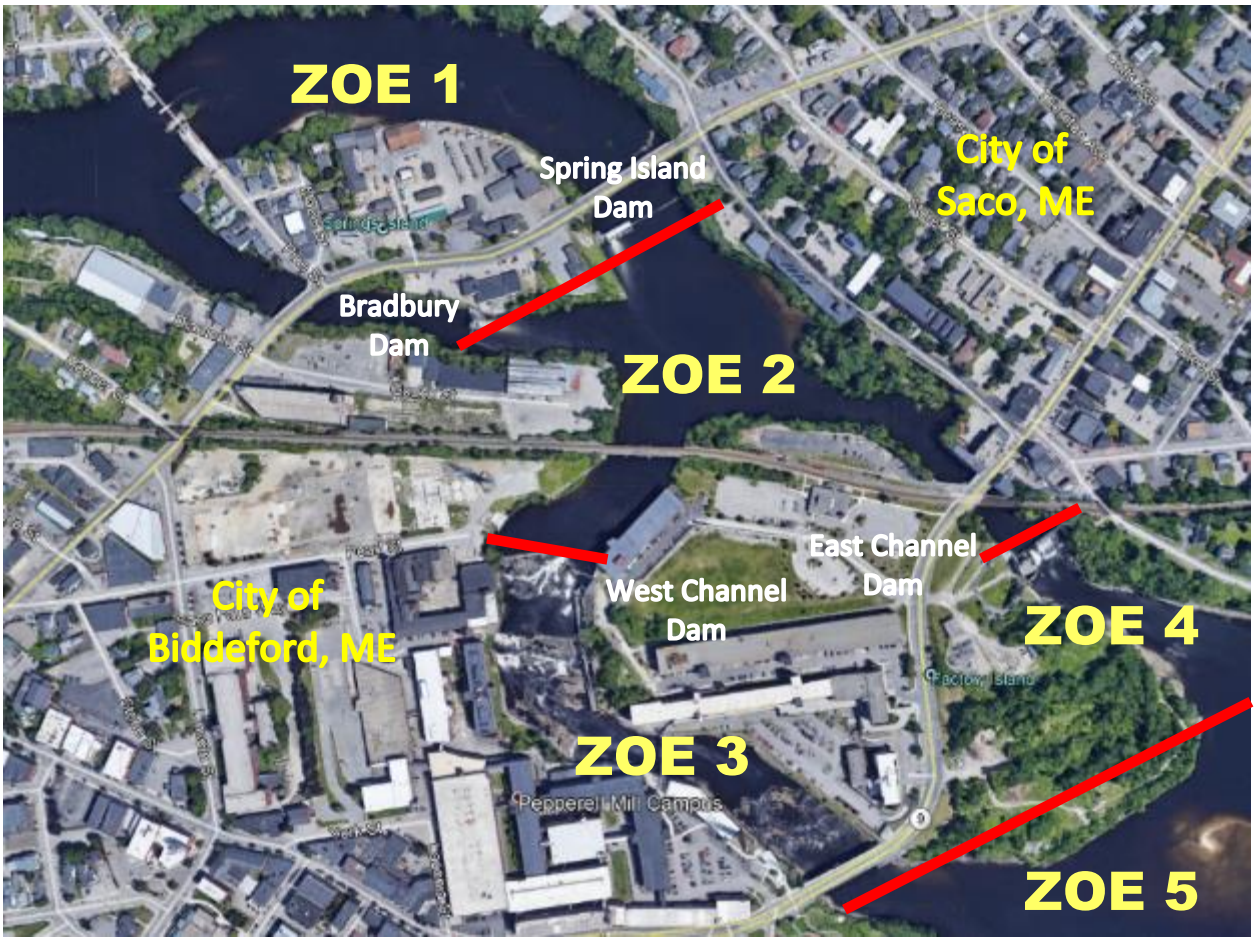

Figure 2 - Aerial View of Project

3. ZONES OF EFFECT (ZOEs)

The Project has a total of five ZOEs defined from upstream to downstream as shown in Figure 2. ZOEs 1 through 5 are:

- ZOE 1 is the Bradbury/Spring Island Impoundment, river mile (RM) 15.6 to RM 6.3;
- ZOE 2 is the West Channel/East Channel Impoundment, RM 6.3 to RM 6.0;
- ZOE 3 is the West Channel Bypass Reach, RM 6.0 to RM 5.8;
- ZOE 4 is the East Channel Tailrace, RM 6.0 to RM 5.8;
- ZOE 5 is the Regulated Downstream River Reach, RM 5.8 to RM 5.6.

The alternative standards selected to satisfy the LIHI certification criteria in each of these ZOEs are identified in the following tables. As part of my review process, I checked and agreed with their selection, with the exception of Threatened and Endangered Species, noted in **RED** in the tables below.

Table 1 - Bradbury/Spring Island Impoundment (RM 15.6 to RM 6.3) - ZOE 1 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes	X				
B	Water Quality		X			
C	Upstream Fish Passage		X			
D	Downstream Fish Passage		X			
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection		X	X		
G	Cultural and Historic Resources Protection	X				
H	Recreational Resources		X			

Table 2 - West Channel/East Channel Impoundment (RM 6.3 to RM 6.0) - ZOE 2 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage		X			
D	Downstream Fish Passage		X			
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection		X	X		
G	Cultural and Historic Resources Protection	X				
H	Recreational Resources	X				

Table 3 – West Channel Bypass Reach (RM 6.0 to RM 5.8) - ZOE 3 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage		X			
D	Downstream Fish Passage		X			
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection		X	X		
G	Cultural and Historic Resources Protection	X				
H	Recreational Resources		X			

Table 4 – East Channel Tailrace (RM 6.0 to RM 5.8) - ZOE 4 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage		X			
D	Downstream Fish Passage		X			
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection		X	X		
G	Cultural and Historic Resources Protection	X				
H	Recreational Resources		X			

Table 5 – Regulated Downstream River Reach (RM 5.8 to RM 5.6) - ZOE 5 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage	X				
D	Downstream Fish Passage	X				
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection		X	X		
G	Cultural and Historic Resources Protection	X				
H	Recreational Resources		X			

4. PROJECT HYDROLOGY

There are three US Geological Survey (USGS) gages located upstream of the Project on the Saco River:

1. USGS gage 01066000 (GAGE1) located at Cornish, Maine. This gage has a contributing drainage area of 1,293 SQMI and contains recorded daily flows from June 4, 1916 to present day;
2. USGS gage 01067000 (GAGE2) located at West Buxton, Maine. This gage has a contributing drainage area of 1,572 SQMI and contains recorded daily flows from October 19, 1907 through September 29, 1940;
3. USGS gage 01067500 (GAGE3) located at Salmon Falls, Maine. This gage has a contributing drainage area of 1,595 SQMI and contains recorded daily flows from October 1, 1938 through September 29, 1948.

Therefore, the only active USGS gage, is GAGE1. Flows from this gage can be used to prorate the inflow at the Project by multiplying the gage daily flows by the drainage area ratio (DAR) of the Project's drainage area by the gage's drainage area (1,703/1,293 or 1.317).

I performed a DAR regression analysis using GAGE1 and GAGE 2 daily flows to find the best multiplying factor to use to estimate GAGE2's daily flows. Based on the analysis, DARs can estimate daily flows at the Project from GAGE1 daily flows. On a monthly basis, the resulting factors are 1.248 for January, 1.305 for February, 1.404 for March, 1.254 for April, 1.197 for May, 1.210 for June, 1.245 for July; 1.251 for August, 1.254 for September, 1.277 for October, 1.220 for November and 1.251 for December. On an annual basis the factor is 1.259.

Based on this approach, the minimum daily flow of 311 CFS occurred on September 13, 2002. The maximum daily flow of 64,042 CFS occurred on March 21, 1936. The average daily flow is 3,488 CFS.

Flow duration analyses indicate a daily flow of 847 CFS is exceeded about 90% of the time annually. A daily flow of 2,249 CFS is exceeded about 50% of the time annually. A daily flow of 7,702 CFS is exceeded about 10% of the time annually. A daily flow of 16,628 CFS is exceeded about 1% of the time annually.

Flow frequency analyses indicate the 10-year daily flow is about 27,320 CFS, the 50-year daily flow is about 39,800 CFS, and the 100-year daily flow is 45,880 CFS, while the 7Q10[5] flow is 444 CFS.

5. PROJECT DESCRIPTION

The Project is comprised of the Spring Island, Bradbury and West and East Channel (Cataract) Dams. The dams were originally constructed around the turn of the 20th century to meet hydro-mechanical and hydroelectric demands of industry along the Saco River. The Spring Island, Bradbury and West Channel dams pre-date the present Cataract power development which was constructed in 1938.

BWPH operates the Project in a run-of-river (ROR) mode while providing an instantaneous minimum flow within both the West and East Channel bypasses and below the confluence of the west and east channel of the Saco River.

The East Channel Dam consistently passes 120 CFS of minimum flow as an attraction flow through its upstream fishway. A flow of 52 CFS is passed through the West Channel downstream fishway from April 1 to December 31. An additional 50 CFS is passed through the West Channel via the upstream Denil fishway so that the bypass minimum flow varies from 50 CFS to 102 CFS throughout the year.

During periods of non-generation, a flow of at least 250 CFS is provided downstream by releases from both the West and East Channel dams for operation of a refuse incinerator built by the Maine Energy Recovery Company (MERC) in the town of Biddeford just above the West Channel Dam (ZOE2). MERC uses 138 CFS of this flow for cooling water purposes. However, when the Cataract Project is not operating, 250 CFS is passed through the headpond into the downstream reach to ensure proper dilution and mixing of condenser cooling water to meet MDEP regulations concerning thermal discharges. The Project's hydrology indicates an inflow of at least 250 CFS is always available.

The Project's turbine flow ranges from 1,300 CFS to 2,600 CFS. During periods of powerhouse generation BWPH provides a total minimum flow[6] of 851 CFS or inflow, whichever is less within the downstream

[5] 7Q10 – This frequency parameter estimates the seven day rolling average streamflow that is exceeded about 90 percent of the time. There is only a 10 percent chance that a seven day rolling average flow will be less than this value.
[6] Since turbine flow from the upstream East Channel Dam can be used to meet this flow requirement, it can be also be defined as a base flow.

reach (ZOE5). Excess inflow above the powerhouse maximum capacity of 2,600 CFS is passed over the East and West Channel dams, which occurs about 33 percent of the time annually.

ROR operation or minimum flows may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement between BWPH, U.S. Fish and Wildlife Service (USFWS) and MDEP.

Water level in the Cataract impoundment upstream of the East and West Channel dams is maintained at the top of the flashboards at elevation of 44.0 feet mean sea level (FTMSL). This elevation is also designated as the normal full pond level (NFPL) for an impoundment surface area of 13.7 acres with negligible usable storage.

Water levels in the Spring/Bradbury impoundment fluctuate between the top of the flashboards at elevation (49.2 FTMSL), also designated as the NFPL, and the spillway crest elevation (47.2 FTMSL) if flashboards have failed. At the NFPL, the surface area is 359 acres and the gross storage volume is 711 acre feet (ACFT) with negligible usable storage.

A. Spring Island Dam

The Spring Island Dam (latitude 43° 29’ 54.22” N, longitude 70° 27’ 4.85” W) consists of:

- A 100-foot wide by 230-foot long nature-like fishway beginning at the East shoreline,
- A concrete gravity overflow section with a fixed crest at elevation of 47.7 (FTMSL) and two gate house sections. The overflow section is topped with 18-inch, pin-supported flashboards that extend 117.5 feet from the fishway to a gate house section.
- A gate house containing four gate openings with sills at an elevation of 39.2 FTMSL. The first gate opening (most easterly opening) is closed by timber stop logs and a slide gate operated manually with a chain hoist. The remaining three openings contain Tainter gates, each 16 feet wide by 11 feet high.
- West of the gate house is a lock system for upstream fish passage. The lock system is 41 feet long by 10 feet wide and contains an attraction flow flume, fish crowder, lock chamber, control gates, and exit way (see at left in Figure 3).

Figure 3 - Spring Island Dam

B. Bradbury Dam

The Bradbury Dam (latitude 43° 29’ 51.10”N, longitude 70° 27’ 11.42”W) consists of a concrete gravity overflow structure extending from the south shore, with one gate section (see Figure 4).

The spillway is 141 feet long, has a fixed crest elevation of 47.7 FTMSL with 20-inch high pin-supported flashboards that abut the gate section. The gate section contains a Tainter gate 20.25 feet wide by 13.5 feet high with a sill elevation of 36.2 FTMSL. North of the gate section is a lock system for upstream fish passage. The lock system is approximately 41 feet long by 10 feet wide and contains an attraction flow flume, fish crowder, lock chamber, control gates, and exit way.

Figure 4 - Bradbury Dam

C. West Channel Dam

The West Channel Dam (latitude 43° 29' 42.73"N, longitude 70° 27' 8.86"W) consists of two overflow sections, a downstream fish passage weir, an upstream Denil fish ladder, and a gate section (see Figure 5). The first overflow section is a concrete and stone masonry gravity structure with a concrete cap and a crest elevation of 40.5 FTMSL. This section extends from the west bank 193 feet then angles 44.5 feet intersecting the former fishway. This overflow section is equipped with a four-foot high inflatable rubber bladder.

The second overflow section extends 24 feet from the gate section to the Denil fish ladder near the downstream fish sluice. This overflow section is a concrete gravity structure with a crest elevation at 40.5 FTMSL with four-foot high pin-supported flashboards.

The notched downstream passage weir and orifice fishway in the West Channel has been abandoned since 1991. Upstream passage at the West Channel dam is currently provided by the Denil fish ladder. There are also sorting facilities at this site. The Denil ladder is four feet wide and approximately 550 feet long. The total rise is approximately 44 feet with an average slope of 1 foot vertical to 8 foot horizontal. Downstream fish passage is now provided by a gated flume.

Figure 5 - West Channel Dam

D. East Channel Dam

The East Channel Dam (latitude 43° 29' 44.45"N, longitude 70° 26' 48.34"W) consists of an overflow section, a gate section, and an intake section (see Figure 6). The overflow section is an 89-foot long concrete gravity structure with a fixed crest at elevation of 39.5 FTMSL, topped by five-foot high pneumatic crest gates. The crest gates are operated from a 10-foot high, 12-foot wide, 16-foot long control building located above the powerhouse intake.

The East Channel gate section contains a vertical lift Broome gate, 20 feet wide by 15 feet high. The sill of the gate is at elevation 29.0 FTMSL.

Upstream passage is provided at the East Channel Dam with a fish lift and sorting and trap/truck facilities. The fish lift travels vertically approximately 44 feet from the tidal pool at the downstream end up to the headpond. A 337-foot long, 8-foot wide flume extends upstream to the sorting facilities and the headpond. Downstream fish passage consists of a gated flume.

The powerhouse intake section is 49 feet wide and is equipped with 3.5-inch clear opening trashracks and two intake openings. The powerhouse is located on Factory Island on the East Channel and the powerhouse substructure is 37 feet by 53 feet comprised of structural steel and brick. The powerhouse contains a 9.5-Megawatt (MW) S. Morgan Smith Kaplan turbine operating at a 0.7 power factor, which produces a

maximum power output of 6.65 MW when passing the maximum hydraulic capacity of 2,600 CFS. The turbine minimum hydraulic capacity is 1,300 CFS.

The draft tube is angled about 20 degrees to the intake and extends 30 feet downriver from the substructure where it discharges into tidewater. Two gates, each 15 feet wide by 13 feet high, are installed at the downstream end of the draft tube.

Figure 6 - East Channel Dam and Powerhouse

6. REGULATORY SUMMARY

A WQC was issued by the MDEP initially on November 29, 1989, was reissued on August 14, 1992[7]and subsequently amended by MDEP on March 15, 1993 and March 15, 1995[8]. FERC issued a 40-year major license for the Project to CMPC on June 29, 1989, effective June 1, 1989, which expires on May 31, 2029[9]. License article 407 was amended in August 1995 to consolidate recreational reporting[10] and the license was amended on June 19, 1997 to remove the NKL powerhouse from the license[11]. On December 23, 1998, CMPC transferred ownership to FPLE and again on June 29, 2013, FPLE transferred ownership to BWPH.

[7] WQC - https://elibrary.ferc.gov/eLibrary/#
[8] Electronic versions not available
[9] FERC License - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12797021
[10] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=3021513
[11] https://elibrary.ferc.gov/eLibrary/idmws/common/opennat.asp?fileID=3084803

A. Licensing Requirements

License Article 401 and Condition 5 of the WQC require that the Project operate in a ROR mode, while providing an instantaneous minimum flow below the confluence of the west and east channels of the Saco River. During periods of non-generation, a minimum flow of 250 CFS is provided. During periods of generation, BWPH provides a total minimum flow of 851 CFS or inflow, whichever is less. Since turbine flow from the upstream East Channel Dam can be used to meet this flow requirement, it can be also be defined as a base flow.

License Article 402 requires a Minimum Flow Monitoring Plan (MFMP). The MFMP was approved by FERC order on May 9, 1990[12] which requires BWPH to use a computer controlled Supervisory Control and Data Acquisition system (SCADA) to monitor minimum flow and record hourly readings. An annual report filing is also required.

License Article 403 required the construction, operation and maintenance of fish passage facilities to provide efficient upstream passage of Atlantic salmon, American shad, and alewife at the East Channel, West Channel, Springs Island and Bradbury dams and downstream passage at the East and West Channel dams. The fish passage facilities were designed in cooperation with the USFWS, the Maine Atlantic Sea Run Salmon Commission (MASRSC), the Maine Department of Marine Resources (MDMR), the Maine Department of Inland Fisheries and Wildlife (MDIFW), and the National Marine Fisheries Service (NMFS).

B. Compliance Issues

On June 2, 2016, a headpond deviation occurred at the Bradbury and Spring Island impoundment due to an error made by the system operator. Subsequent low inflows extended the deviation just under 10 hours. On July 27, 2016[13], FERC determined that the incident was a violation of the WQC and license. BWPH's follow-up actions included notification of the appropriate resource agencies and implementation of measures to prevent further such occurrences. Due to BWPH's immediate follow-up actions, which included notification of the appropriate resource agencies, refresher alarm response training to the entire system control staff, a review of license requirements with operators, and a review of the training program for operators, no additional enforcement action was taken other than the notice of violation.

Although not found in the FERC docket, the application states that from January through September of 2019, four unplanned incidents occurred related to equipment malfunctions and adverse weather conditions. None were found to be a violation of the license.

7. LIHI CERTIFICATION PROCESS

BWPH submitted an initial application package for LIHI certification on February 7, 2020. On February 28, 2020, LIHI sent an intake review report which found that some minor information was missing. BWPH supplied supplemental information on March 25, 2020.

[12] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=3454581
[13] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14316735

A. Comment Letters

On April 7, 2020, LIHI filed notice on their email list that the public comment period for the application had been opened. No comments were received during the comment period which ended on June 6, 2020.

B. Agency Correspondence

On March 25, 2020, the MDEP responded to a request of BWPH concerning the March 15, 1995 WQC (Appendix A). The MDEP stated that the requirements for water quality and habitat both up and downstream of the Project remain consistent with the WQC. The March 1995 WQC, the 1994 Saco River Fish Passage Agreement (Agreement), as well as consultation with the resource agencies, continues to direct fish passage improvements completed at the Project and that are planned for future construction for the West Channel deflection wall and the East Channel flume extension. Therefore, the MDEP finds the March 1995 WQC still pertinent and essential to the Project's continued operation.

On April 7, 2020, LIHI emailed contacts[14] listed in the Project application as knowledgeable about the Project. Given that the application and supplemental information provided all supporting documentation and no other apparent issues were uncovered in my review, I did not reach out to any resource agencies.

8. CERTIFICATION REVIEW

This section contains my review of the Project with regard to the LIHI Certification criteria. As part of my review, I conducted a FERC e-library search to verify claims in the application. My review concentrated on the period since BWPH acquired the Project on June 29, 2013 through March of 2020 for FERC docket number P-2528.

A. LIHI Criterion-Flows

The goal of this criterion is to support habitat and other conditions that are suitable for healthy fish and wildlife resources in riverine reaches that are affected by the facility's operation.

The application states that the Project satisfies the LIHI flows criterion in ZOE 1 by meeting alternative standard A-1, and in ZOE 2, ZOE 3, ZOE 4 and ZOE 5 by meeting alternative standard A-2.

License Article 401 and Condition 5 of the WQC require that the Project operate in a ROR mode, while providing a base flow of 851 CFS, or inflow, whichever is less, below the confluence of the west and east channels of the Saco River. This flow was recommended by resource agencies since it approximates the historical unregulated median August flow (Aquatic Base Flow) in this portion of the Saco River.

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The Project is also required to provide water for the operation of a refuse incinerator built by the MERC in the town of Biddeford just above the West Channel Dam (ZOE2). MERC uses 138 CFS of this flow for cooling water purposes. However, when the Project is not operating, 250 CFS is passed through the headpond into the downstream reach to ensure proper dilution and mixing of condenser cooling water to meet MDEP regulations concerning thermal discharges. The Project's hydrology indicates an inflow of at least 250 CFS is always available.

ROR operation or minimum flows may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement between BWPH, USFWS and MDEP.

License Article 402 required a Minimum Flow Monitoring Plan (MFMP). The plan was approved by FERC order on May 9, 1990[15] which requires BWPH to use a computer controlled SCADA to monitor minimum flows and to record hourly readings for the Project. An annual report filing is also required.

A.1 Bradbury and Spring Island Impoundment

Flows into ZOE1 come from the Skelton Project approximately 9.6 miles upstream. The Bradbury and Spring Island dams backwater to the tailrace of the Skelton Project. The Bradbury/Spring Island impoundment is operated in a ROR mode. The impoundment is maintained at the top of flashboard elevation (49.2 FTMSL) or at the spillway crest elevation (47.2 FTMSL) if flashboards have failed. Releases from the impoundment, through either the Bradbury or Spring Island dam, enter the East and West Channel (a.k.a. Cataract) impoundment or ZOE 2.

A.2 Cataract Impoundment

Releases from the Cataract impoundment, through either the West Channel Dam (ZOE 3) or the East Channel Dam's outlet works or powerhouse (ZOE 4), combine and enter the Saco River below the Project (ZOE 5).

A.3 West Channel

Flows through the West Channel bypass reach consist of flows not utilized by the East Channel gate and powerhouse as well as the amount required to maintain headpond levels at both the East and West Channels within license limits. A continuous flow of 52 CFS is passed through the West Channel downstream fishway from April 1 to December 31 as conditions allow. An additional 50 CFS is passed through the West Channel via the upstream Denil fishway. In effect, the bypass minimum flow varies from 50 CFS to 102 CFS throughout the year. The area at the lower end of the West Channel bypass is fully tidal with a tidal fluctuation between 6 and 9 feet.

[15] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=3454581

A.4 East Channel

East Channel tailrace flows are regulated though the powerhouse, broome gate, and new rubber dam. The broome gate and rubber dam are utilized to provide flows in excess of turbine capacity and are operated to maintain minimum flows and headpond levels as required by the license. A flow of 120 CFS is continually passed through the upstream fishway. The Project's turbine flow ranges from 1,300 CFS to 2,600 CFS.

A.5 Downstream Reach

The downstream reach requires a base flow of 250 CFS from the combined flows out of the west and east reaches whenever the Project is not operating, and a base flow of 851 CFS whenever the Project is producing power.

A.6 Summary

As previously discussed, since BWPH acquired ownership of the Project, five minimum flow deviations have occurred. Of these, one was found to be a license violation by FERC due to operator error. BWPH's follow-up actions and implementation of measures will help to prevent further such occurrences.

My review indicates that BWPH has proactively operated the Project impoundments in a ROR mode and has provided required minimum flows with the few exceptions. Minimum flow recommendations are science-based. It is my recommendation the Project satisfies the flow criterion.

B. LIHI Criterion-Water Quality

The goal of this criterion is to ensure water quality is protected in water bodies directly affected by facility operations, including downstream reaches, bypassed reaches, and impoundments above dams and diversions.

The application states that the Project satisfies the LIHI flows criterion in all ZOEs by meeting alternative standard B-2.

At the request of BWPH concerning the March 15, 1995 WQC for the Project, on March 25, 2020, the MDEP stated that the Project effects on water quality and habitat both up and downstream remain consistent as outlined in the WQC. The March 1995 WQC, the 1994 Saco River Fish Passage Agreement, as well as consultation with the resource agencies, continues to direct fish passage improvements that have been constructed at the Project and are planned for future construction (West Channel deflection wall and the East Channel flume extension). Therefore, the MDEP finds the March 1995 WQC still pertinent and essential to the Project's continued operation.

This section of the Saco River is not identified as impaired in MDEP's 2018 Report (see page 17).[16] The Project meets all water quality standards for Class B waters pursuant to the Project's WQC as amended. While the uppermost reach of the Spring Island/Bradbury impoundment is classified as Class A, the hydrologic influence of the Project does not negatively affect this reach.

[16] https://www.maine.gov/dep/water/monitoring/classification/reclass/BEP_2018_ReclassProposals_ForBEP_Dec_final.pdf

The Saco River from the Spring Island and Bradbury dams upstream to the Route 95 bridge, approximately 2 miles, is Class B. Class B water is also present from the Interstate 95 bridge downstream to tidewater.

Class B waters 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.

Dissolved oxygen (DO) content of Class B waters is greater or equal to 7 parts per million or 75% of saturation, whichever is higher. From October 1st to May 14th, due to spawning and egg incubation of indigenous fish species, 7-day mean DO needs to equal or exceed 9.5 parts per million and the 1-day minimum DO needs to exceed 8.0 parts per million in identified fish spawning areas.

In my review, no water quality issues were found. The Project is operated as a ROR facility with minimal impoundment fluctuation and the Project does not appear to adversely affect water quality. It is my recommendation that the Project satisfies the water quality criterion.

C. LIHI Criterion-Upstream Fish Passage

The goal of this criterion is to ensure safe, timely and effective upstream passage of migratory fish so that the migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the Project's facilities.

The Applicant states that ZOE 1, ZOE 2, ZOE 3 and ZOE4 satisfy the LIHI upstream fish passage criterion by meeting alternative standard C-2, and ZOE 5 satisfies the criterion by meeting alternative standard C-1 since upstream passage concerns only begin upstream in ZOE 3 and ZOE 4. ZOE 1 and ZOE 2 both pass attraction flows for upstream fish passage.

There are currently anadromous fish species present in the Saco River and American eel is present in good numbers in the lower portion of the river, with unimpeded access from the ocean to the Project. Upstream fish passage facilities are present at the Project and at the upstream Skelton dam, with passage scheduled in the future at additional upstream dams. Upstream eel passage facilities are present at most dams on the river. The Saco River is managed for Atlantic salmon, river herring (alewife) and American shad as part of resource agency plans to restore these species to the Saco River. An annual report of the operations, fish numbers, status, and any other details of fish passage at these four sites is submitted to state and federal agencies for review and a final report is filed with the FERC.

License Article 403 required the construction, operation and maintenance of fish passage facilities to provide efficient upstream passage of Atlantic salmon, American shad, and alewife at the East Channel (Cataract), West Channel, Springs Island and Bradbury dams, as well as downstream passage at the Cataract and West Channel dams. The fish passage facilities were designed in cooperation with the USFWS, the MASRSC, the MDMR, the MDIFW, and the NMFS.

On March 27, 2007, the 2000-2005 Saco River Fish Passage Assessment Report (SRFPAR) and recommendations were filed as part of the 1994 Saco River Fish Passage Agreement for fish passage and fisheries management at multiple projects on the river including the Skelton Project (FERC No. 2527), Cataract Project (FERC No. 2528), Bonny Eagle Project (FERC No. 2529), Hiram Project (FERC No. 2530), and Bar Mills Project (FERC No. 2194). On July 17, 2007, FERC issued an order modifying and

approving the SRFPAR and its recommendations for fish passage and fisheries management.[17] The order recommended upstream American eel passage be operational at the East and West Channel Dams by June 1, 2008 and at the Springs Island and Bradbury Dams by June 1, 2010. Downstream eel passage was also to be operational at the East and West Channel Dams by September 1, 2011.

On March 31, 2008[18], the licensee filed the 2007 SRFPAR with USFWS and FERC. On October 31, 2008[19], FERC approved it. On March 30, 2009[20], the 2008 SRFPAR was filed and on August 20, 2009[21], FERC approved it. Similarly, the FERC docket indicates that SRFPARs were consistently filed for the years 2009[22], 2010[23], 2011[24], 2012[25]. No SRFPARs were filed for years 2013 through 2018.

On May 15, 2014[26], FERC approved a temporary four-foot drawdown at the Springs Island-Bradbury impoundment for a two-week period in June 2014 to conduct an American shad radio-tagging study, the study plan having been filed on February 6, 2014.

On September 4, 2015[27], FERC granted BWPH a time extension to May 1, 2017 for providing upstream American shad passage at the Springs-Bradbury development since the 2014 study results showed that the change in operation did not result in the required passage efficiency. BWPH stated they held consultation meetings with the resource agencies to discuss the requirement to install a Denil fish passage facility at the Springs Island dam and passage options at the Bradbury dam. The time extension was needed for further consultation and design and construction of the fishway.

On March 30, 2016[28] , FERC granted BWPH another time extension to May 1, 2018 for providing American shad upstream passage at the Springs Island-Bradbury dam. On December 11, 2015, BWPH met with the resource agencies and stakeholders to review the conceptual design of the fishway; however, it was decided that alternatives should be explored first. As a result, BWPH stated that the discussions of passage alternatives would cause a delay in the design review process.

On September 7, 2016[29], BWPH submitted another request for time extension to May 1, 2020 to provide American shad upstream passage the Springs Island-Bradbury dam. BWPH met with the agencies and stakeholders on several occasions in early to mid-2016 to discuss alternative upstream fish passage measures, ultimately reaching agreement on a nature-like fishway which necessitated an amended operational date of May 1, 2020. On November 28, 2016,[30] FERC issued a deadline extension for installation until May 1, 2018. However, FERC stated that once 30% of the basic design is completed, a request for another extension of time would be considered.

[17] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11400880
[18] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=11638104
[19] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=11847116
[20] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=11982921
[21] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12121155
[22] 2009 SRFPAR - https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12389660
[23] 2010 SRFPAR - https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12655291:1
[24]2011 SRFPAR - https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12926554
[25] 2012 SRFPAR - https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13215922
[26] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13546221
[27] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13978930
[28] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14250066
[29] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14348288
[30] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14408811

On May 1, 2018[31], BWPH filed a new request for a time extension until May 1, 2020 to install and have upstream fish passage structural improvements since the 30% design drawings for the nature like fishway were distributed to resource agencies for review and approval on February 15, 2017. On June 14, 2018, FERC granted the time extension until May 1, 2020.[32]

A 2018 Saco River Diadromous Fish Report (SRDFR) [33] was filed on March 22, 2019. On May 8, 2019, BWPH had filed a request to amend the SRFPAR.[34] The request stated that after nearly 22 years of studies, data gathering, and advancements, all parties agreed that implementation of the 2019 Amendment would better help to advance fisheries management and fish passage requirements. On July 17, 2019, FERC approved the revised Fish Passage Assessment Report.[35]

On December 18, 2019 [36], FERC accepted the October 17, 2019 BWPH filing[37] that provided construction and design details for the proposed concrete diversion wall downstream of the West Channel Dam to improve upstream fish passage at the existing Denil fish ladder. On January 31, 2020, due to construction of the new nature-like fishway at Spring Island and installation of a new rubber dam at the East Channel Dam, BWPH request a time extension until May of 2021 to finish fish passage at East Channel.[38] On February 24, 2020, FERC approved the time extension.[39]

Upstream American eel passage facilities are in place and operational at the East and West Channel Dams and the Springs Island/Bradbury Dam.

C.1 Bradbury and Spring Island Dams

The Spring Island and Bradbury impoundment is used as a migratory pathway upstream for diadromous species once they pass through the Spring Island and Bradbury fishways. The upstream Skelton Project also has upstream fish passage.

The fish locks are designed to operate at river flows up to 11,000 CFS[40] and consist of a 5-foot wide by 28-foot long lock chamber and a 5-foot wide by 11-foot long exit way. The fluctuating lock water levels allow salmon, shad, and river herring to ascend the 5.0-foot elevation difference at the dams.

The locks have a minimum water depth of 5 feet and operate with a flow of approximately 80 CFS and a fishway entrance velocity of 4 to 6 feet per second (FPS). The 80-CFS attraction flow flows through the downstream lock gate. The fish then swim through the crowder and remain in the lock chamber. During the operational cycling process, the downstream gate closes and the surface water elevation in the lock chamber is raised from 44.0 feet to 49.2 feet. The upstream gate then opens and the crowder slowly moves toward the upstream gate guiding the fish into the upstream impoundment. The upstream gate then closes

[31] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14904029
[32] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14947251
[33] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15195061
[34] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15241985
[35] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15310087
[36] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15426630
[37] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15382953
[38] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15456248
[39] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15468945
[40] 11,000 CFS is exceeded about 82 percent of the time annually.

and the crowder moves back to its original position. The discharge gate then opens, returning the surface water elevation in the lock chamber to 44.0 ft. and the downstream gate opens to complete the process.

The new nature-like fishway was constructed at the Springs Dam in 2019 and allows for fish passage both upstream and downstream. The fishway is approximately 100 feet wide by 300 feet long and consists of large boulders placed on a solid based slightly sloped ramp. This slows the river flow for fish to ascend or descend year-round.

C.2 West Channel Tailrace/Bypass Reach

The new 550-foot-long Denil fishway at the West Channel is 4 feet wide with a 1-foot vertical by 8-foot horizontal slope. The minimum depth of water in the fishway is 2.5 feet with a minimum flow of 12 CFS. The maximum attraction water flow is 33 CFS with an entrance velocity of 2 to 6 FPS.

A counting window and associated trapping structures are located near the exit of the fishway and target species can swim freely into the Cataract impoundment. A floating trash boom was installed in front of the West Channel exit to help keep floating debris from entering the fishway. The diversion wall at the West Channel dam that deflects flows away from the entrance to the fishway is expected to be completed by May 2021.

C.3 East Channel Tailrace/Bypass Reach

The fishway at the East Channel Dam consists of a lower entrance flume and crowding area, a 45-foot high fish lift or elevator, and an upper exit flume leading into the impoundment. The fishway can operate up to river flows of 11,000 CFS.[41] Upper flume water flow is 40 CFS with a velocity of 1 FPS. Total attraction flow is 80 CFS with an entrance velocity averaging 5 FPS.

A counting window and sorting, trapping, and trucking facilities are located near the exit of the upper flume. Fish can be released to swim into the Cataract impoundment or can be transported to the upstream Spring Island and Bradbury impoundment. Fish transport takes place in one of two stocking trucks assigned to the fishway. The trucks are equipped with 1,000-gallon circular, fiberglass-insulated tanks with aeration systems utilizing bottled oxygen and water pumps to circulate water in the tanks. A flume extension at the entrance to the fishway is expected to be completed by May 1, 2021.

My review found BWPH has proactively consulted with resource agencies for over 22 years on upstream fish passage issues and is nearing completion of installation of all upstream facilities. It is my recommendation that the Project satisfies the upstream fish passage criterion.

D. LIHI Criterion-Downstream Fish Passage

The goal of this criterion is to ensure safe, timely and effective downstream passage of migratory fish and for riverine fish such that the facility minimizes loss of fish from reservoirs and upstream river reaches affected by facility operations. Migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the facility.

[41] 11,000 CFS is exceeded about 82 percent of the time annually.

The Applicant states that ZOE 1, ZOE 2, ZOE 3 and ZOE4 satisfy the LIHI downstream fish passage criterion by meeting alternative standard D-2, and ZOE 5 satisfies the criterion by meeting alternative standard D-1.

American Eel

Downstream American eel passage measures, consisting of night-time shut-downs in September and October have been implemented at the Project.

On August 25, 2009, FERC accepted the April 1, 2009 filing of a 2008 Evaluation of Silver American Eel Downstream Passage report (ESAEDP).[42] The ESAEDP indicated that downstream eel passage was achieved by 82% of the sample population, and the remaining 18% either remained upstream, or likely passed downstream under high flows. Four test scenarios were developed; however, no scenario yielded 90% passage which was the targeted efficiency goal for permanent downstream eel passage measures. The study was able to draw three main conclusions on downstream eel passage at the Project:

1. Eels passing via the powerhouse forebay under 200 CFS using the broome gate set at 0.5 feet resulted in 37.5% downstream passage;
2. Eels using the same route under 400 CFS and the broome gate set to 1 foot yielded 50% downstream passage; and
3. Setting the broome gate to 1 foot does not provide effective downstream eel passage.

On March 8, 2010, FERC accepted the January 19, 2010 filing of the 2009 ESAEDP.[43] The ESAEDP indicated that no study eels could be attained, despite BWPH having secured several sources prior to the 2009 study. The agencies acknowledged that study eels were difficult to obtain in 2009 and agreed that the study should be canceled for 2009 and continued in 2010.

On March 18, 2011, FERC accepted the filing of the 2010 ESAEDP.[44] In 2010, it was decided that the best option for the near future would be to allow downstream eel passage at the East Channel Dam as suggested by the MDMR for eight-hour, eight-week nightly shutdowns from September 1 through October 31. This was offered as an interim measure until further downstream eel research could identify a more cost effective alternative.

Clupeids (shad and river herring)

On April 29, 2010, the licensee filed a downstream passage study of juvenile clupeids through the Project.[45] Due to high river flows and the absence of a flow vane and directional curtain boom, the resource agencies agreed that it would be appropriate to abandon attempts to conduct the study during the fall of 2008 and reschedule it under ideal conditions in 2009. In 2009, after several meetings, discussions, and site visits with resource agencies, a more quantitative approach for studying downstream passage effectiveness at Project was proposed. In addition to the eight-foot deep fish directional boom and the new flow vane, a floating net pen would be utilized below the bypass exit to collect and enumerate all tagged and released juvenile clupeids exiting downstream through the bypass.

[42] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12125765
[43] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12288921
[44] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12590596
[45] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12342128

A floating net pen was installed at the bypass exit within the Cataract tailrace in an attempt to collect out-migrating juvenile clupeids passed through the bypass. Turbulence in the tailrace and heavy flows through the bypass quickly destroyed the floating collection net pen ending the study for 2009. The study was repeated in 2010 and on March 16, 2011, that study report was filed.[46] In 2010, a more "quantitative" approach to try to establish juvenile clupeid bypass efficiency utilized a very small prototype 13-mm half duplex PIT tag. Although 1,000 tags were anticipated to be used, only 50 were acquired. In addition, approximately 850 juvenile clupeids were tagged with visual tags in an attempt to observe movement and behavior.

On January 25, 2012, the licensee filed the 2011 downstream passage study report.[47] In 2011, 1,000 13-mm half duplex pit tags were acquired to complete the study as designed in 2010. In mid-August 2011, monitoring equipment was installed and calibrated and extensive efforts began to acquire study fish. Daily observations began on the Kennebec, Sebasticook, and Saco rivers in an attempt to capture juvenile clupeids for the study. No fish were observed until August 28, 2011 when Tropical Storm Irene passed through the Northeast creating high water and flood conditions throughout the state. The majority of the juveniles were flushed out during this time. Observations continued throughout the fall; however, river flows remained too high to conduct the study.

On March 29, 2013, the licensee filed the 2012 downstream passage study report.[48] Again, flow conditions were too high to conduct the study. Based on the repeated failure to obtain usable site-specific data, but the strong suggestive evidence that there are not significant downstream passage issues at the Project, a proposal was made to defer further studies of juvenile clupeids until technology improvements become available, or until there is an observed or noted indication of juvenile clupeid passage concerns at the Project. On March 25, 2013, USFWS, NMFS, MDEP, and MDMR all concurred that adequate attempts to implement studies to determine downstream passage of juvenile clupeids through the Project had been made and no further studies would be required (Appendix A).

Kelts (post-spawned salmon)

On January 27, 2011, the licensee filed the Phase 1 Saco River Kelt Passage Evaluation (SRKPE).[49] This study was designed to determine which dam on the river has the greatest potential to delay or adversely affect downstream kelt passage. The Skelton Dam ranked highest among the five dam study sites, primarily due to its lack of spillway passage potential, height, and depth of gates.

On July 27, 2011, the licensee filed the Phase 2 SRKPE report.[50] USFWS commented that due to the limited number of study fish proposed for the testing, and the focus on two of the six dams, the study should be considered a pilot study and not a comprehensive evaluation of the effectiveness of the downstream passage facilities on the Saco River. The USFWS also reserved authority to require additional studies of kelt passage effectiveness if necessary.

[46] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12588060
[47] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12874309
[48] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13219649
[49] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12547104
[50] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12715007

On June 4, 2013, FERC accepted the March 29, 2013 filing of the 2012 Saco River Kelt Passage Evaluation Update.[51] The update stated that Atlantic salmon returns had been very low in 2012 with only eight fish available for radio-tagging. Since the study plan required 20-30 adult salmon to be tagged, the study was abandoned in 2012.

There currently are no generation facilities operating at the Bradbury and Spring Island dam locations and no requirement for specific downstream passage at those dams. Historically, downstream passage from the Cataract impoundment has been provided by a sluice gate in the West Channel next to the West Channel fishway exit and by a sluice gate at the East Channel forebay area located between the spill gate and the powerhouse intake. Both gates can pass 52 CFS at full pond. In 2019, a new nature-like fishway was constructed at the Springs Dam. The fishway is approximately 100 feet wide by 300 feet long and consists of large boulders placed on a solid, slightly sloped ramp. This slows the river flow for fish to ascend or descend year-round. All other downstream flows are passed through spill gates or over the dams to allow for fish downstream migration into the Cataract impoundment.

My review found no current issues pertaining to downstream fish passage and BWPH has proactively consulted with resource agencies on downstream fish passage measures. It is my recommendation that the Project satisfies the downstream fish passage criterion.

E. LIHI Criterion-Shoreline and Watershed Protection

The shoreline and watershed protection criterion is designed to ensure that sufficient action has been taken to protect, mitigate or enhance environmental conditions of soils, vegetation, and ecosystem functions on shoreline and watershed lands associated with the facility.

The Applicant states the LIHI shoreline and watershed protection criterion in all ZOEs are satisfied by meeting alternative standard E-1.

No shoreline management plan is required for the Project. Lands within the Project boundary for all ZOEs are limited to required Project operations. The southern portion of ZOE 1 and ZOE 2 and ZOE 3 are within the cities of Saco and Biddeford, Maine that are heavily developed with businesses and apartment buildings. Lands within the Project boundary of ZOE4 located below the East Channel Dam are also heavily developed within the city consisting of businesses and apartment buildings. There are no critical habitats or other lands of significant ecological value associated with the Project.

My review found no issues pertaining to shoreline and watershed protection and with ROR operations, the Project does not adversely impact shorelines around the impoundments. It is my recommendation that the Project satisfies the shoreline and watershed protection criterion.

[51] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13274336

F. LIHI Criterion-Threatened and Endangered Species

The threatened and endangered species protection criterion is designed to ensure that the facility does not negatively impact state or federally-listed threatened or endangered species.

The Applicant states the LIHI threatened and endangered species criterion is satisfied in all ZOEs by meeting alternative standard F-2. This review finds that standard F-3, Recovery Planning and Action is more appropriate for sturgeon as discussed below.

The Atlantic Salmon Gulf of Maine distinct population segment (DPS) is listed as endangered under the Federal Endangered Species Act (ESA).[52] The Saco River is not identified as critical habitat for the DPS nor are Saco River Atlantic salmon listed under the ESA.

The Atlantic sturgeon Gulf of Maine DPS is listed as threatened under the ESA.[53] The Atlantic sturgeon New York Bight DPS, Chesapeake Bay DPS, South Atlantic DPS, and Carolina DPS, and the short-nose sturgeon are also listed as endangered under the ESA. NMFS issued a recovery plan for short-nose sturgeon in 1998[54] and recovery plans are currently under development for Atlantic sturgeon.[55]

On January 3, 2017, BWPH filed a biological assessment and handling and protection plan for short-nose and Atlantic sturgeon.[56] On September 5, 2017, NMFS provided a biological opinion to FERC regarding the proposed amendment of the license to incorporate a sturgeon protection and handling plan.[57] NMFS stated that continued operation of the Project may adversely affect, but is not likely to jeopardize the continued existence of short-nose sturgeon or the Gulf of Maine DPS of Atlantic sturgeon. Additionally, since there is no critical habitat identified for these species in the Project area, the Project will not have a significant effect on the species. On October 17, 2018, FERC approved a NMFS-modified Short-nose and Atlantic Sturgeon Handling and Protection Plan (SASHPP).[58] Consistent with the consultation requirements of Section 7 of the Endangered Species Act, BWPH is consulting with NMFS to ensure that the Project appropriately addresses Atlantic and short-nose sturgeon needs.

BWPH consulted with USFWS on December 14, 2018 regarding known Northern long-eared bat hibernaculum and known maternity roost sites within ¼-mile, and within 150 feet, respectively, of the Cataract Dam. USFWS did not identify any hibernaculum or maternity roost sites within the Project area. The Northern long-eared bat is also listed as a state-endangered species by the MDIFW.

A USFWS report dated December 9, 2019 identified the Northern long-eared bat, the piping plover and red knot birds, and the small whorled pogonia plant as federally-threatened species (see application supplemental information). Both bird species are tidal/marine shoreline birds that may be present in the tidal reach downstream of the Project. However, the Project's ROR mode is unlikely to affect these species. The small whorled pogonia is an upland species and unlikely to be found within the Project boundary.

[52] https://www.fisheries.noaa.gov/resource/map/atlantic-salmon-critical-habitat-gulf-maine-dps
[53] https://www.fisheries.noaa.gov/action/initiation-5-year-review-endangered-new-york-bight-chesapeake-bay-carolina-and-south
[54] https://repository.library.noaa.gov/view/noaa/15971
[55] https://www.fisheries.noaa.gov/resource/document/recovery-outline-atlantic-sturgeon-distinct-population-segments
[56] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14456868
[57] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14673448
[58] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15074715

There is no USFWS designated critical habitat for the Northern long-eared bat in the Project area and the Project does not anticipate the need for tree removal.

The Maine Natural Areas Program (MNAP) reviewed the proposed Project area on October 29, 2018 and identified that there are no rare botanical features identified within the Project area.

My review found no issues pertaining to threatened and endangered species. The Project is in compliance with the sturgeon handling and protection plan and is unlikely to affect other listed species. Based on the information provided, it is my recommendation that the Project satisfies the threatened and endangered species protection criterion.

G. LIHI Criterion-Cultural Resource Protection

The cultural and historic resource protection criterion is designed to ensure that the facility does not unnecessarily impact cultural and historic resources associated with the facility's lands and waters, including resources important to local indigenous populations.

The application states the LIHI cultural and historic resources criterion in all ZOEs is satisfied by meeting alternative standard G-1.

The FERC Environmental Assessment included in the Project license noted that there were 11 sites listed on the National Register of Historic Places and mill buildings on Factory Island adjacent to the Project were eligible for listing at that time. FERC further stated that there were likely to be archaeological sites dating from 1630 when the river was first settled by Europeans.

License article 406 states that before starting any ground-disturbing activities within Project boundaries, the state's Historic Preservation Officer (SHPO) needs to be consulted and a cultural resource management plan be prepared if necessary.[59] Also, on page 41 of the license, the SHPO concluded in a February 25, 1986 letter that continued operation of the Project would have no effect on any structure, site, building, district, or object listed or eligible for listing on the National Register.

During the period of review (June 29, 2013, through March of 2020), BWPH corresponded with the Maine Historical Preservation Commission (MHPC) on two occasions. On October 25, 2013, BWPH contacted the MHPC requesting their review of a change in work scope requiring a temporary drawdown of the Cataract impoundment. BWPH asked the MHPC to confirm that the work performed would not create an adverse impact on the cultural or historical resources of the Project. On April 30, 2014 (Appendix A), the SHPO notified FERC that their review of the revised work scope was in compliance with all license requirements regarding cultural resource protection and that no issues pertaining to cultural and historical resources protection were identified.

On March 12, 2019 (Appendix A), the MHPC responded to BWPH's March 1, 2019 request that they review the proposed construction of the Springs Dam nature-like fishway. The SHPO stated they had reviewed the information and concluded the fishway construction would have no adverse effect upon historic properties.

[59] See page 13 of FERC License - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12797021

BWPH has proactively consulted with resource agencies pertaining to cultural and historical matters and appears to be in compliance with related license requirements. It is my recommendation that the Project satisfies the cultural and historic resources protection criterion.

H. LIHI Criterion-Recreation

The goal of this criterion is to ensure that recreation activities on lands and waters controlled by the facility are accommodated and that the facility provides recreational access to its associated land and waters without fee or charge.

The Applicant states the LIHI recreation criterion in ZOE 1, ZOE 3, ZOE4 and ZOE5 are satisfied by meeting alternative standard H-2 and in ZOE 2 by satisfying alternative standard H-1.

The Applicant states the Project's developments are in compliance with recreational access, accommodation, and facility conditions in the FERC license. Recreation facilities in the Project vicinity include the following:

- The Diamond Riverside boat launch is located approximately ½ mile upstream of the Spring Island and Bradbury Dams (ZOE 1) on the east side of the river in the City of Saco. It is a concrete plank ramp with parking available for six vehicles with trailers along with parking spots for four additional vehicles. Day use is low to moderate in the summertime. It is owned and operated by the City of Saco and free to the public.
- Rotary Park beach is a city-owned and operated beach area located one mile upriver from the Spring Island and Bradbury Dams (ZOE 1) on the west side of the river in the City of Biddeford. A large parking lot is available for residents and a life guard is hired by the City for the busy summer months.
- Rotary Park boat launch is approximately one mile upriver from the Spring Island and Bradbury dams (ZOE 1, upstream but adjacent to the beach area) on the west side of the river in the City of Biddeford. It is a shallow concrete plank ramp and has parking available for 12 to 15 vehicles with trailers as well as parking for many other vehicles. It is owned and operated by the City of Biddeford and open to the public free of charge.
- A trail is available to the public near the East Channel for fishing on the east side of the tailrace (ZOE 4). The trail is located behind the Cataract fishway office and can be accessed from the lower part of Factory Island. The area is lightly utilized for fishing in the spring and early summer. The end of the trail next to the river is within the Project boundary but the majority of the trail is outside the boundary.
- A fishing trail is located on the east side of the Cataract tailrace area (ZOE 4 & ZOE 5) starting just below the dam and extending 600 feet downstream along the river. The trail is maintained by a private trail club and the City. The trail is used heavily for fishing during the spring and summer. Access is provided to the public and parking is located in downtown Saco.
- Route 5 carry-in access is located approximately halfway between the Cataract and Skelton projects (ZOE 1 - 4.5 miles upstream of Cataract). It is constructed of granite steps extending down about 15 feet to the river's edge. The access was developed by the Maine Department of Transportation (MDOT). The site gets moderate use during the spring, summer, and fall and provides parking for 8 vehicles. There is no trailer access.

- Poor's Island is a public recreation area located above the Cataract East Channel dam and below the Spring Island dam adjacent to ZOE 2 on the east side of the river. A covered footbridge provides access to the small island for picnicking, and other day use activities. This island access is provided and maintained by the City of Saco. There is no boating, canoeing or other water recreation in this area. Parking is public in the Saco downtown area.
- A boat launch on the east side of the river and below the East Channel Dam next to the Saco Yacht club (ZOE 5) is an improved concrete plank ramp available free to the public. Although it can support large trailered boats, it is still completely tidally influenced and can be shallow at a low tide. It is owned and maintained by the City of Saco and outside of the Project boundary. Use is moderate in the spring summer and fall. Parking for about 8 trailered vehicles is available, along with roadside parking for others.

License article 407 requires BWPH to monitor recreational use of the Project area, above and below the Project dams, to determine whether existing recreational facilities are meeting recreational needs. A Recreation Monitoring Plan was approved by FERC on June 28, 2004.[60] Recreational monitoring studies consist, at a minimum, of annual recreation use data (using recreation days as the unit of measure) and meetings with consulted agencies every 5 years.

Recreation Facility Monitoring Reports for the Project were filed in October 2002; April 2009; and April 2015. FERC's latest acknowledgment to the report filing was on November 30, 2015.[61] The next Recreation Facility Monitoring Report is due April 2021.

FERC's most recent Environmental Inspection Report was issued on December 28, 2016 for the Project and the inspection was conducted on September 8, 2016. The report identified the following requirements related to recreation resources within the Project lands:

- BWPH was to review the FERC Form 80 report for the Spring Island Development and the West Channel Development to determine if the roadside parks are Project facilities.
- BWPH was to replace the signage at the Spring Island boat ramp and repair the Bradbury Lake Boat Ramp.

The signage was replaced by December 31, 2016. Repairs to the Bradbury Lake Boat Ramp, also outside of the Project boundary, were completed on November 11, 2016. No follow up actions were identified for the Bradbury or West Channel Developments recreational facilities.

There is no formal recreational access to ZOE 2 - Cataract impoundment, ZOE 3 - West Channel bypass reach or ZOE 4 - East Channel tailrace. Public access within ZOE 5 is limited to the boat launch on the east side of the river and below the East channel Dam next to the Saco Yacht club.

[60] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=10178065
[61] https://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=14057762

BWPH appears to be in compliance with the license recreational access, accommodation, and facility conditions. My review found no issues pertaining to recreational resources and where available, access is provided without fees. Therefore, it is my recommendation that the Project satisfies the recreational resources criterion.

9. RECOMMENDATION

A review of the certification application and supporting documentation, and a search of the FERC docket shows that BWPH has successfully complied with the FERC license articles and other requirements. BWPH operates and maintains the Project to support applicable environmental resources and the Project satisfies the LIHI criteria as discussed in the sections above. I recommend that the Project be certified for a five (5) year term with the following condition:

> **Condition 1:** The facility Owner shall provide documentation in annual LIHI compliance submittals that the West Channel diversion wall and the flume extension at the entrance to East Channel fishway are completed and operational no later than May 1, 2021; or if not completed by that time, the Owner shall provide a report on the status of the project including resource agency consultation and a timeline for completion of the project.

Gary M. Franc

FRANC LOGIC

Licensing & Compliance
Hydropower Consulting & Modeling

APPENDIX A

DOCUMENTS

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

GERALD D. REID
COMMISSIONER

March 25, 2020

RE: LOW IMPACT HYDROPOWER INSTITUTE APPLICATION FOR CERTIFICATION FOR THE CATARACT HYDROELECTRIC PROJECT (FERC NO. 2528)

To whom it may concern:

The Cataract Project (FERC No. 2528) (Project) is an existing hydroelectric generating project located on the Saco River, in the Cities of Saco and Biddeford and the Towns of Buxton and Dayton, in York County, Maine. The Project includes the Cataract East and West Channel Dams, the Bradbury Dam and the Springs Dam. The Cataract East and West channel dams create an impoundment which extends upstream approximately 0.3 miles and has a surface area of approximately 14 acres at a normal full pond elevation of 44 feet (USGS). The Springs and Bradbury dams together create an impoundment with a surface area of approximately 360 acres at a full pond elevation of 49.2 feet. The impoundment extends upstream about 9.3 miles to the tailrace of the Skelton Dam, which is also licensed to the applicant.

As requested for LIHI Certification of the Project, the Department of Environmental Protection (the Department) has reviewed the Water Quality Certification (WQC) issued on November 29, 1989 (L-016084-33-A-N) and the WQC Amendment issued March 15, 1995 (L-016084-33-I-M). The 1989 WQC is associated with the re-licensing of the Cataract Project and this Order initially established conditions for certification and relicensing including, recreation facilities, fish passage facilities, fish passage studies, water levels of the impoundment, minimum flows and maintenance drawdowns. The subsequent Amendment issued in March 1995 modified conditions of the original WQC and incorporated the provisions of the 1994 Saco River Fish Passage Agreement in to the existing WQC. The Saco River Fish Passage Agreement (Agreement) is an agreement between the licensee, state and federal resource agencies, and other stakeholders whose priorities include volitional passage of anadromous and catadromous fish species up and downstream of the Project. The Agreement incorporated various specifications for future fish passage improvements, including funding, construction of new fish passage facilities as well as improvements to existing facilities at the Cataract Project. It also required effectiveness testing of new facilities and fish passage improvements.

The November 1989 WQC established a baseline for understanding environmental impacts of Project operations. To date, Project operations have remained consistent as directed by the 1989 WQC, and therefore, Project impacts on water quality and habitat both up and downstream remain consistent as outlined in this WQC. The March 1995 WQC, the Agreement, as well as consultation with the resource agencies, continues to direct fish passage improvements that have been constructed at the Project (the Springs Dam Nature-like Fishway) and are planned for future construction (the West Channel Deflection Wall and the East Channel Flume

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AUGUSTA, MAINE 04333-0017
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PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

website: www.maine.gov/dep

Extension). Therefore, the Department finds that the November 29, 1989 (L-016084-33-A-N) and the WQC Amendment issued March 15, 1995 (L-016084-33-I-M) are pertinent and essential to the Project's continued operation.

Please feel free to contact me at (207) 446-1619 or via email at Christopher.Sferra@maine.gov if you have any questions regarding this Project. Sincerely,

Christopher O. Sferra, Project Manager

Bureau of Land Resources

Maine Dept of Environmental Protection

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

PAUL R. LEPAGE
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

April 30, 2014

Mr. Joseph Enrico
US Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

P-2528-084

Project: MHPC# 0614-14 – Cataract Project; Saco River Basin; temporary drawdown of impoundment

Town: Biddeford, ME

Dear Mr. Enrico:

In response to your recent request, I have reviewed the information received March 31, 2014 to initiate consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

Based on the information submitted, I have concluded that there will be **no historic properties affected** by the proposed undertaking, as defined by Section 106.

Please contact Robin Reed of our staff if we can be of further assistance in this matter.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
Deputy State Historic Preservation Officer

cc. Kevin Bernier, Brookfield Renewable Energy Group

PHONE: (207) 287-2132

FAX: (207) 287-2335

MAINE HISTORIC PRESERVATION COMMISSION
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JANET T. MILLS
GOVERNOR

KIRK F. MOHNEY
DIRECTOR

March 12, 2019

Ms. Kelly Maloney
Brookfield Renewable
Great Lake Hydro America, LLC
150 Main Street
Lewiston, ME 04240

Project: MHPC# 0278-19 Cataract Hydroelectric Project; FERC 2528
Springs Dam Nature-Like Fishway Project

Town: Saco, ME

Dear Ms. Maloney:

In response to your recent request, I have reviewed the information received March 1, 2019 to continue consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

Based on the information submitted, I have concluded that the proposed undertaking will have **no adverse effect** upon historic properties (architectural or archaeological), as defined by Section 106.

Please contact Megan Rideout at (207) 287-2992 or megan.m.rideout@maine.gov 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

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

PAUL R. LEPAGE
GOVERNOR

PATRICK C. KELIHER
COMMISSIONER

March 25, 2013

Matthew LeBlanc
NextEra Energy Resources
26 Katherine Drive
Hallowell, Maine, 04347

RE: Downstream Passage Evaluation for Juvenile Clupeids at the Cataract Project (FERC No. 2528) on the Saco River, Saco ME

Dear Matt:

This letter is a joint response from the Maine Department of Marine Resources (MDMR), the U.S Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS) regarding the Downstream Passage Evaluation for Juvenile Clupeids at the Cataract Project (FERC No. 2528) on the Saco River, Saco ME, dated January 2013.

Pursuant to the *Saco River Fisheries Assessment Agreement* (2007 Agreement), NextEra Energy Resources (NextEra) was to conduct a two-year semi-quantitative study of downstream passage effectiveness for clupeids at the Cataract project (FERC No. 2528). After consulting with the resource agencies (MDMR, USFWS, and NMFS), NextEra conducted a field study in 2007 and 2008 that was not successful. After additional consultation with the resource agencies, NextEra conducted a pilot study in 2010 to determine whether radio frequency identification (RFID) technology could be used to assess downstream passage of juvenile clupeids. In 2012, NextEra conducted a full-scale evaluation of downstream passage effectiveness for juvenile clupeids at the Cataract Project using RFID technology. The study showed that use of the bypass by juvenile clupeids during four releases was relatively low (23.3%, >1%, 8.1%, and 4.8%). However, the results were confounded by the nighttime shutdowns (8PM to 4AM from September 1 through October 31) that occurred at the Cataract Project to reduce turbine passage and mortality of emigrating adult American eel.

The MDMR, USFWS, and NMFS believe that the nightly shutdowns for American eel also provide downstream passage for emigrating juvenile clupeids, but the agencies are not aware of semi-quantitative methods that could be used to test the effectiveness of this strategy for passing juvenile clupeids. Therefore, as long as the shutdowns continue, the MDMR, USFWS, and NMFS believe that no additional studies of downstream passage effectiveness for clupeids at the Cataract project (FERC No. 2528) are warranted.

If you have any questions please contact gail.wippelhauser@maine.gov or 207-624-6349.

Sincerely,

Gail Wippelhauser

Gail Wippelhauser
Marine Resources Scientist

Cc: Steven Shepard, USFWS
Sean Mc Dermott, William McDavitt, NOAA
Kathy Howatt, DEP
Steve Walker, MDIFW