Brookfield
Renewable N.A.

October 1, 2026

VIA E-FILING

Debbie-Anne A. Reese
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: **Brunswick Hydroelectric Project (FERC No. 2284)**
Draft License Application

Dear Secretary Reese:

Brookfield White Pine Hydro LLC (BWPH) is in the process of relicensing the Brunswick Hydroelectric Project (FERC No. 2284), (Project), with the Federal Energy Regulatory Commission (FERC or Commission). The Project is located on the Androscoggin River in the towns of Topsham and Brunswick, Maine, and straddles the border between Cumberland and Sagadahoc counties. The FERC license expires on February 28, 2029. BWPH commenced the licensing process by filing its Notice of Intent (NOI) and Pre-Application Document (PAD) on February 21, 2024. BWPH is utilizing the Commission's Integrated Licensing Process (ILP).

Pursuant to the Commission's regulations at 18 C.F.R. § 5.16(c), BWPH herein files the Draft License Application (DLA) for the Project. The DLA consists of the following exhibits:

- Initial Statement
- Exhibit A – Project Description
- Exhibit B – Project Operation and Resource Utilization
- Exhibit C – Construction History
- Exhibit D – Statement of Costs and Financing
- Exhibit E – Environmental Report
- Exhibit F – General Design Drawings and Supporting Design Report
- Exhibit G – Project Maps
- Exhibit H – Description of Project Management and Need for Project Power

The draft Exhibit F contains Critical Energy Infrastructure Information (CEII) and will be filed under separate cover. In accordance with 18 C.F.R. § 5.16(e), relicensing participants may submit comments regarding the DLA to FERC within 90 days of this filing (i.e., December 30, 2026).

BROOKFIELD WHITE PINE HYDRO LLC
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If there are any questions or comments regarding the DLA, please contact me by phone at (315) 566-0197 or by email at Michael.Scarzello@brookfieldrenewable.com.

Sincerely,



Michael Scarzello
Manager, Licensing
Brookfield Renewable

Attachment: Draft License Application

cc: Distribution List

DISTRIBUTION LIST
Brunswick Hydroelectric Project (FERC No. 2284)
Draft License Application

I, Michael Scarzello, Manager, Licensing, Brookfield Renewable, hereby certify that copies of the foregoing document have been transmitted to the following parties on October 1, 2026.



Michael Scarzello
Manager, Licensing

October 1, 2026

One copy, via e-filing to:

Ms. Debbie-Anne Reese, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Dockets Room
Washington, D.C. 20426

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Draft License Application

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Brunswick Project (FERC No. 2284)
Draft License Application

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BROOKFIELD WHITE PINE HYDRO LLC

DRAFT LICENSE APPLICATION

VOLUME I: PUBLIC

BRUNSWICK HYDROELECTRIC PROJECT (FERC No. 2284)



Submitted by:

Brookfield White Pine Hydro LLC
460 Civic Center Drive
Augusta, ME 04330

Brookfield
Renewable N.A.

October 2026

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

DRAFT APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

CONTENTS

This Application for New License for the Brunswick Hydroelectric Project (FERC No. 2284) consists of the following:

Initial Statement
Exhibit A – Project Description
Exhibit B – Project Operation and Resource Utilization
Exhibit C – Construction History and Proposed Construction Schedule
Exhibit D – Statement of Costs and Financing
Exhibit E – Environmental Report
Exhibit F – General Design Drawings and Supporting Design Report
(CEII; filed with FERC under separate cover)
Exhibit G – Project Map
Exhibit H – Description of Project Management and Need for Project Power

EXHIBIT A
PROJECT DESCRIPTION

October 2026

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT A
PROJECT DESCRIPTION

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LIST OF ABBREVIATIONS AND DEFINITIONS

acre-ft.	acre feet
BWPH	Brookfield White Pine Hydro LLC
Brunswick Project	Brunswick Hydroelectric Project (FERC No. 2284)
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
FERC	Federal Energy Regulatory Commission
ft.	feet / foot
hp.	horsepower
Hz	Hertz
KVA	kilovolt-ampere
kW	kilowatt
MDMR	Maine Department of Marine Resources
mi^2	square mile
MW	megawatt
NGVD29	National Geodetic Vertical Datum of 1929
RM	river mile
rpm	revolutions per minute
V	voltage

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT A
PROJECT DESCRIPTION

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH) owns and operates the Brunswick Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC or the Commission) Project No. 2284. The 19-megawatt (MW) Project is located on the Androscoggin River in the Towns of Topsham and Brunswick, Maine (ME). The Project straddles the border between Cumberland and Sagadahoc counties.

The Project is the first dam on the mainstem of the Androscoggin River at the head-of-tide located at approximately river mile (RM) 6. The dam and powerhouse span the Androscoggin River immediately above the U.S. Route 201 bridge connecting Topsham and Brunswick, ME, at a site originally known as Brunswick Falls. In total, the Project is the first of 22 hydroelectric projects on the mainstem Androscoggin River. The drainage area at the Project is 3,437 square miles (sqm) while the average annual inflow to the Project is approximately 7,018 cubic feet per second (cfs). The Project boundary extends approximately 4.5 miles upstream to the Pejepscot Dam and encompasses a total of approximately 348 acres.

Table 1-1 provides a summary of pertinent Project information.

Table 1-1: General Project Information

General Information	
Owner	Brookfield White Pine Hydro LLC
FERC Project Number	2284
Current License Term	March 1, 1979 – February 28, 2029
Counties	Sagadahoc, Cumberland
General	
Nearest Town(s)	Topsham, Brunswick
River	Androscoggin
Drainage Area	3,437 mi^2
Normal Full Pond Elevation	39.4 ft.[1]
Normal Tailwater Elevation	2.5 ft.
Impoundment Length	11.5 miles
Gross Storage	125 acre-ft.
Surface Area at Normal Full Pond	175 acres
Average Annual Inflow at Brunswick Project	7,018 cfs
Structures	
Dam	Brunswick
Construction	Concrete gravity
Total Length	830 ft.
Total Height	40 ft.
Spillway Length	510 ft.
Powerhouses	1 (constructed in1983)
Turbine / Generator Units	3 units
Turbine Manufacturer / Type	1 vertical-shaft, fixed blade propeller 2 horizontal shaft, fixed blade propeller tubular
Turbine Capacities	Unit 1: 5,075 cfs Unit 2: 1,200 cfs Unit 3: 1,200 cfs Total: 8,600 cfs

[1] Unless otherwise noted, all elevations referenced in this license application refer to the National Geodetic Vertical Datum of 1929 (NGVD29), U.S. feet.

Generator Capacities	Unit 1: 12,600 kW Unit 2: 3,500 kW Unit 3: 3,500 kW
Total Authorized Installed Capacity	19 MW

2 PROJECT STRUCTURES

2.1 Existing Structures

Existing Project structures generally consist of a dam, spillway, fish passage facilities, a powerhouse, an interconnection with the local utility's transmission system, and ancillary equipment. Figure 2.1-1 depicts the general Project layout.

2.1.1 Dam and Spillway

Brunswick Dam is a concrete gravity structure with a total length of 830 feet (Figure 2.1.1-1). The dam consists of a 135-foot-long intake/powerhouse section with a top elevation of 55 feet, a 510-foot-long uncontrolled spillway section with a crest elevation of 39.4 feet, an 80-foot-long gate section with two 32.5-foot-wide by 22-foot-high Tainter gates with sill elevations of 20.0 feet, a 48-foot-wide emergency spillway section with a crest elevation of 39.4 feet, and 57-foot-long, non-overflow section with a top elevation of 55 feet.

The right spillway section (looking downstream) is approximately 188-feet-long, and the current license allows for the installation of wooden flashboards that are 2.6-feet-high on this section of the spillway. These flashboards are designed to prevent spill from entering the tailrace below this location so as not to attract upstream migrants to this location. The left spillway section is approximately 322-feet-long and does not have flashboards. A 2-foot-wide concrete pier separates the two spillway sections. Immediately to the south of the spillway pier is a 21-foot-high and 170-foot-long concrete retaining wall that separates the tailrace area from the ledge area below the spillway. Figure 2.1.1-2 provides s photo of the Tainter gates and emergency spillway sections for the Project.

2.1.2 Intake Structure

The concrete intake structure (Figure 2.1.2-1) is integral with the dam and is located on the right bank of the river (Brunswick shoreline) and is approximately 110 feet long and has a maximum height of 65 feet, and the top elevation of intake structure deck is 55.0 feet.

The trashracks for Unit 1 consist of three separate panels covering the intake openings. Each steel panel has 3.5-inch clear spacing on the trashrack. The trashracks panels have a top elevation of 26.85 feet, and extend down to an elevation of -12.38 feet. Each panel is approximately 12 feet wide. The upstream fish passage facility exit flume leading to the impoundment is located near the Unit 1 intake. There is one 10-foot wide by 12.25-foot high trashrack with clear spacing

of 5.75 inches at the flume's exit. The top elevation of this trashrack is 55.0 feet, and the bottom elevation is 32.75 feet.

The trashracks for Units 2 and 3 consists of one panel per unit. Each steel panel has 3.5-inch clear spacing on the trashrack. The trashracks panels have a top elevation of 55.0 feet and extend down to an elevation of 20.0 feet. Each panel is approximately 17 feet wide. The sluice opening for the downstream fish passage facility is located near the Unit 2 and 3 intake. The trashrack over the opening is approximately 3.5-feet-wide with a top elevation of 55.0 feet, and a bottom elevation of 33.0 feet.

The trashracks are cleaned with using a motor-operated trash rake from a concrete deck.

2.1.3 Powerhouse

The powerhouse, constructed in 1983, (Figure 2.1.3-1) is integral with the dam and located on the right bank of the river. It is approximately 125-feet-wide and 135-feet-long and constructed of brick masonry and concrete. The powerhouse contains one vertical and two horizontal propeller turbine generators. A mobile crane with a capacity of approximately 120 tons is used for dismantling and servicing the turbine-generators, stop logs, and other equipment.

2.1.4 Tailrace

Water discharges through the powerhouse into a tailrace (Figure 2.1.4-1) with a maximum depth of approximately 12 feet, a width of approximately 96 feet, and a length of approximately 300 feet. The tailrace is formed in excavated rock and has a U-shape cross section. The normal tailwater elevation is 2.5 feet. Figure 2.1.4-2 contains the tailwater rating curve for the Project.

2.1.5 Fish Passage Facilities

2.1.5.1 Upstream Fish Passage Facilities

Upstream fish passage at the Project is provided via a vertical slot fishway that is parallel to the tailrace and adjacent to the south side of the powerhouse (Figure 2.1.4-1). The upstream fishway is typically operated between May 1 and November 15, as conditions allow, however, the exact timing is determined annually in consultation with resource agencies.

The upstream fishway is owned and maintained by BWPH and, under prior agreement, Maine Department of Marine Resources (MDMR) personnel operate the fishway each season during the peak of the river herring (i.e., sea-run alewives and blueback herring) and American shad run. A formal agreement for shared operations of the fishway was established in December 1977 but was terminated by MDMR by letter dated November 21, 2016. BWPH and MDMR have an interim informal agreement where MDMR voluntarily operates the fishway from May 1 to July 31 annually, and BWPH operates it for the remainder of the fish passage season.

The fishway and associated trap and sort facility were installed in 1983. The fishway is 570-feet-long and consists of 42 individual pools, each pool is 8.5-feet-wide and 10-feet-long, with a 1-foot drop between each pool and a 1:10 slope in a switchback configuration. The fishway is designed to pass American shad, river herring, and Atlantic salmon. The trapping facility, located at the upstream end of the fishway, provides MDMR or BWPH staff the opportunity to trap and truck (or volitionally pass) river herring, American shad or Atlantic salmon, sort undesirable fish, and to collect data on migratory and resident fish species that use the fishway. As fish swim to the top of the fishway, fixed grating guides them past a viewing window and into a 500-gallon capacity fish hoist (trap). The hoist elevates the fish to overhead sorting tanks where MDMR or BWPH staff sort and either sluice into tanks for transport or pass fish upstream via a concrete exit flume leading to the headpond. There is one 10-foot wide by 12.25-foot high trashrack with clear spacing of 5.75 inches at the flume's exit.

The fishway flows consist of approximately 30 cfs passing downstream through the fishway with an additional 70 cfs passed via a gravity fed pipe from the headpond to a diffusion area at the lower end of the fishway for a total flow of 100 cfs. An electric Rotork operator located at the fishway entrance is automated to pass all fishway flows (~100 cfs) over the entrance gate with an approximate 0.75-foot drop during all tidal levels with a 0.25-foot dead band to not operate inside of every 10 minutes. The fishway is typically operated up to a river flow of approximately 20,000 cfs.

Although the vertical slot fishway is designed to run volitionally, BWPH does not operate it in a volitional manner to prevent the passage of invasive species.

Downstream of the dam spillway, the riverbed consists of broad ledges interspersed with one large pool and a few smaller pools (Figure 2.1.1-1). The Project also has a fish barrier wall located between the dam and Shad Island and a concrete cap over the ledges at the southern end of the spillway section. These structures were installed in the 1980s to prevent fish from accessing the spillway section and to prevent spill from entering the tailrace and interfering with fish attraction to the fishway. The ledge is approximately 520-feet-long, 15-feet-wide, and 6-feet-high (at high tide). This barrier serves to prevent fish from being drawn up into the ledges near the spillway portion of the dam during periods of spill.

2.1.5.2 Downstream Fish Passage Facilities

Downstream fish passage is provided at the Project via a surface sluice (Figure 2.1.2-1) and associated 18-inch diameter pipe (Figure 2.1.5.2-1). located between Units 1 and 2. The pipe has an attraction and conveyance flow of approximately 20 cfs and passes through the powerhouse and discharges into the Project tailrace. The existing sluice gate and pipe were installed in 1983. The trashrack covering the sluice opening is approximately 3.5-feet-wide with a top elevation of 55.0 feet and a bottom elevation of 33.0 feet. The facility is operated from April 1 through December 31, as river conditions allow.

2.1.6 Switchyard / Transmission Lines

2.1.7 Project Boundary

The Project boundary follows the contour level of 42.0 feet around most of the Project impoundment, except along the northerly shore of the impoundment between the Project dam and the Black Bridge railroad crossing where it follows the contour level of 46.0 feet. The Project boundary also encloses the principal Project works including the dam, intake, powerhouse, tailrace, and fishway. The Project boundary extends approximately 4.5 miles upstream to the Pejepscot Dam and encompasses a total of approximately 348 acres. Project boundary drawings are presented in Exhibit G.

2.2 Proposed Structures

There are no new structures being proposed in this application.



BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Brookfield

N

0 240 480 960 Feet

Figure 2.1-1:
Project Facilities

Path: D:\Brookfield\02456\GIS\Maps\DLA\DLA.aprx

Figure 2.1.1-1: Brunswick Dam



Figure 2.1.1-2: Brunswick Tainter Gates and Emergency Spillway Sections



Figure 2.1.2-1: Brunswick Turbine Intake Structure and Fishway Openings



Figure 2.1.3-1: Brunswick Powerhouse



Figure 2.1.4-1: Brunswick Tailrace

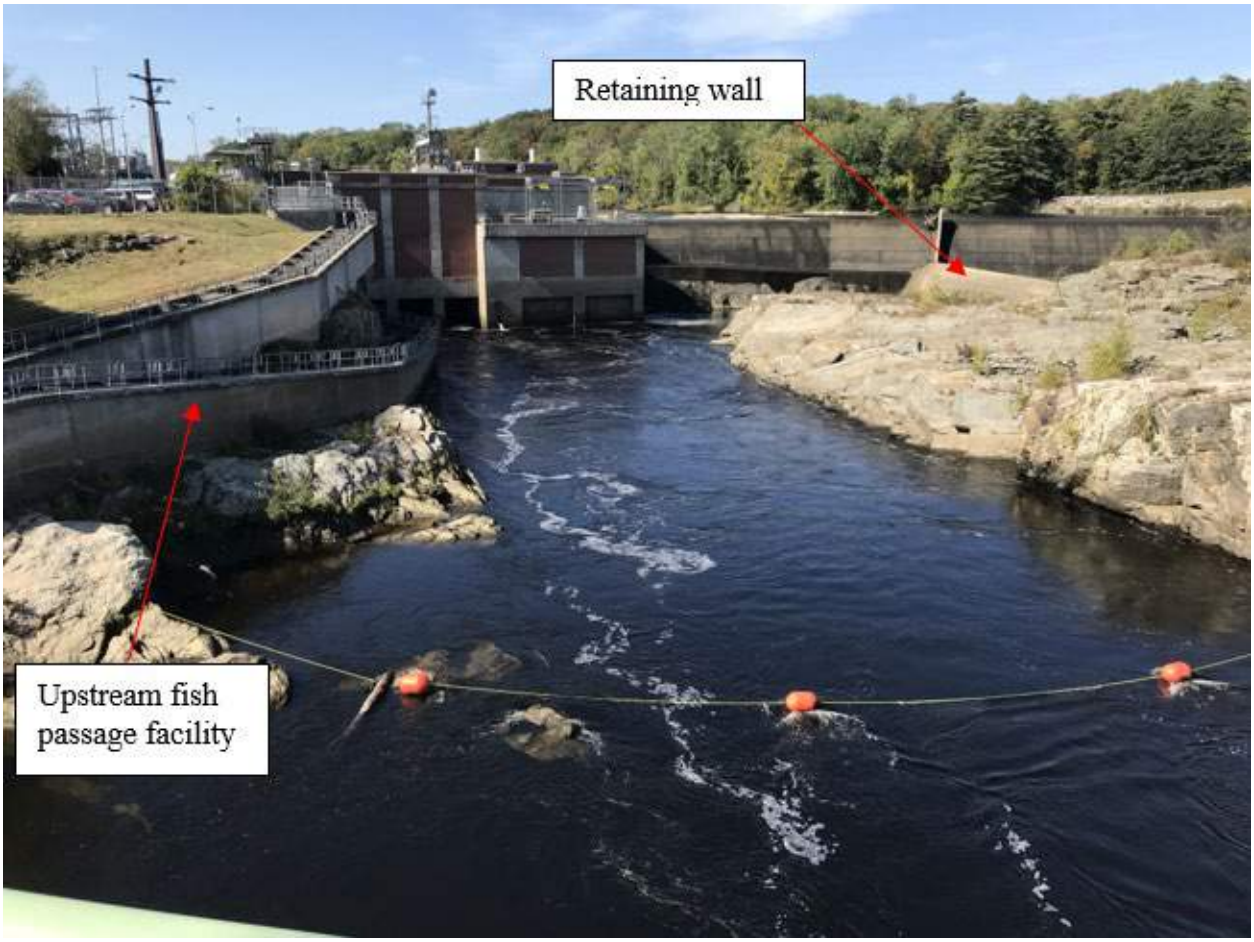


Figure 2.1.4-2: Tailwater Rating Curve

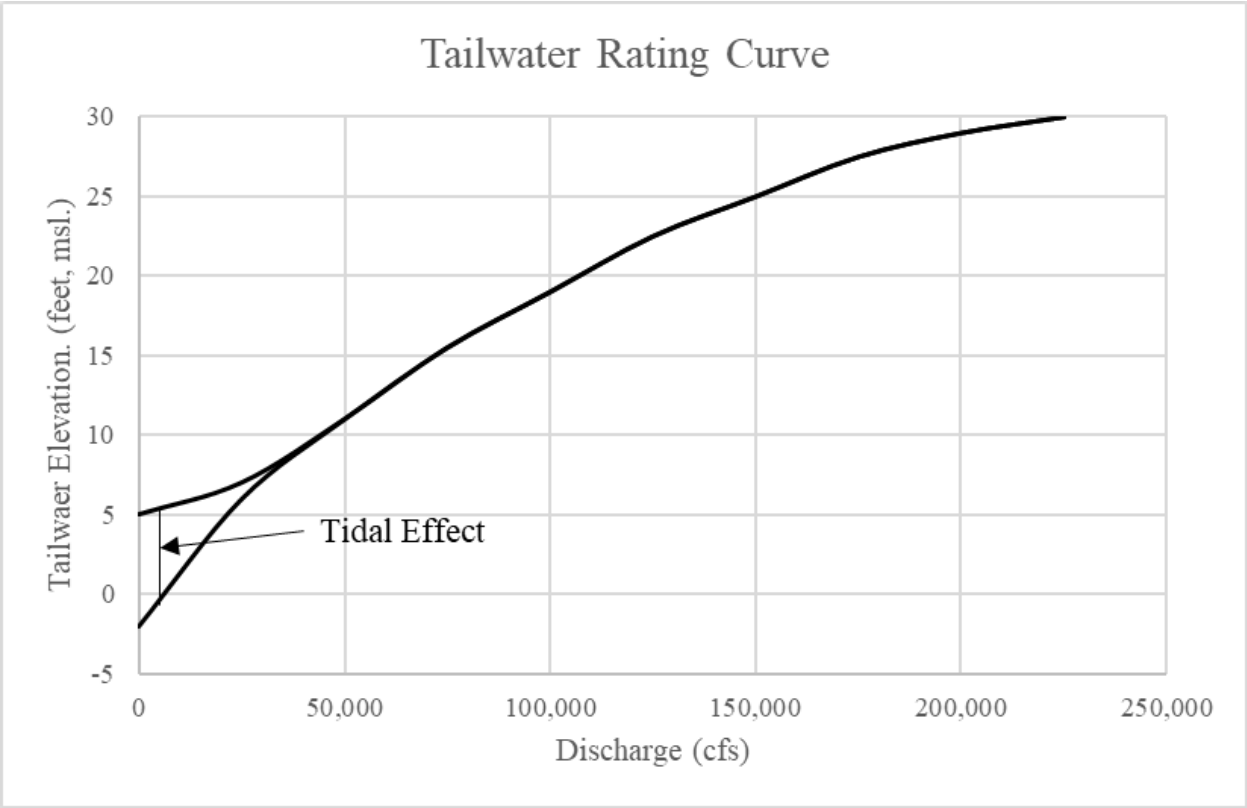


Figure 2.1.5.2-1: Brunswick Downstream Fish Passage Discharge Pipe



3 IMPOUNDMENT DATA

3.1 Surface Area and Elevation

The Brunswick Project impoundment encompasses approximately 175 acres at elevation of 39.4 ft.

3.2 Storage Capacity

The Brunswick impoundment has a gross storage capacity of 125 acre-feet; however, due to the Project's run-of-river mode of operation, it provides no significant usable storage.

4 TURBINES AND GENERATORS

4.1 Existing Turbines and Generators

The Project's installed capacity is 19.0 MW with a total hydraulic capacity of 7,475 cfs. There are three propeller style turbines with the following characteristics (Table 4.1-1).

Table 4.1-1: Project Turbine Characteristics

Characteristic	Unit 1	Unit 2	Unit 3
Type	vertical-shaft, fixed blade propeller	horizontal shaft, fixed blade propeller tubular	horizontal shaft, fixed blade propeller tubular
Rated Capacity (hp)	16,000	5,000	5,000
Rated Capacity (MW)	12.0	3.765	3.765
Runner Diameter (feet)	15	8.2	8.2
Number of blades	5	5	5
Rated Head (feet)	32	37	37
Rated Speed (rpm)	90	212	212
Maximum Hydraulic Capacity (cfs)	5,075	1,200	1,200
Minimum Hydraulic Capacity (cfs)	2,741	NA	NA

Turbine unit 1 is connected to a 3 phase, 60 Hz, 12,500-volt generator. Turbine units 2 and 3 are each connected to a 3 phase, 60 Hz, 12,500-volt generator. Unit 1 has a capacity of 12,600 kW and Unit 2 and 3 each have capacities of 3,500 kW (Table 4.1-2).

The main leads between the generator and main transformer are two single conductors, 750 kilo circular mils[2] aluminum, interlocked armor, insulated power cables per phase.

Table 4.1-2: Project Generator Characteristics

Characteristic	Unit 1	Unit 2	Unit 3
Type	Siemens-Allis	Siemens-Allis	Siemens-Allis
Capacity (MW)	12.6	3.5	3.5
Rated Apparent Power (KVA)	14,000	3,889	3,889
Rated Voltage (V)	12,500	12,500	12,500
Power Factor	0.9	0.9	0.9
Frequency (Hz)	60	60	60
Rated Speed (rpm)	90	211.8	211.8

4.2 Proposed Turbines and Generators

There are no proposed changes to the existing turbines and generators.

5 SWITCHYARD/ TRANSMISSION LINES

The Project transmission facilities consists of an approximately 60-foot-long underground cable that leads to a non-Project switchyard that houses the Project's transformer (Figure 5-1), which is a self-cooled/forced-air-cooled-type, rated at 18,000/24,000 kVA, 12.47-34.5 kV, 3 phase, 60 hertz. Bare cable connects the transformer output through fused disconnect switches and to the non-Project switchyard bus. The switchyard also houses non-Project facilities and equipment including an additional transformer, busses, and distribution equipment. An electrical single-line diagram showing the Project's connection to the transmission system is presented in Exhibit H.

[2] Kilo circular mils is a measurement of the cross-sectional area of electrical conductors. 1 kilo circular mils is approximately equal to 0.5067 mm^2.

Figure 5-1: Brunswick Interconnection Point



6 ADDITIONAL EQUIPMENT

The Project also has appurtenant facilities, such as cranes, trash rakes, and other equipment necessary for day-to-day operations and maintenance.

7 LANDS OF THE UNITED STATES

There are no lands of the United States within the Project.

EXHIBIT B
PROJECT OPERATION AND RESOURCE UTILIZATION

October 2026

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT B
PROJECT OPERATION AND RESOURCE UTILIZATION

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LIST OF ABBREVIATIONS AND DEFINITIONS

BWPH	Brookfield White Pine Hydro
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
El.	Elevation
FERC	Federal Energy Regulatory Commission
ft.	feet / foot
ISO	Independent System Operator
ME	Maine
mi^2	square mile(s)
MW	megawatt
MWh	Megawatt hours
NEPOOL	New England Power Pool
NH	New Hampshire
Project	Brunswick Hydroelectric Project (FERC No. 2284)
U.S.	United States
USGS	United States Geological Survey

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT B
PROJECT OPERATION AND RESOURCE UTILIZATION

1 PROJECT OPERATION

1.1 Existing Operating

The Brunswick Hydroelectric Project (Project) is operated as an automatic run-of-river facility with no storage or flood control capacity. A pond level sensor is installed near the intake to monitor the Project impoundment level and to regulate the turbine-generator operation. The Project has a maximum hydraulic capacity of 7,475 cubic feet per second (cfs) through the turbine-generator units, and a minimum hydraulic capacity of 1,200 cfs.

The Project's turbine-generator units 2 and 3 are not adjustable, meaning they can only be completely off or on, and cannot be adjusted over a range of operating flows. Due to the on/off nature of these units and the small pond available, the impoundment fluctuates to allow these units to operate. Impoundment fluctuations related to this operation are limited to less than two feet below the top of the spillway crest as required by the FERC license.

Unit 1 typically operates at maximum efficiency during periods of river flow less than or equal to 4,400 cfs, during which periods, the unit will run in an on/off mode. During river flows of 4,400 cfs to 5,000 cfs, the unit discharge will typically approximate river flows and the pond level will be relatively constant. Unit 2 and 3 will then normally come online for river flows of 7,400 cfs or greater. There is no minimum flow requirement in the existing license, as the river reach below the Project is backwatered and tidally influenced. However, during fishway operation (typically May 1 to November 15 as conditions allow, with the exact timing determined annually based on resource agency consultation), upstream fishway flow is 100 cfs and downstream fishway flow is 60 cfs regardless of unit operations.

BWPH also provides nighttime spill flows at the Project for downstream Atlantic salmon smolt migration based on a set of unit operational guidelines driven by total river flow at the Project. This unit prioritization is implemented during the downstream Atlantic Salmon passage season with the exact timing determined annually through resource agency consultation and is a condition of the final Atlantic Salmon Species Protection Plan that was incorporated into the Project license in 2022.

1.2 Proposed Operation

BWPH proposes to continue the existing operations described in Section 1.1 over the next license term.

1.3 Annual Plant Factor

The average annual plant factor is determined using the following equation:

$$\frac{\text{Average Annual Output}}{\text{Licensed Capacity x 8760 hours/year}} = \text{Average Annual Plant Factor}$$

Table 1.3-1 provides the annual gross and average monthly gross generated megawatt hours (MWh) at the Project for the past ten years (2013-2025). The Project's average annual energy production for the period examined was 92,250 megawatt-hours (MWh) and an annual plant factor of approximately 55% based on its current capacity of 19.0-MW.

Table 1.3-1. Annual and Monthly Gross Generation (MWh) for the Project (2013-2025)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2013	8,581	8,412	11,512	13,455	11,152	12,026	11,501	8,157	8,727	5,459	5,822	7,370	112,174
2014	9,434	7,293	7,799	9,282	11,430	9,478	9,206	8,807	4,125	7,232	7,217	11,253	102,556
2015	9,416	6,347	6,008	11,535	8,059	11,982	6,826	4,884	3,397	5,952	6,212	10,225	90,843
2016	6,827	10,267	12,893	12,868	9,671	4,830	4,419	3,185	3,078	3,016	5,534	6,462	83,050
2017	7,740	7,421	8,975	10,598	10,557	7,046	6,786	4,516	3,886	3,989	9,370	7,338	88,222
2018	9,534	9,641	11,609	12,320	7,004	3,097	3,693	5,427	4,190	4,528	9,812	8,311	89,166
2019	10,370	10,995	11,699	11,936	10,169	10,980	6,116	3,975	3,287	8,041	7,820	8,442	103,830
2020	9,970	8,273	12,789	12,603	9,575	3,795	4,229	3,138	2,348	4,354	4,829	4,794	80,697
2021	4,719	4,780	7,006	11,580	5,947	2,845	3,431	3,357	3,541	3,012	7,108	6,926	64,252
2022	5,211	6,815	11,755	13,107	8,088	4,885	3,697	3,978	4,882	7,928	9,260	12,555	92,161
2023	12,298	9,011	10,201	12,861	7,404	10,327	13,253	12,088	9,416	8,461	7,923	10,204	123,447
2024	12,298	7,681	12,464	12,061	8,644	6,182	8,805	8,368	4,336	3,943	3,771	6,598	95,151
2025	4,850	2,566	10,228	12,933	10,015	9,310	5,086	2,757	2,224	3,259	4,766	5,711	73,705
Mean	**8,558**	**7,654**	**10,380**	**12,088**	**9,055**	**7,445**	**6,696**	**5,587**	**4,418**	**5,321**	**6,880**	**8,168**	**92,250**

1.4 Project Operation During Adverse, Mean, and High Water Years

1.4.1 River Basin Operations

The Androscoggin River flow regime is set by the Upper Androscoggin River Storage System, which consists of a series of headwater storage reservoirs located in Maine and New Hampshire. Outflow from the storage reservoirs is set in accordance with various legal agreements. The upper portion of the Androscoggin River contains 16 run-of-river hydroelectric projects until reaching the Gulf Island Hydroelectric Project. The Gulf Island Project then re-regulates downstream flow for the lower Androscoggin River. The lower portion of the Androscoggin River contains 5 run-of-river hydroelectric projects, including the Brunswick Project which is the first dam upstream of the Androscoggin River's confluence with Merrymeeting Bay.

Annual and monthly flow duration curves for the period January 1987 through December 2025 are provided in Appendix B-1. Daily flow data prorated from the Auburn, ME U.S. Geological Survey (USGS) gage (No. 01059000) were utilized to develop the flow duration curves.

1.4.2 Operation During Adverse Conditions

With the existing regulation of the upstream storage facilities, the reduction in river flows due to adverse water conditions is generally minimal and infrequent. During low inflow conditions, BWPH operates the Project to maintain the impoundment level near 39.4 feet and to provide the required flows necessary for operation of the fish passage structures. During the rare occasions when inflows to the impoundment are less than the minimum hydraulic capacity of the Project's turbines, all flow is released over the spillway or through the Tainter gates.

1.4.3 Operation During High Water and Flood Conditions

Under higher river flow conditions, inflows in excess of the hydraulic capacity (7,475 cfs) of the generating units is spilled at the dam. It is estimated that the Project is operated in this manner approximately 25% of the year. High flows in the Androscoggin River Basin occur annually during the spring and fall run-off periods. The magnitude of spring flows may vary considerably depending on the water content of the melting snow cover, the occurrence of coincidental heavy spring rainfall, and warm temperatures. Under flood conditions, in addition to spillage and maximum unit operation, the Tainter gates on the dam spillway are opened to help control upstream water levels.

2 DEPENDABLE CAPACITY AND AVERAGE ANNUAL ENERGY PRODUCTION

2.1 Project Hydrology

The Androscoggin River flows about 169 miles from its headwaters at Umbagog Lake in Errol, NH to Merrymeeting Bay. The drainage area at Merrymeeting Bay, where the Androscoggin River ends, is approximately 3,470 mi^2. Brunswick dam is the first dam on the mainstem of the Androscoggin River. The drainage area at the Project is approximately 3,437 mi^2. The Project impoundment has surface area of approximately 175 acres at the elevation of El. 39.4. The Project has a gross storage capacity of 125 acre-feet; the Project has negligible usable storage capacity as a run-of-river Project. The average annual inflow to the Project is approximately 7,037 cfs. The Project impoundment is fed directly by the Androscoggin River, as it is located on the mainstem at the head of tide in Brunswick, Maine. Upstream inflow is also provided by the tributary contributions from Androscoggin River extensive watershed (e.g., Ellis River, Little Androscoggin, Nezinscot River).

Annual and monthly flow duration curves based on prorated data from the Auburn, ME USGS gage are included in Appendix B-1. The mean daily inflow for the period examined is approximately 7,002 cfs. The peak streamflow at the impoundment during this period was approximately 104,911 cfs on April 2, 1987. The peak streamflow for the period of record at the USGS gage is approximately 135,000 cfs on March 20, 1936.

2.2 Dependable Capacity

The dependable capacity is defined as the load carrying ability of a power plant under adverse load and flow conditions. The dependable capacity (seasonal claimed capability) for the Project is 3.907 MW (summer) and 6.896 MW (winter). These are calculated based on a 5-year average (2021-2025) to determine qualified capacity; for summer (June –September) for the 5 hours between 1 p.m. and 6 p.m.; and for winter (October-May) for the 2 hours between 5 p.m. and 7 p.m.

2.3 Area-Capacity Curve

At elevation 39.4 feet, the impoundment has a surface area of 175 acres, and a gross storage capacity of 125 acre-feet. Appendix B-2 contain the area-capacity curve for the Project.

2.4 Estimated Hydraulic Capacity

The Project has a combined maximum hydraulic capacity of 7,475 cfs.

2.5 Tailwater Rating Curve

The normal tailwater elevation at the Project is El. 2.5 feet. Appendix B-3 contains the tailwater rating curve for the Project.

2.6 Power Plant Capacity vs. Head

At a gross head of 37 feet., the Project has a total authorized nameplate capacity of 19.0-MW. Appendix B-4 contains the plant capability curve for the Project.

3 USE OF PROJECT POWER

The Project generates renewable power for Maine and the regional power pool administered by ISO New England. Currently, output is sold on the open market through bidding into the New England Power Pool (NEPOOL) market administered by ISO New England., the non-project independent system operator for New England. ISO New England administers all significant aspects of the NEPOOL market.

4 PLANS FOR FUTURE DEVELOPMENT

BWPH has no plans to alter Project operations at this time nor does BWPH have any future development plans at the Project.

APPENDIX B-1 – ANNUAL AND MONTHLY FLOW DURATION CURVES

Figure B1-1. Annual Flow Duration Curve (1987-2025)

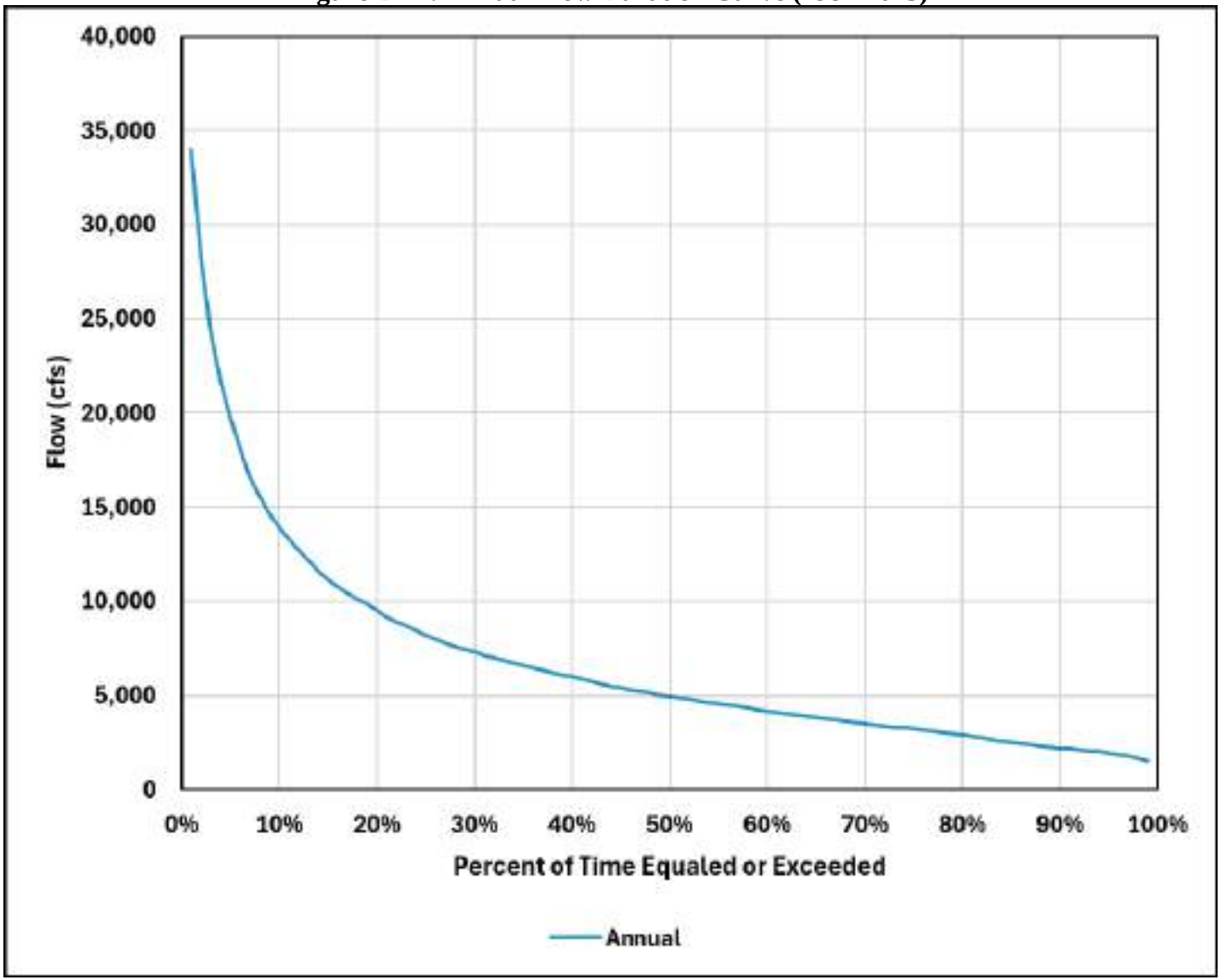


Figure B1-2. January, February, and March Flow Duration Curve (1987-2025)

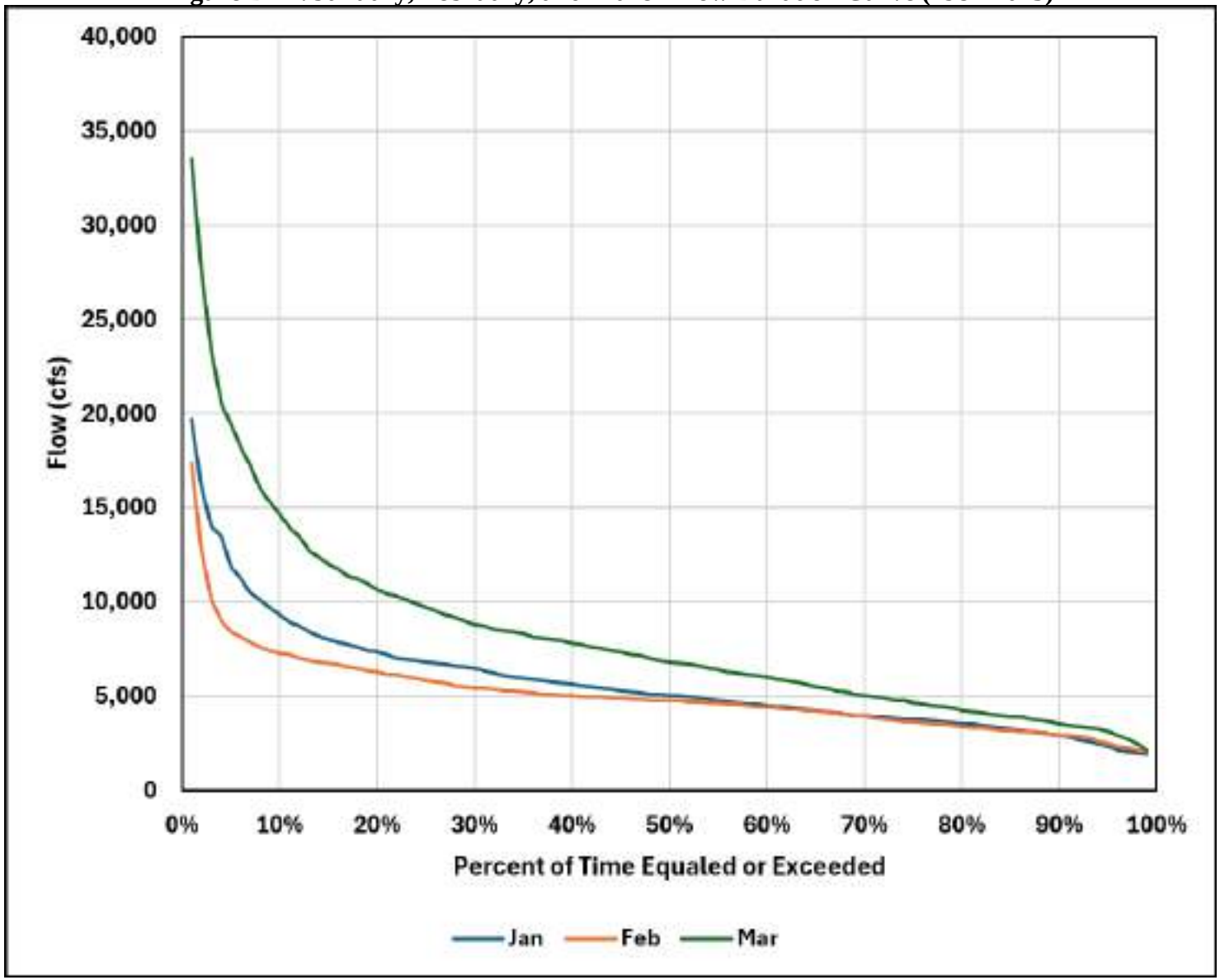


Figure B1-3. April, May, and June Flow Duration Curve (1987-2025)

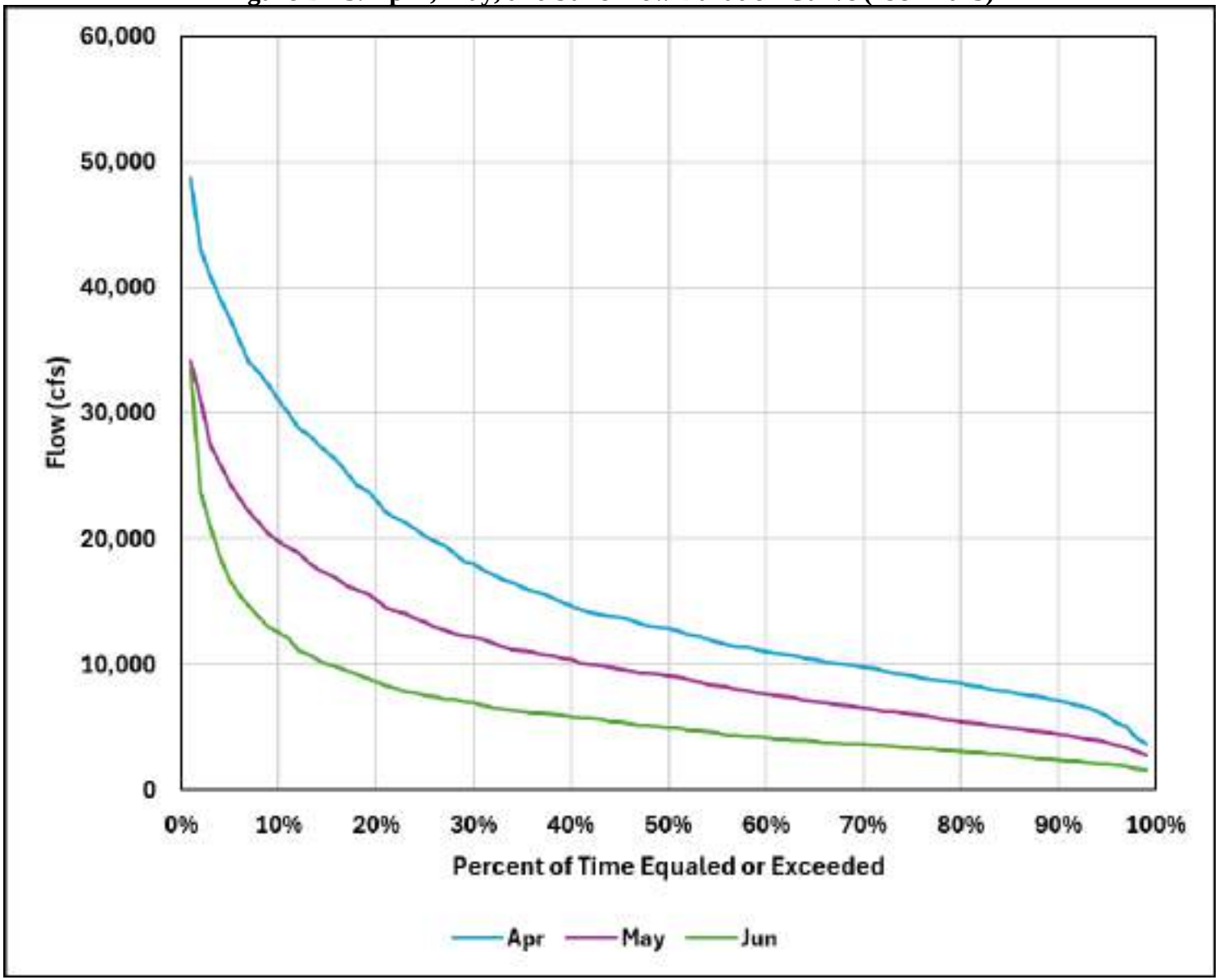


Figure B1-4. July, August, and September Flow Duration Curve (1987-2025)

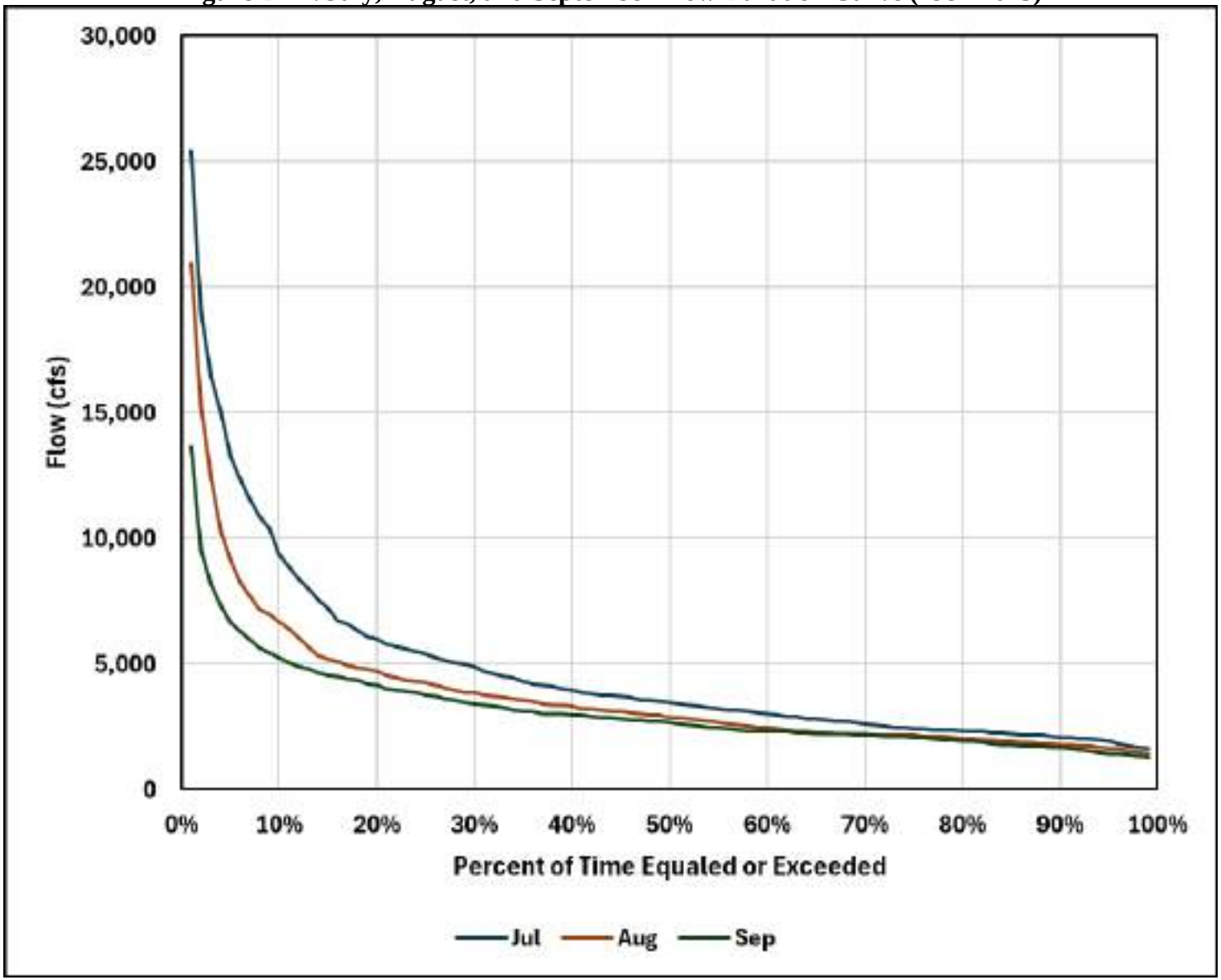
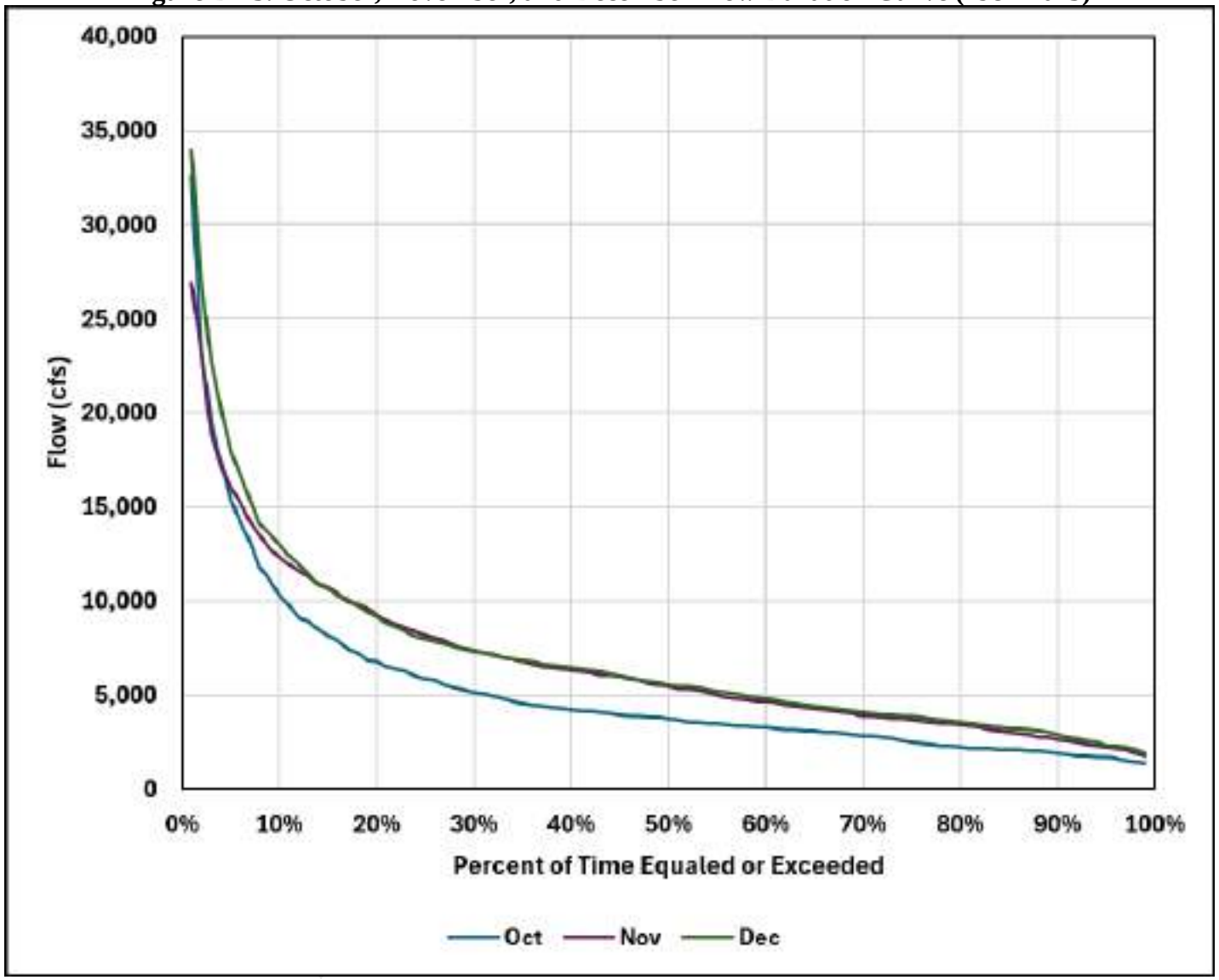
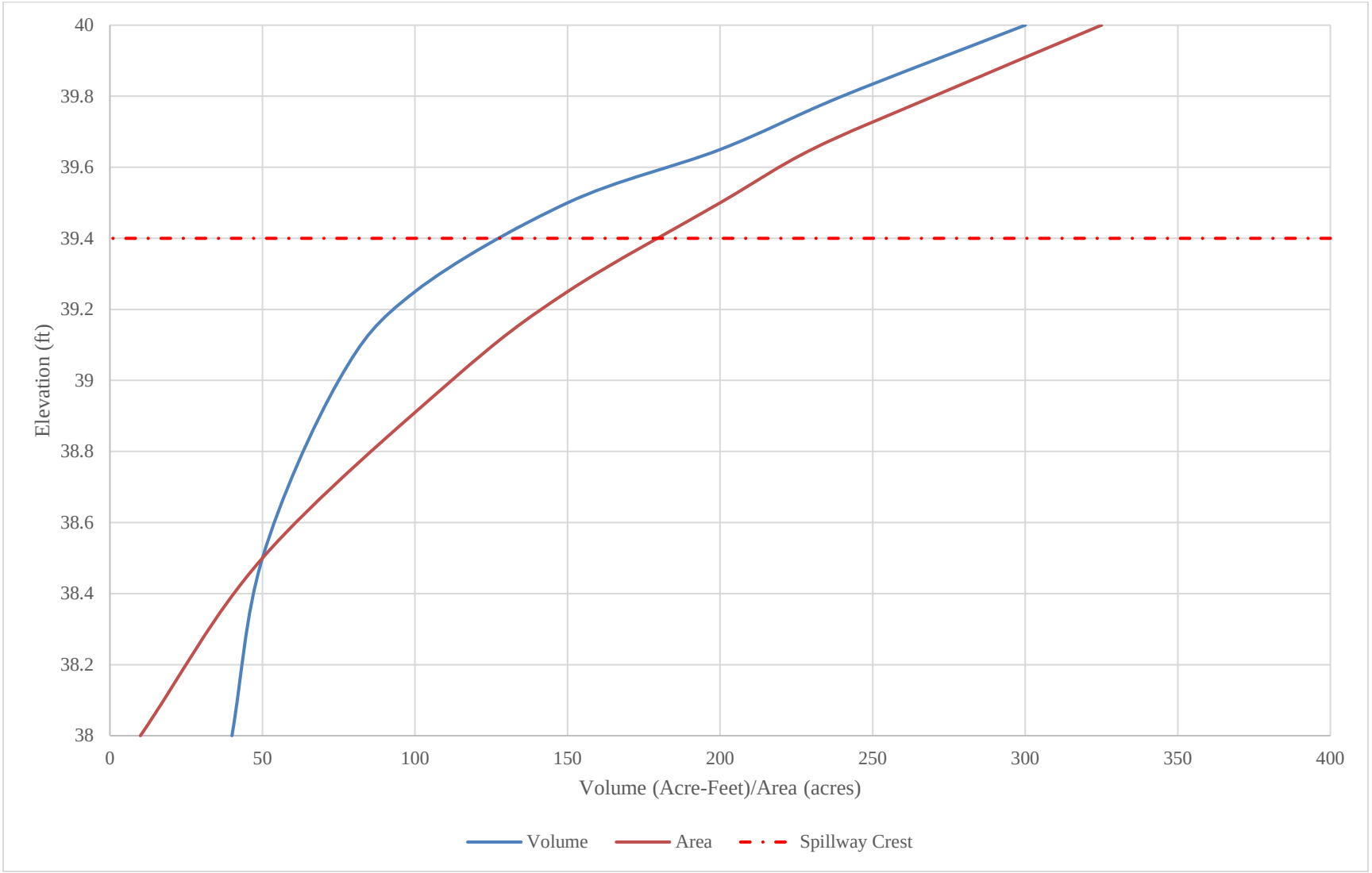


Figure B1-5. October, November, and December Flow Duration Curve (1987-2025)



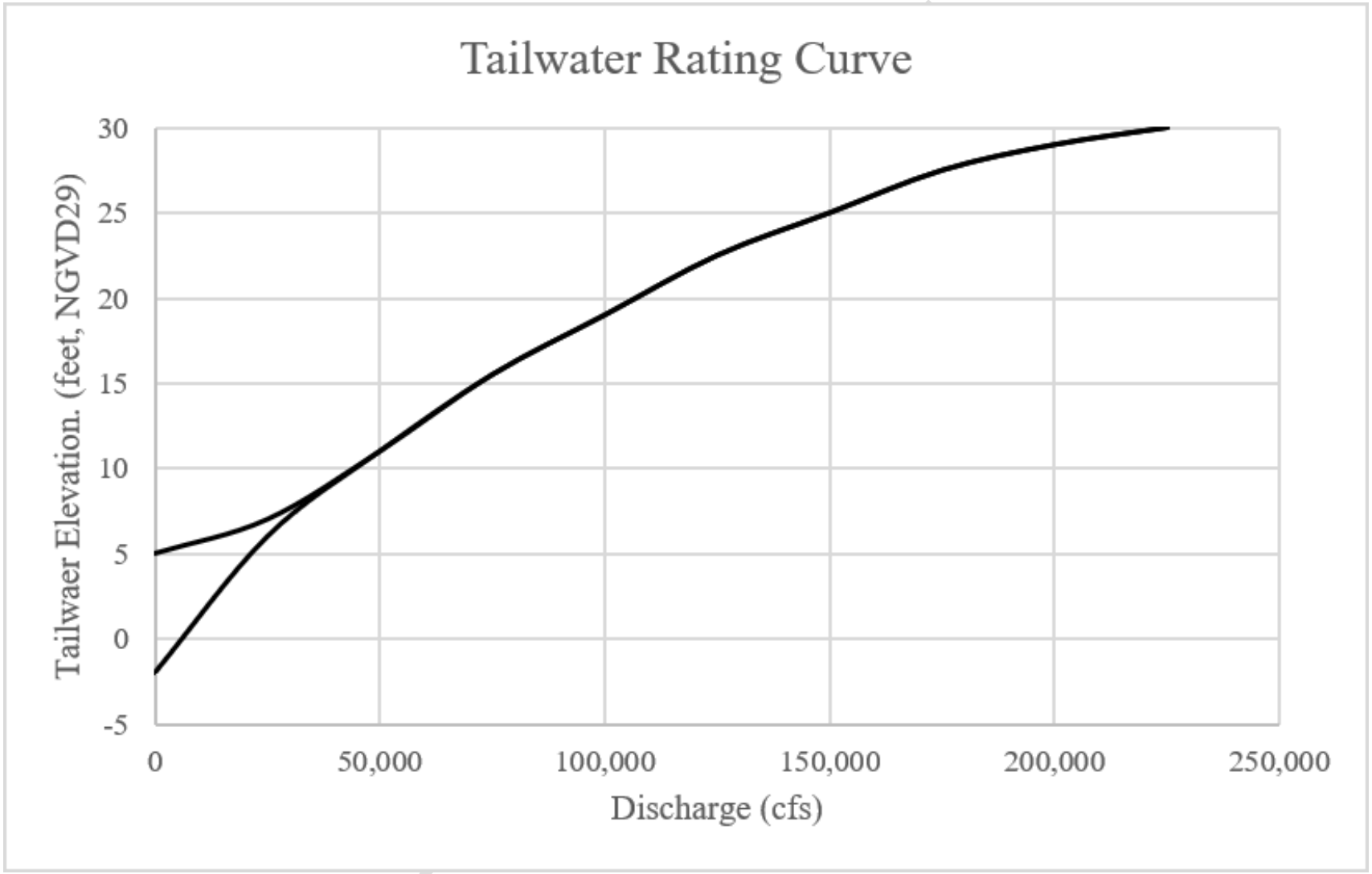
APPENDIX B-2 – AREA-CAPACITY CURVE

Figure B2-1. Area-Capacity Curve



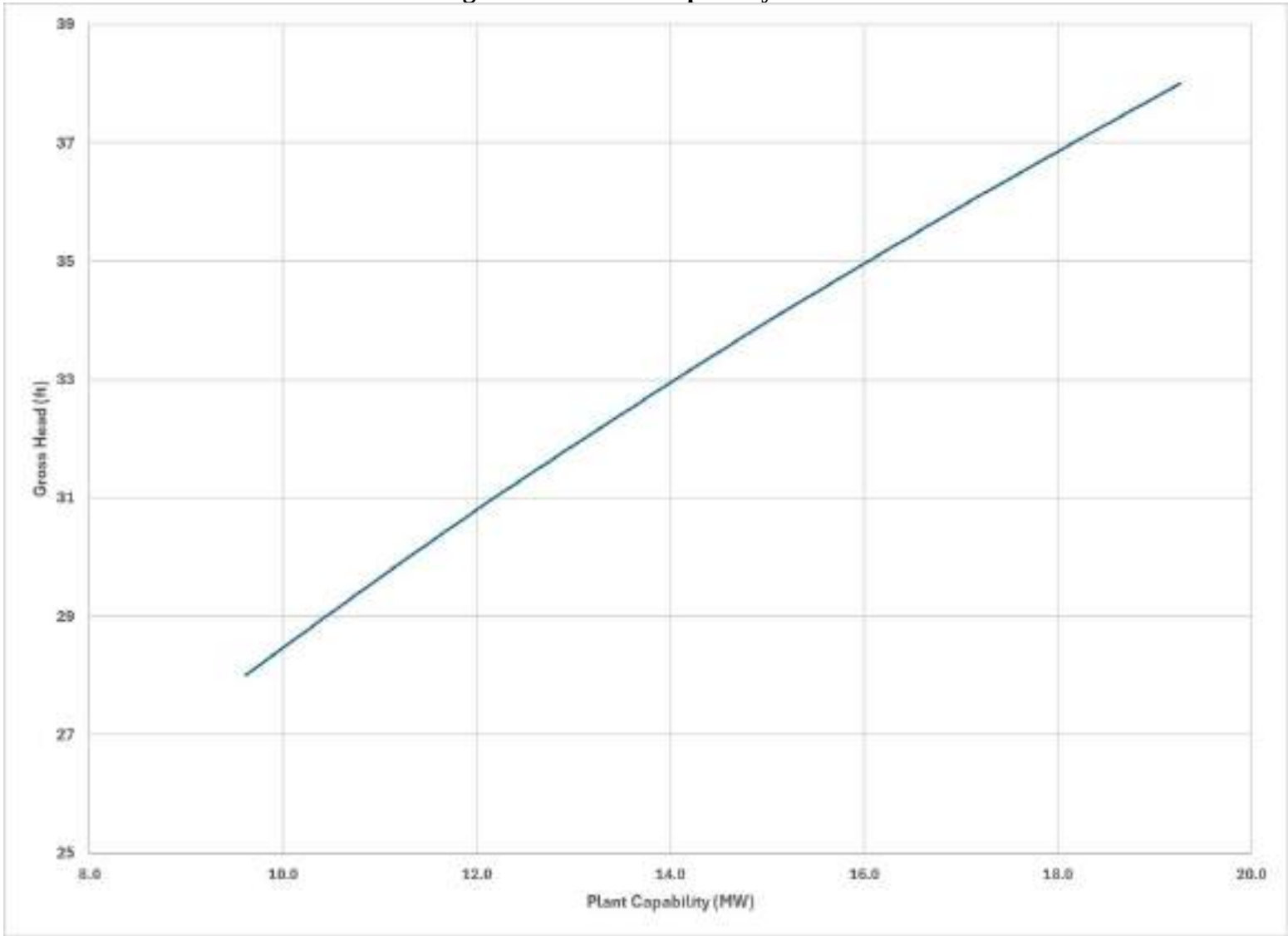
APPENDIX B-3 – TAILWATER RATING CURVE

Figure B3-1. Tailwater Rating Curve



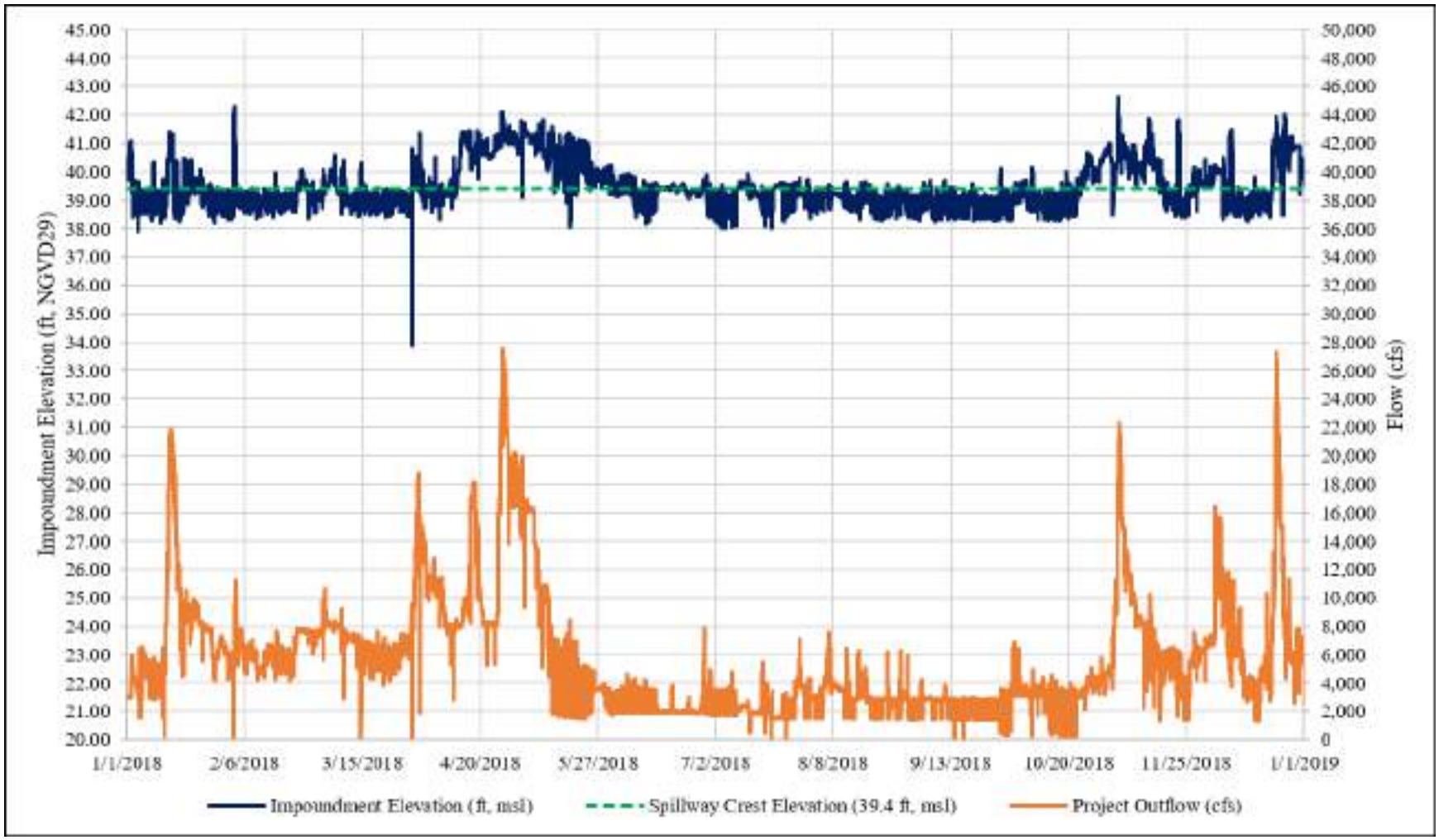
APPENDIX B-4 – PLANT CAPABILITY CURVE

Figure B4-1. Plant Capability Curve



APPENDIX B-5 – FLOW AND IMPOUNDMENT WATER LEVEL DATA (2018-2022)

Figure B5-1: Hourly Project Outflow and Impoundment Levels for 2018[1]



[1] Project impoundment was drawn down on March 30 from 1000 to 1200 hours to a minimum elevation of 33.9 ft to perform repairs to the Project fishway.

Figure B5-2: Hourly Project Outflow and Impoundment Levels for 2019

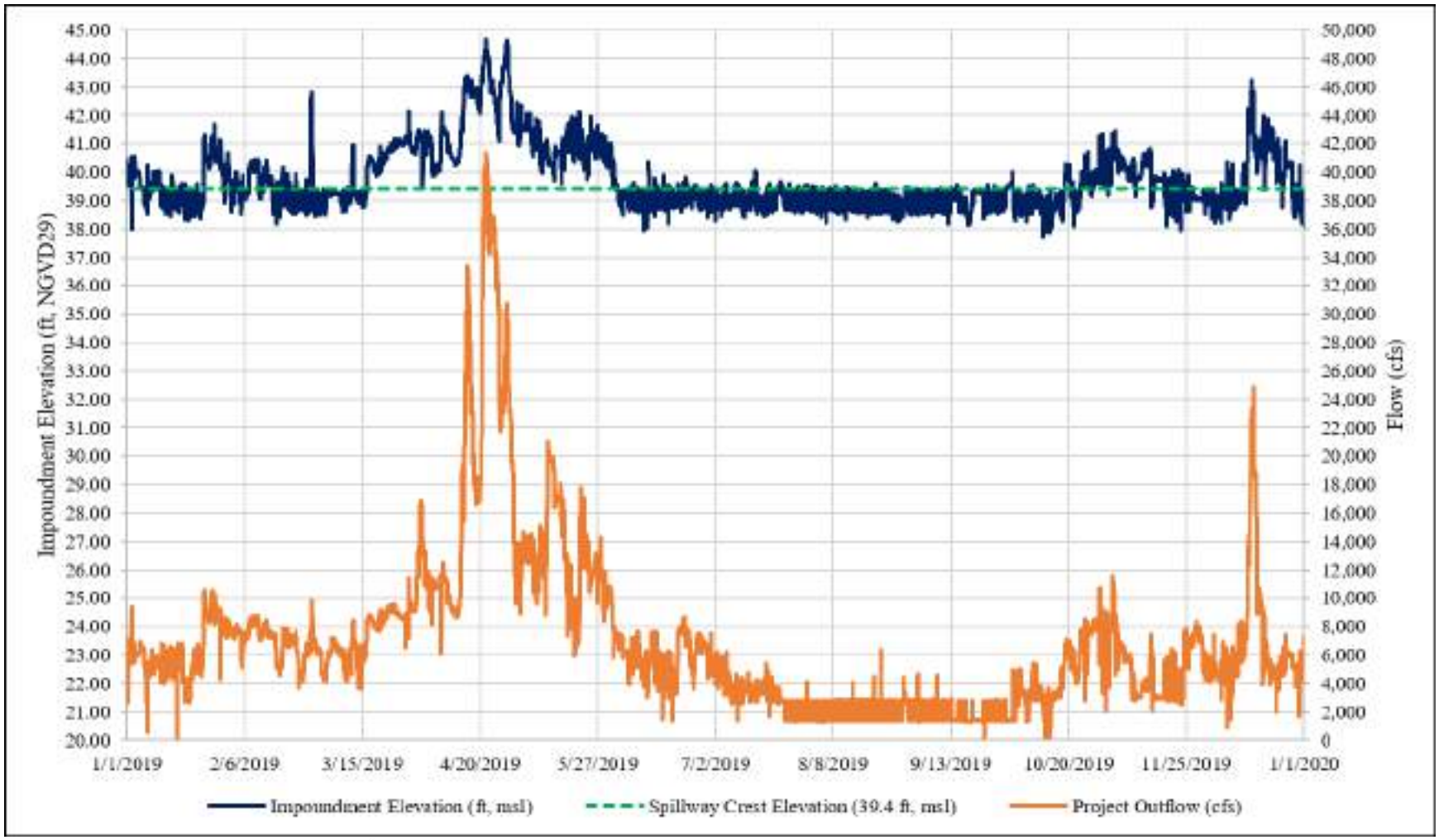


Figure B5-3: Hourly Project Outflow and Impoundment Levels for 2020

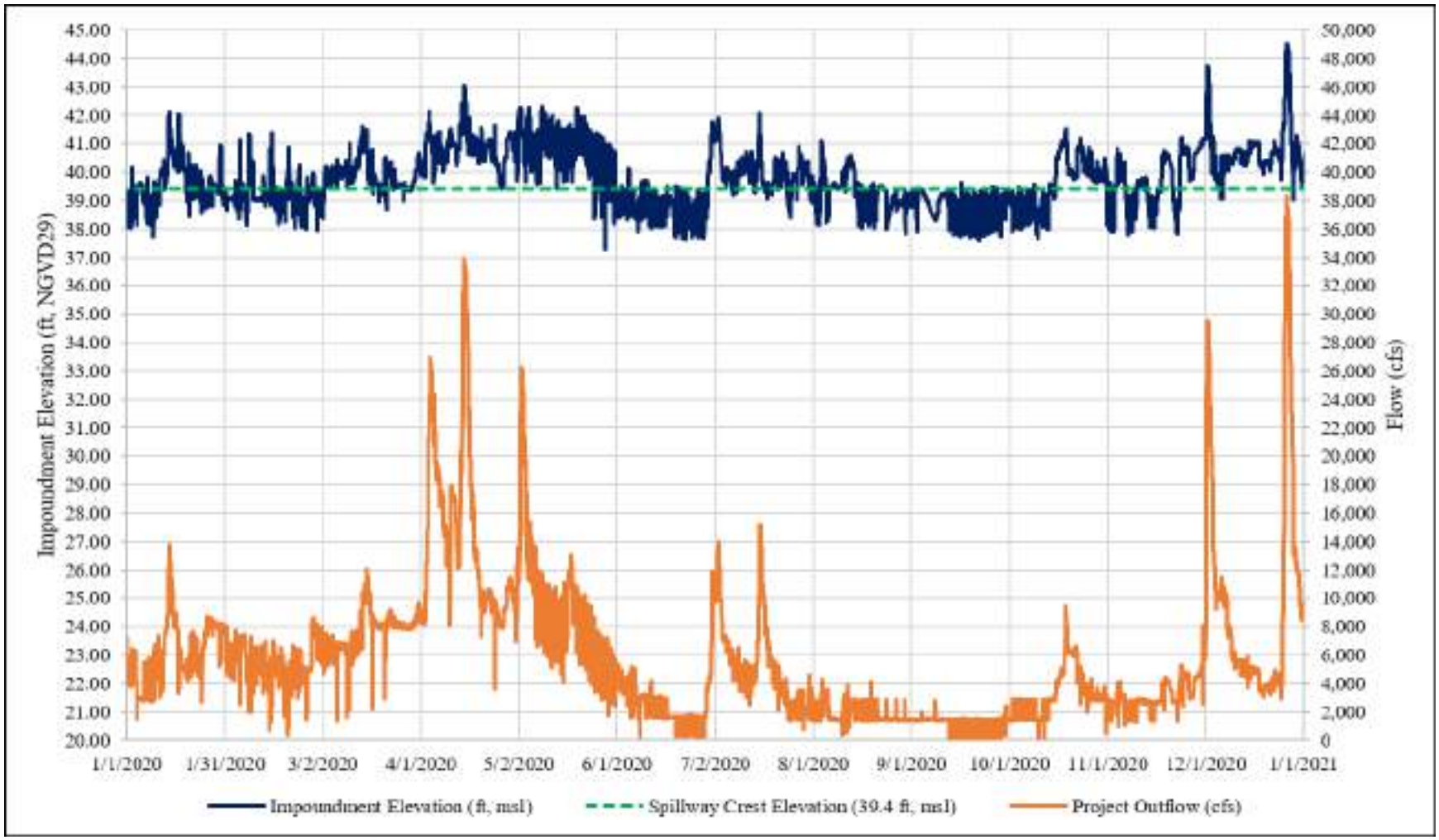


Figure B5-4: Hourly Project Outflow and Impoundment Levels for 2021

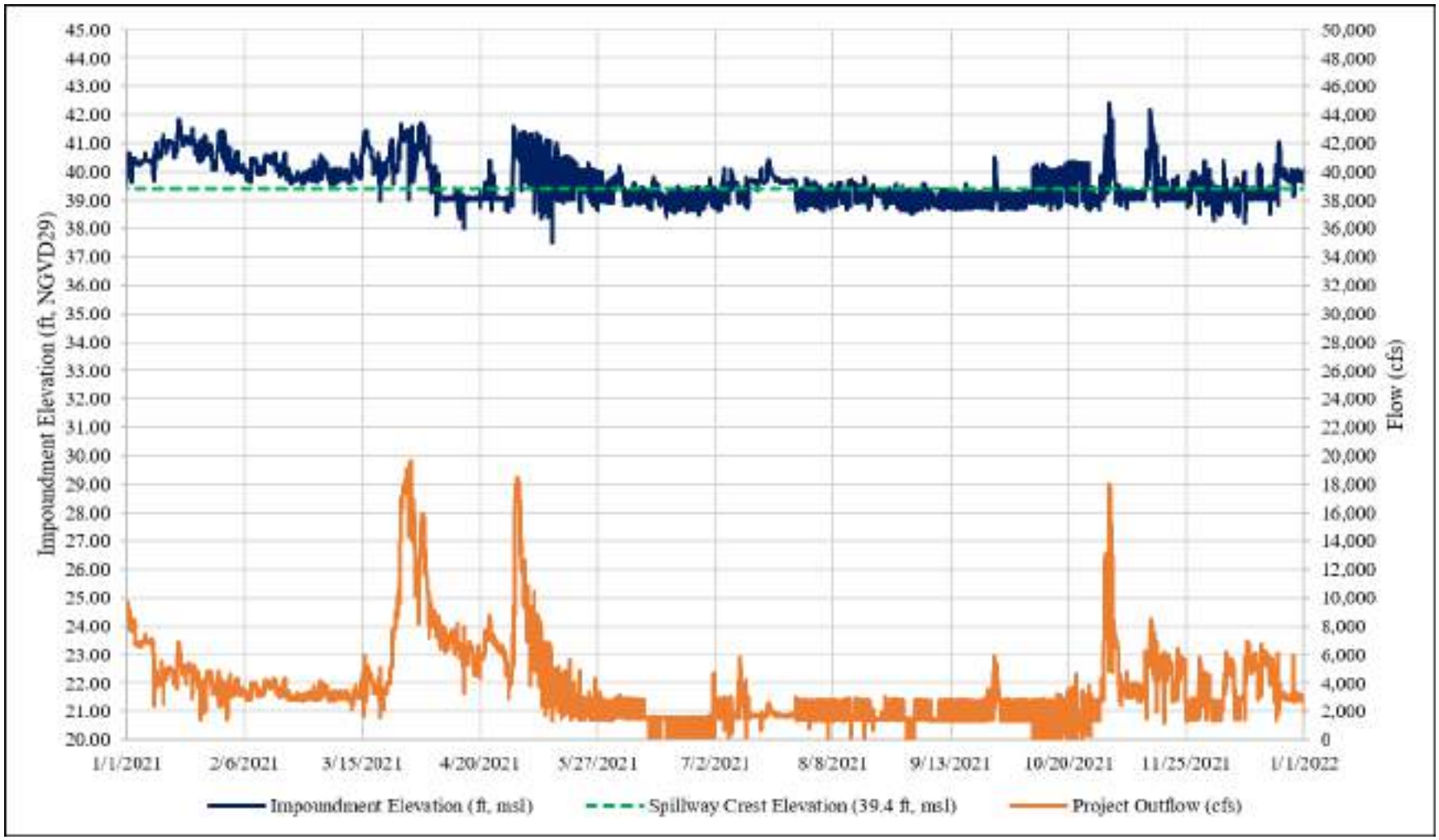


Figure B5-5: Hourly Project Outflow and Impoundment Levels for 2022[2]



[2] Project impoundment was drawn down March 31 from 0800 to 1100 hours to a minimum elevation of 34.5 ft to perform dredging of the Project fishway.

EXHIBIT C
CONSTRUCTION HISTORY

October 2026

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT C
CONSTRUCTION HISTORY

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LIST OF ABBREVIATIONS AND DEFINITIONS

BWPH	Brookfield White Pine Hydro
Commission	Federal Energy Regulatory Commission
FERC	Federal Energy Regulatory Commission
MW	megawatt
Project	Brunswick Hydroelectric Project (FERC No. 2284)

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT C
CONSTRUCTION HISTORY

1 CONSTRUCTION HISTORY

1.1 Original Construction

The existing Brunswick Hydroelectric Project (Project) was developed in the late 20th century, replacing the older mill-era structures. The previous project, named the Brunswick-Topsham Project, was located at approximately the same site as the present Project and included two dams and two powerhouses (FERC Project Nos. 2284 and 2834). The Topsham Powerhouse was located on the Topsham, or north (left), side of the Androscoggin River adjacent to the upstream dam. The Brunswick Dam consisted of two sections located about 500 feet downstream of the Topsham Dam. It was divided by Shad Island, and the Brunswick powerhouse was adjacent to the section of the Brunswick Dam between Shad Island and Brunswick, or south (right), side of the river. The original project utilized only a portion of the available head and streamflow.

Between 1980 and 1983 the Project was rebuilt under FERC Project No. 2284. A new dam was constructed at the approximate location of the former Topsham Dam. The old powerhouses and dams were razed, and a new powerhouse for Unit l was constructed adjacent to the new dam and placed in commercial operation on March 15, 1982. A second and third generating unit were added to the new powerhouse between 1981 and 1983. Those two units were placed in commercial operation on April 1, 1983.

The Project was designed as a run-of-river facility, and the three turbine-generator units have a combined capacity of approximately 19.0 megawatts (MW). The facility has continued to operate in run-of-river mode since construction, with only limited impoundment storage. Brookfield White Pine Hydro LLC (BWPH) acquired the Project in 2013 and has operated it since.

1.2 Modification or Additions to the Existing Project

The Project has remained largely unchanged since BWPH acquisition in 2013. No major capital projects have been completed, only routine maintenance and planning activity.

2 PROJECT SCHEDULE OF NEW DEVELOPMENT

BWPH proposes no new development (e.g., additional generating units) at the Project.

EXHIBIT D
STATEMENT OF COSTS AND FINANCING

October 2026

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 224)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT D
STATEMENT OF COSTS AND FINANCING

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LIST OF ABBREVIATIONS AND DEFINITIONS

BWPH	Brookfield White Pine Hydro
CFR	Code of Federal Regulations
Commission	Federal Energy Regulatory Commission
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
ISO New England	Independent System Operator of New England
MW	megawatt
MWh	Megawatt hours
PME	Protection, mitigation, and enhancement
Project	Brunswick Hydroelectric Project (FERC No. 2284)

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT D
STATEMENT OF COSTS AND FINANCING

1 ORIGINAL COST OF EXISTING UNLICENSED FACILITIES

This section is not applicable to the Brunswick Hydroelectric Project (Project) as Brookfield White Pine Hydro LLC (BWPH) is not applying for an initial (original) license.

2 ESTIMATED AMOUNT PAYABLE UPON TAKEOVER PURSUANT TO SECTION 14 OF THE FEDERAL POWER ACT

Under Section 14(a) of the Federal Power Act (FPA), the Federal government may take over any project licensed by the Federal Energy Regulatory Commission (FERC or the Commission) upon the expiration of the current license. The Commission may also issue a new license in accordance with Section 15(a) of the FPA. If such a takeover were to occur upon expiration of the current license, BWPH would have to be reimbursed for the net investment, not to exceed fair value, of the property taken, plus severance damages. To date, no agency or interested party has recommended a federal takeover of the Project pursuant to Section 14 of the FPA.

2.1 Fair Value

The fair value of the Project is dependent on prevailing power values and license conditions, both of which are currently subject to change. The best approximation of fair value would likely be the cost to construct and operate a comparable power generating facility. Because of the high capital costs involved with constructing new facilities and the increase in fuel costs associated with operation of such new facilities (assuming a fossil fueled replacement), the fair value would be considerably higher than the net investment amount. If a takeover were to be proposed, BWPH would calculate fair value based on then-current conditions.

2.2 Net Investment

The net book investment for the Project is approximately $[TO BE PROVIDED IN FINAL LICENSE APPLICATION] as of the end of 2025.

2.3 Severance Damages

Severance damages are determined either by the cost of replacing (retiring) equipment that is "dependent for its usefulness upon the continuance of the License" (Section 14, Federal Power Act), or the cost of obtaining an amount of power equivalent to that generated by the Project from the least expensive alternative source, plus the capital cost of constructing any facilities that would be needed to transmit the power to the grid, minus the cost savings that would be realized by not operating the Project. These values would need to be calculated based on power values and license conditions at the time of project takeover. However, BWPH believes that potential severances inflicted by a takeover of the Project would be significant. Therefore, given the challenges of estimating damages associated with severance, BWPH is reserving the right to provide the Commission with such an estimate should the Commission consider federal takeover of the Project.

3 ESTIMATED COST OF NEW DEVELOPMENT

3.1 Land and Water Rights

BWPH is proposing no expansion of its land or water rights as a consequence of this license application.

3.2 Cost of New Facilities

BWPH is not proposing any capacity-related developments at the Project at this time.

4 ESTIMATED AVERAGE ANNUAL COST OF THE PROJECT

This section describes the annual costs of the Project as proposed. The estimated average cost of the total Project will be approximately $[TO BE PROVIDED IN FINAL LICENSE APPLICATION], based on a 5-year period of analysis. This estimate includes costs associated with existing and projected project operations and maintenance[1], as well as local property and real estate taxes, but excludes income taxes, depreciation, and costs of financing.

4.1 Capital Costs

BWPH uses a [TO BE PROVIDED IN FINAL LICENSE APPLICATION]-percent rate to approximate its average cost of capital. Actual capital costs are based on a combination of funding mechanisms that includes stock issues, debt issues, resolving credit lines, and cash from operations.

[1] Including major maintenance costs.

4.2 Taxes

Property taxes for the 2025 fiscal year were approximately $[TO BE PROVIDED IN FINAL LICENSE APPLICATION]. Income taxes for the Project are incorporated into costs BWPH's consolidated business and are not separated out for the Project.

4.3 Depreciation and Amortization

Depreciation for the Project is approximately $[TO BE PROVIDED IN FINAL LICENSE APPLICATION] for the last 12 months ending December 31, 2025.

4.4 Operation and Maintenance Expenses

The estimated annual operation and maintenance expense at the Project will be approximately $[TO BE PROVIDED IN FINAL LICENSE APPLICATION] including corporate support costs.

4.5 Costs of Proposed Environmental Measures

BWPH proposes several protection, mitigation, and enhancement (PME) measures for inclusion in the new license for the Project. The PME measures would add capital costs and increase annual operations and maintenance costs for the Project. Table 4.5-1 presents the itemized preliminary costs associated with these PME measures.

Table 4.5-1. Cost Estimate of Proposed PME Measures

Proposed PME Measure	Capital Cost (2026 dollars)	Annual Operations and Maintenance Cost (2026 dollars)
Continue to operate the Project in a run-of-river mode by maintaining the impoundment within 2 feet of the spillway crest, such that inflow approximates outflow.	$0	$0
Develop and Implement a Operations Monitoring and Compliance Plan	$25,000	$5,000

Proposed PME Measure	Capital Cost (2026 dollars)	Annual Operations and Maintenance Cost (2026 dollars)
Continue consultation with the applicable resource agencies regarding upstream and downstream fish passage improvements for Atlantic Salmon, American Shad, river herring, and Sea Lamprey as the remaining outstanding studies are completed. Once the remaining studies have been completed, BWPH will identify additional PME measures for the Project related to upstream and downstream fish passage for inclusion in the FLA. In the interim BWPH proposes to: • Continue to provide upstream passage for Atlantic Salmon, American Shad, river herring, and other diadromous fish species past the Project via a vertical slot fishway. • Continue to provide downstream passage for diadromous fish via the Project's downstream fish passage facility consisting of a surface sluice and tailrace discharge pipe. • Continue to implement measures in the Final SPP to protect Atlantic Salmon, Shortnose Sturgeon, and Atlantic Sturgeon.	$**TBD**	$**TBD**
Installation and operation of a temporary portable American Eel ramp(s) for two passage seasons (June 1 through September 15) to further identify a suitable location for a permanent upstream American Eel ramp. The temporary portable eel ramp(s) will be installed during the first full passage season after the effective date of the new license.	$20,000	$50,000
Installation and operation of a permanent upstream American Eel ramp based on the results of the temporary portable ramp evaluation conducted during relicensing. The permanent ramp will be installed during the second full passage season after the effective date of the new license.	$300,000	$50,000

Proposed PME Measure	Capital Cost (2026 dollars)	Annual Operations and Maintenance Cost (2026 dollars)
Develop and implement a Fishway Operations and Maintenance Plan.	$25,000	$10,000
Avoid tree clearing (i.e., removal of all trees greater than three inches in diameter at breast height) on Project lands from April 15 through October 31, unless a tree poses an immediate threat to human life or property, to minimize potential impacts to northern long-eared bat and tricolored bat.	$0	$0
Continue to operate and maintain the existing FERC-approved Project recreation sites with proposed facility enhancements as described in Exhibit E-Section 4.9.3.	$35,000	$5,000
Develop and implement a Historic Properties Management Plan	$25,000	$5,000
Total	$**TBD**	$**TBD**

5 ESTIMATED ANNUAL VALUE OF PROJECT POWER

Power generated by the Project is sold through the Independent System Operator of New England (ISO New England) at prevailing market rates. BWPH estimates gross annual energy production of approximately 92,250 MWh. The average monthly Day Ahead Locational Marginal Pricing for the Maine Zone was $[TO BE PROVIDED IN FINAL LICENSE APPLICATION]/MWh for the period January 1, 2025 to December 31, 2025.

With a current average annual generation of 92,250 MWh, the cost of replacement power would be approximately $[TO BE PROVIDED IN FINAL LICENSE APPLICATION] annually.

6 SOURCES AND EXTENT OF FINANCING

BWPH's current financing needs are generated from internal funds. BWPH is likely to finance major enhancements through earnings retention, equity contributions, and loans made by the corporate parent or some combination of those mechanisms.

7 COST TO DEVELOP THE LICENSE APPLICATION

The approximate cost to date to prepare the application for new license for the Project is $[TO BE PROVIDED IN FINAL LICENSE APPLICATION].

8 ON-PEAK AND OFF-PEAK VALUES OF PROJECT POWER

BWPH is proposing to operate the Project in a run-of-river mode; therefore, values of on-peak and off-peak Project power are not applicable, per 18 C.F.R. § 4.51(e)(8).

9 ESTIMATED AVERAGE ANNUAL INCREASE OR DECREASE IN PROJECT GENERATION

Table 9.0-1 presents the decrease in generation resulting from the proposed PME measures for the Project.

Table 9.0-1. Estimate of Reduced Generation of Proposed PME Measures

Proposed PME Measure	Reduced Generation (MWh)	Annual Cost (2026 dollars)
[TO BE PROVIDED IN FINAL LICENSE APPLICATION]	**TBD**	$**TBD**
Total	**TBD**	$**TBD**

EXHIBIT E
ENVIRONMENTAL REPORT

October 2026

BRUNSWICK HYDROELECTRIC PROJECT

(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT E
ENVIRONMENTAL REPORT

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LIST OF ABBREVIATIONS AND DEFINITIONS

ASMFC	Atlantic States Marine Fisheries Commission
APE	Area of Potential Effect
BCC	Birds of Conservation Concern
BCM/BCP	Brunswick Canoe/Portage
BIL	Brunswick Interstate Ledges
BTLT	Brunswick-Topsham Land Trust
BWPH	Brookfield White Pine Hydro LLC
BWS	Brunswick Water Street
C	Celsius
CARMA	Cultural & Architectural Resource Management Archive
CFD	Computational Fluid Dynamics
CFR	Code of Federal Regulations
cfs	Cubic feet per second
cm	Centimeters
Commission	Federal Energy Regulatory Commission
CPUE	Catch Per Unit Effort
CSO	Combined Sewer Overflows
CWA	Clean Water Act
DLA	Draft License Application
DO	Dissolved Oxygen
EFH	Essential Fish Habitat
EPT	Ephemeroptera, Plecoptera, and Trichoptera
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FOMB	Friends of Merrymeeting Bay
FPA	Federal Power Act
ft	Foot or Feet
GOM DPS	Gulf of Maine Distinct Population Segment
GIS	Geographic Information System
HBI	Hilsenhoff Biotic Index
HPMP	Historic Properties Management Plan
ILP	Integrated Licensing Process

IPaC	Information for Planning and Consultation
Integrated Report	Integrated Water Quality Monitoring and Assessment Report
ISPP	Interim Species Protection Plan
ISR	Initial Study Report
K factor	Erosion factor
Kf factor	Fine earth erosion factor
Licensee	Brookfield White Pine Hydro, LLC
m^2	Square meters
MBPL	Maine Bureau of Parks and Lands
MCOG	Midcoast Council of Governments
MDACF	Maine Department of Agricultural, Conservation and Forestry
MDEP	Maine Department of Environmental Protection
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDMR	Maine Department of Marine Resources
ME	Maine
MEDAFS	Maine Department of Administration and Financial Services State Economist
mg/L	Milligrams per liter
mgd	Million gallons per day
MHPC	Maine Historic Preservation Commission
mm	Millimeters
MMBTU	Merrymeeting Bay Chapter of Trout Unlimited
MRSA	Maine Revised Statutes Annotated
MW	Megawatt
NEPA	National Environmental Policy Act
NGO	Non-Government Organization
NGVD29	National Geodetic Vertical Datum of 1929
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
PAD	Pre-Application Document
PCB	Polychlorinated Biphenyls

PME	Protection, Mitigation, and Enhancement measures
Project	Brunswick Hydroelectric Project (FERC No. 2284)
PSP	Proposed Study Plan
QHEI	Qualitative Habitat Evaluation Index
RM	River mile
Run-of-river	A Project that uses the flow of a river with little to no reservoir capacity for storing water
RSP	Revised Study Plan
TE	Threatened and Endangered
TMDL	Total Maximum Daily Loads
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
SHPO	State Historic Preservation Officer
SHRU	Salmon Habitat Recovery Unit
SPP	Species Protection Plan
sqm	Square mile
µg/L	Micrograms per liter
µS/cm²	Microsiemens per centimeter squared
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USR	Updated Study Report
VRMP	Volunteer River Monitoring Program

BRUNSWICK HYDROELECTRIC PROJECT

(FERC NO. 2284)

APPLICATION FOR NEW LICENSE FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT E ENVIRONMENTAL REPORT

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH) owns and operates the Brunswick Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC or the Commission) Project No. 2284. The 19-megawatt (MW) Project is located on the Androscoggin River in the Towns of Topsham and Brunswick, Maine (ME). The Project straddles the border between Cumberland and Sagadahoc counties.

The Project is the first dam on the mainstem of the Androscoggin River at the head-of-tide located at approximately river mile (RM) 6. The dam and powerhouse span the Androscoggin River immediately upstream of the U.S. Route 201 bridge connecting Topsham and Brunswick, ME, at a site originally known as Brunswick Falls. In total, the Project is the first of 22 hydroelectric projects on the mainstem Androscoggin River. The drainage area at the Project is 3,437 square miles (sqm) while the average annual inflow to the Project is approximately 7,018 cubic feet per second (cfs). The Project boundary extends approximately 4.5 miles upstream to the Pejepscot Dam and encompasses a total of approximately 348 acres. The Project does not occupy any federal lands.

1.1 Application

FERC issued a new license to operate the Project to the Central Maine Power Company (CMP) by Order dated February 9, 1979. The license was transferred from CMP to FPL Energy Maine Hydro, LLC (FPL Hydro) by order dated December 28, 1998. Most recently, FERC amended license on July 29, 2013, to change the Licensee's name from FPL Energy Maine Hydro, LLC to BWPH. The current license for the Project expires on February 28, 2029.

As required under the Federal Power Act (FPA), BWPH must file with the Commission its application for a new license for the Project on or before February 28, 2027. BWPH is preparing its new license application for the Project in accordance with FERC's Integrated Licensing Process (ILP). Pursuant to the ILP process and schedule requirements (Code of Federal Regulations (CFR) Chapter 18, Part 5), BWPH is filing a Draft License Application (DLA) with the Commission and other interested parties, including federal and state agencies, tribal organizations, non-governmental organizations (NGOs), local governments, and the public.

The purpose of this draft Environmental Report is to: (1) describe the existing and proposed Project facilities, project lands, and waters; (2) describe existing and proposed Project operations and maintenance; and (3) provide a draft analysis of the effects of the proposed relicensing on each environmental resource identified during scoping, including protection, mitigation, and enhancement (PME) measures as appropriate for each resource area potentially affected by the relicensing, including an analysis of cumulative effects. BWPH used the following guidelines provided by the Commission in preparing this Environmental Report:

- Scoping Document 2 (Issued July 29, 2024)
- 18 CFR § 5.18[b] (content requirements for an Exhibit E)
- Preparing Environmental Documents: Guideline for Applicants, Contractors, and Staff (FERC 2008)

1.2 Public Review and Consultation

The Commission requires an applicant for a new license to consult with the appropriate resource agencies, tribes, and other entities before filing the application. The Licensee initiated the relicensing and stakeholder consultation process by submitting a Notice of Intent to relicense the Project and a Pre-Application Document (PAD) to state and federal agencies, tribes, NGOs, and other interested parties on February 21, 2024. On April 16, 2024, the Commission began the public scoping process by issuing Scoping Document 1 (SD1) to identify pertinent resource issues related to the relicensing. FERC also used SD1 to solicit comments and suggestions on its preliminary list of resource issues and alternatives to be addressed in the environmental analysis and requested that the stakeholders identify studies needed to provide pertinent information about the resources potentially affected by the relicensing. The Commission then held public scoping meetings and a site visit on May 7, 2024, to receive input on the scope of the environmental analysis.

BWPH then received comments on the PAD and/or study requests from the National Marine Fisheries Service (NMFS), United States Fish and Wildlife Services (USFWS), National Park Service (NPS), Maine Department of Environmental Protection (MDEP), Maine Department of Inland Fisheries and Wildlife (MDIFW), Maine Department of Marine Resources (MDMR), Town of Brunswick, Friends of Merrymeeting Bay (FOMB), and Merrymeeting Bay Chapter of Trout Unlimited (MMBTU) on or before June 20, 2024. On July 29, 2024, FERC issued Scoping Document 2 (SD2). In SD2, the Commission identified the potential resource issues to be evaluated during the environmental analysis of the relicensing pursuant to the National Environmental Policy Act (NEPA).

1.2.1 Studies

BWPH developed a Proposed Study Plan (PSP) based on the PAD comments and/or study requests received. BWPH filed the PSP with FERC on August 2, 2024, and held its study plan meetings on August 28, 2024, and October 9, 2024. The purpose of the meetings were to provide information on the FERC process plan and schedule, provide additional information on Project

operations, review the specific study plans contained in the PSP, and provide an opportunity for meeting attendees to ask questions related to the proposed studies. FERC and Stakeholders attended this meeting. Comments on the PSP were received from NMFS, USFWS, NPS, MDMR, FOMB, and MMBTU. Based on comments received on the PSP, BWPH filed a Revised Study Plan (RSP) with FERC on December 2, 2024. Comments on the RSP were filed by USFWS, MDMR, NMFS, MMBTU and Maine Historic Preservation Commission (MHPC). On December 30, 2024, FERC issued a Study Plan Determination approving the following studies:

- Water Quality Assessment;
- Tailwater Benthic Macroinvertebrate Study;
- Computational Fluid Dynamics Modeling;
- Upstream and Downstream Fish Passage Alternatives Study;
- Visual Surveys of Upstream American Eel Movements;
- Diadromous Fish Behavior, Movement, and Project Interaction Study;
- Fish Assemblage Study;
- Evaluation of Stranding Risk/Bathymetry Study;
- Mussel Survey;
- Recreation Study;
- Historic Architectural Survey;
- Prehistoric and Historic Archeological Survey;
- Invasive Plant Survey

BWPH filed the Initial Study Report (ISR) on December 31, 2025 and held its ISR Meeting on January 15, 2026 via conference call. Following the meeting, BWPH filed an ISR Meeting Summary with the Commission on January 30, 2026. Comments were received on the ISR filings from NMFS on February 25, 2026, MDEP, MDMR, MDIFW on March 2, 2026, FOMB on March 3, 2026 and Free the Andro Coalition on February 27, 2026. On April 1, 2026, BWPH filed a response to the comments received.

In addition, several studies are still ongoing as of the filing of this DLA including:

- Computational Fluid Dynamics and Two-Dimensional Hydraulic Modeling;
- Upstream and Downstream Fish Passage Alternatives Studies (Phase 1 and 2);
- Diadromous Fish Behavior, Movement, and Project Interaction Study (Phase 2); and
- Prehistoric and Historic Archeological Resources Survey (Phase 1B).

BWPH intends to file the final reports for these studies with the Updated Study Report (USR) on January 1, 2027. The USR Meeting will be held on January 15, 2027, with the USR Meeting Summary filed on or before January 31, 2027. Stakeholders can then provide comments on the USR on or before March 2, 2027, with BWPH filing a response to comments received by April 1, 2027. FERC will issue its *Director's Determination on Disagreements/Amendments* on or before May 1, 2027.

Table 1.2.1-1 identifies the stakeholders that BWPH consulted during resource issue scoping, study plan development, resource study reporting, and preparation of the license application.

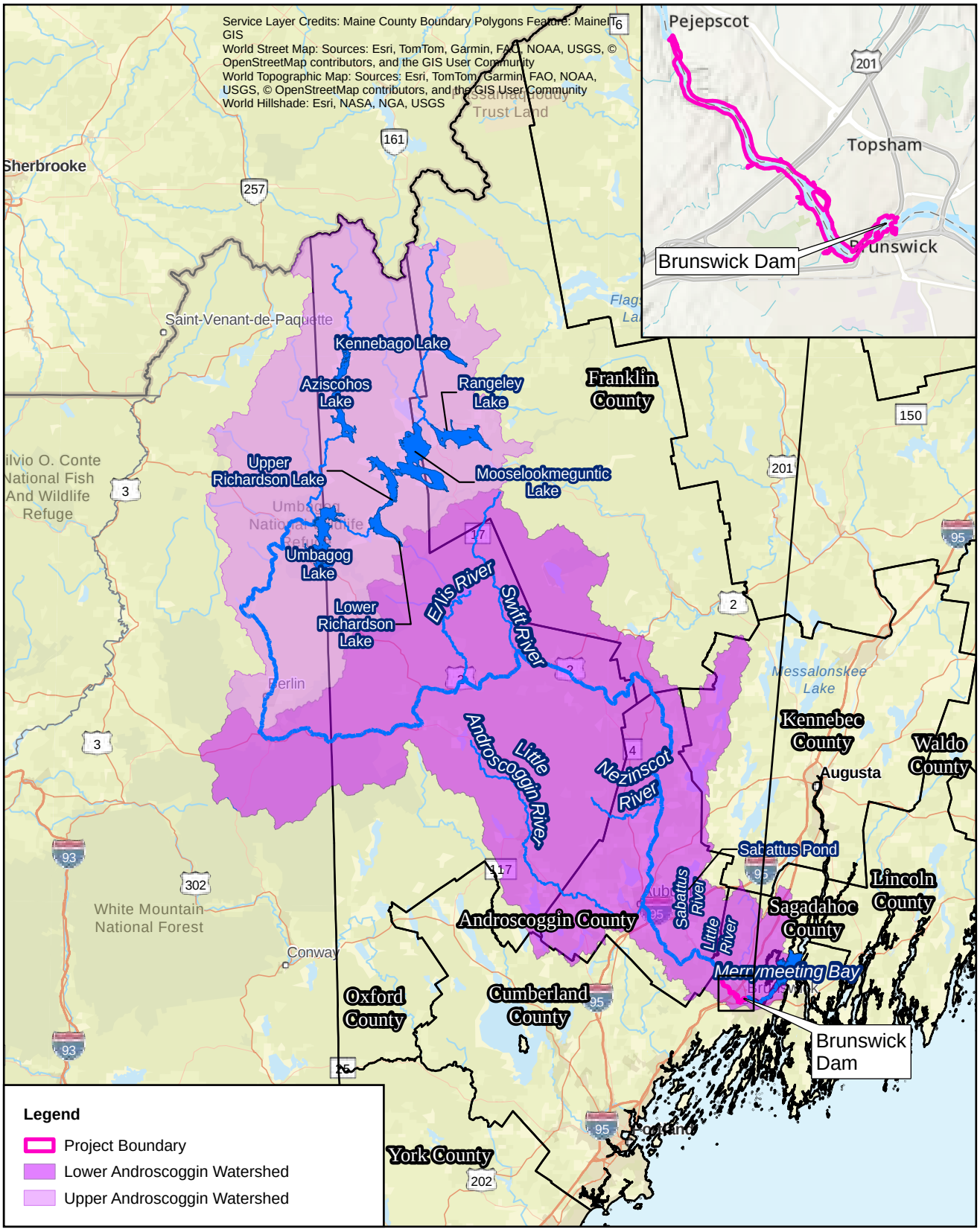
1.2.2 Comments on the Draft License Application

The DLA is being provided to participating federal and state agencies, tribes, NGOs, local governments, and the public. Comments on the DLA are due on December 30, 2026. BWPH will address stakeholders' comments on the DLA during preparation of the Final License Application (FLA), which will be filed with the Commission no later than February 28, 2027.

Table 1.2.1-1. List of Consulted Parties

Federal Agencies	
ACHP	Advisory Council on Historic Preservation
BIA	Bureau of Indian Affairs
FERC	Federal Energy Regulatory Commission
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NPS	National Park Service
USACE	United States Army Corps of Engineers
USDOI	United States Department of Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
State Agencies	
MBPL	Maine Bureau of Parks and Lands
MCP	Maine Costal Program
MDACF	Maine Department of Agriculture, Conservation, and Forestry
MDEP	Maine Department of Environmental Protection
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDMR	Maine Department of Marine Resources
MaineDOT	Maine Department of Transportation
MHPC	Maine Historic Preservation Council
Tribes	
Aroostook Band of Micmacs	
Houlton Band of Maliseet Indians	
Mi’kmaq Nation	
Passamaquoddy Tribe	
Penobscot Indian Nation	
Local Governments	
City of Auburn ME	
City of Bath, ME	
City of Lewiston, ME	
Town of Brunswick, ME	

Town of Cumberland, ME	
Town of Freeport, ME	
Town of Gray, ME	
Town of Harpswell, ME	
Town of Lisbon, ME	
Town of New Gloucester, ME	
Town of Sabattus, ME	
Town of Topsham, ME	
Town of Yarmouth, ME	
Non-Governmental Organizations	
American Rivers	American Rivers
AWW	American Whitewater
AMC	Appalachian Mountain Club
ARWC	Androscoggin River Watershed Council
ASF	Atlantic Salmon Federation
BBRC	Bath–Brunswick Regional Chamber
FOMB	Friends of Merrymeeting Bay
FTA	Free the Andro Coalition
Maine Audubon	Maine Audubon Society
Maine Rivers	Maine Rivers
MMBTU	Maine Council of Trout Unlimited and Merrymeeting Bay Chapter of Trout Unlimited
Sebago TU	Trout Unlimited (Sebago Lake Chapter)



BRUNSWICK HYDROELECTRIC PROJECT
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Brookfield

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Miles

Figure 2.1.2-1:
Androscoggin River Watershed

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2 STATUTORY AND REGULATORY REQUIREMENTS

BWPH, as Licensee for the Project, is subject to the requirements of the FPA as well as other applicable statutes. The major regulatory and statutory requirements are summarized below.

2.1 Clean Water Act – Section 401

BWPH is subject to the Water Quality Certification under Section 401(a)(1) of the federal Clean Water Act of 1977. The MDEP establishes water quality standards consistent with Maine statute 38 MRSA § 464-70. BWPH will file an application for 401 Water Quality Certification within 60 days of the Commission's Notice of Ready for Environmental Analysis, as required under Commission regulations.

2.2 Endangered Species Act

The federal Endangered Species Act (ESA) (16 U.S.C. 1531-1544 - Public Law 93-205) provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead federal agencies for implementing ESA are the USFWS and NMFS. The USFWS maintains a nationwide list of endangered species. Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. The law requires federal agencies, in consultation with the USFWS or NMFS to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. Section 9 of the ESA prohibits taking endangered species of fish and wildlife; the regulations implementing ESA define "take" as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct.

BWPH developed an Interim Species Protection Plan (ISPP) for the Brunswick Project that included provisions for Atlantic Salmon, as well as Atlantic and Shortnose Sturgeon. The ISPP was developed in consultation with the fishery resource agencies, and the Project license was amended by FERC on December 13, 2013, to incorporate the terms and conditions of the ISPP. In 2019, upon expiration of the ISPP, BWPH developed a final Species Protection Plan (SPP) for the Project, the terms of which were incorporated into the Project license by FERC on August 16, 2022. The purpose of both the ISPP and SPP is to guide Project operation and management, including fishway operations until relicensing. Terms and conditions of the ISPP and SPP include provisions for fishway operation and monitoring, Project operation, and the conduct of certain fish passage studies. The Final SPP is in effect until the issuance of a new license for the Project.

On February 21, 2024, with the filing of the Notice of Intent, BWPH requested that FERC designate it as the non-federal representative for purposes of consultation under Section 7 of the ESA. On April 16, 2024, FERC granted this request.

Consultation with federal agencies related to the Project's potential effects on ESA-listed Atlantic Salmon, Atlantic Sturgeon, and Shortnose Sturgeon have been ongoing. Consistent with this designation, FERC will develop a draft Biological Assessment for the federally endangered Gulf of Maine (GOM) Distinct Population Segment (DPS) of Atlantic Salmon, as well as Atlantic and Shortnose Sturgeon.

2.3 Coastal Zone Management Act

Under section 307 (c)(3)(A) of the Coastal Zone Management Act (CZMA) (16 U.S.C. §1456), FERC cannot issue a license for a project within or affecting a states' coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or unless the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

The Project is located on the Androscoggin River at the head-of-tide at approximately RM 6 in the Towns of Brunswick and Topsham, ME. The Project straddles the border between Cumberland and Sagadahoc counties. The Project dam is the first dam on the mainstem of the Androscoggin River. The dam and powerhouse span the Androscoggin River immediately above the U.S. Route 201 bridge connecting Topsham and Brunswick, ME, at a site originally known as Brunswick Falls and inside of Maine's designated coastal zone (MDMR, 2026). BWPH will provide MDMR with a request for consistency certification concurrent with the filing of the application for 401 Water Quality Certification with MDEP. BWPH will file the CZMA consistency certification with the Commission when it is received.

2.4 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires FERC to take into account the effect of its undertakings on historic properties, which in this case includes the issuance of a federal license for the continued operation of the Project. Section 106 of the NHPA is implemented through the Advisory Council on Historic Preservation (ACHP) Council regulations "Protection of Historic Properties" (36 CFR Part 800). The regulations implementing Section 106 (36 CFR Part 800) define the process for identifying historic properties, assessing effects, and seeking ways to resolve adverse effects on historic properties in consultation with the State Historic Preservation Officer (SHPO), federally recognized Indian tribes, the public, and other appropriate parties.

Specifically, FERC typically completes Section 106 by entering into a Programmatic Agreement with the Licensee, the ACHP, and the SHPO and tribes. FERC typically requires the Licensee to develop and implement a Historic Properties Management Plan (HPMP) as a license condition. Through an approved HPMP, FERC can require consideration and management of effects on historic properties for the license term, thus meeting the requirements of Section 106 for its undertakings.

On April 16, 2024, FERC designated BWPH as the non-federal representative for purposes of initiating day-to-day consultation pursuant to Section 106. BWPH has consulted with MHPC regarding the Project's Area of Potential Effect (APE). In addition, BWPH conducted historical and cultural resource studies in consultation with the MHPC. The results of the studies conducted to date are described in detail in Section 4.11 of this Exhibit E. The results of remaining studies not yet completed will be included in the FLA and filed with the USR.

Once the remaining studies are complete, BWPH will prepare an HPMP that will be included in the FLA. The HPMP will contain specific steps to be taken by BWPH to protect and preserve the historic properties identified at the Project over the term of the new license. With the implementation of an approved HPMP, the continued operation of the Project as proposed by BWPH will have no adverse effects on historical or cultural resources at the Project.

2.5 Magnuson-Stevens Fishery Conservation and Management Act

In 1996 the U.S. Congress recognized the increasing pressure on marine fishery resources and addressed these problems in its reauthorization of the Magnuson Fishery Conservation and Management Act, now known as the Magnuson-Stevens Act (16 U.S.C. 1800 – 1891(d)). This act required the eight Regional Fishery Management Councils, in collaboration with NMFS, to give heightened consideration to essential fish habitat (EFH) in resource management decisions. Congress defined EFH as "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity." The designation and conservation of EFH seeks to minimize adverse effects on habitat caused by fishing and non-fishing activities.

In 1998, NMFS designated 11 rivers in Maine, including the Androscoggin River, as EFH for all life stages of Atlantic Salmon. Before a federal agency proceeds with an activity that may adversely affect a designated EFH, the agency must (1) consult with NMFS and, if requested, the appropriate council for the recommended measures to conserve EFH, and (2) reply to NMFS within 30 days of receiving EFH recommendations with their decision regarding those recommendations. The agency's response must include proposed measures to avoid or minimize adverse effects on the habitat or an explanation if the agency does not adopt NMFS' recommendation.

2.6 Wild and Scenic Rivers and Wilderness Acts

Congress created the National Wild and Scenic Rivers System in 1968 (16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. Rivers are classified as either wild, scenic, or recreational. No nationally designated wild and scenic rivers or wilderness areas are located within the Brunswick Project boundary or in the vicinity of the Brunswick Project (WSR, 2026; NWPS, 2026).

The only designated wild and scenic waterway in Maine is a 92.5-mile reach of the Allagash River (WSR, 2026). The Wilderness Act of 1964 [Public Law 88-577 (16 U.S.C. 1131-1136)]

was enacted to establish a National Wilderness Preservation System for the permanent good of the whole people and for other purposes. None of the three wilderness areas in Maine are within the Androscoggin River basin (NWPS, 2026).

2.7 Federal Lands

There are no federal lands within the Project boundary.

2.8 References

Maine Department of Marine Resources. 2026. Coastal Zone Map. https://www.maine.gov/dmr/programs/maine-coastal-program/coastal-zone-map.

National Wilderness Preservation System (NWPS). 2026. Wilderness.net. Wilderness Areas of the United States.

Wild and Scenic Rivers (WSR). 2026. National Wild and Scenic Rivers System – Maine. Available online URL: http://www.rivers.gov/maine.php.

3 PROPOSED ACTION AND ALTERNATIVES

3.1 No-Action Alternative

Under the no-action alternative, the Project would continue to operate as required by the current project license (i.e., there would be no change to the existing environment). No new environmental PME measures would be implemented. FERC uses this alternative to establish baseline environmental conditions for comparison with other alternatives.

3.2 Existing Project Description

The 19-MW Brunswick Project is located on the Androscoggin River at the head-of-tide at approximately RM 6. The Project is in the Towns of Topsham and Brunswick, ME. The Project straddles the border between Cumberland and Sagadahoc counties. The drainage area at the Project is 3,437 sqm while the average annual inflow to the Project is approximately 7,018 cfs. The Project dam is the first dam on the mainstem of the Androscoggin River. The dam and powerhouse span the Androscoggin River immediately above the U.S. Route 201 bridge connecting Topsham and Brunswick, ME, at a site originally known as Brunswick Falls. The Project boundary extends approximately 4.5 miles upstream to the Pejepscot Dam and encompasses a total of approximately 348 acres. The FERC Project boundary is depicted in the Exhibit G drawings.

3.2.1 Existing Project Facilities

The Project consists of a 4.5-mile-long, 175-acre impoundment; an 830-foot-long and 40-foot-high concrete gravity dam with a gate section containing two Tainter gates and an emergency spillway; an intake and a powerhouse containing three turbine-generating units with an authorized rating of 19.0 MW. The Project also has a vertical slot upstream fishway, a downstream fish bypass, a 21-foot-high fish barrier wall between the dam and Shad Island, and a 3-foot-high by 20-foot-long concrete fish barrier weir across Granney Hole Stream in Topsham. An overview of Project facilities is shown in Figure 3.2.1-1. *Exhibit A – Project Description* provides additional detail about the existing Project facilities.

3.2.2 Existing Project Operation

The Project is operated in automatic mode as a run-of-river facility with no storage or flood control capacity. A pond level sensor is installed near the intake to monitor the Project impoundment level and to regulate the turbine-generator operation. The Project has a maximum hydraulic capacity of 7,475 cfs through the turbine-generator units, and a minimum hydraulic capacity of 1,200 cfs.

The Project's turbine-generator units 2 and 3 are not adjustable, meaning they can only be completely off or on, and cannot be adjusted over a range of operating flows. Due to the on/off nature of these units and the small pond available, the impoundment fluctuates to allow these

units to operate. Impoundment fluctuations related to this operation are limited to less than 2 ft below the top of the spillway crest as required by the FERC license.

Unit 1 typically operates at maximum efficiency during periods of river flow less than or equal to 4,400 cfs, during which periods, the unit will run in an on-off mode. During river flows of 4,400 cfs to 5,000 cfs, the unit discharge will typically approximate river flows and the pond level will be relatively constant. Unit 2 and 3 will then normally come online for river flows of 7,400 cfs or greater. There is no minimum flow requirement in the existing license, as the river reach below the Project is backwatered and tidally influenced.

BWPH also provides nighttime spill flows at the Project for downstream Atlantic salmon smolt migration based on a set of unit operational guidelines driven by total river flow at the Project. This unit prioritization is implemented during the downstream Atlantic Salmon passage season (May 1 to May 31) through resource agency consultation and is a condition of the final Atlantic Salmon Species Protection Plan that was incorporated into the Project license in 2022.

Total River Flow (cfs)	Unit Operations
<7,615	Unit 1 – online day; offline night Unit 2/3 – both online day; one offline night
7,615-18,275	Unit 1 – online day; offline night Unit 2/3 – both online day; both online night
>18,275	Unit 1 – online day and night Unit 2/3 – online day and night

3.2.3 Existing Project Boundary

The Project boundary follows the contour level of 42.0 feet (ft) National Geodetic Vertical Datum of 1929 (NGVD29)[1] around most of the Project impoundment, except along the northerly shore of the impoundment between the Project dam and the Black Bridge railroad crossing where it follows the contour level of 46.0 ft. The Project boundary also encloses the principal Project works including the dam, intake, powerhouse, tailrace, and fishway. The Project boundary extends approximately 4.5 miles upstream to the Pejepscot Dam and encompasses a total of approximately 348 acres. Figure 3.2.1-1 depicts the existing Project boundary.

3.2.4 Existing Environmental Measures

BWPH currently implements the following environmental measures at the Project.

- Operate the Project in a run-of-river mode by maintaining the impoundment within 2 ft of the spillway crest, such that inflow approximates outflow.
- Provide upstream passage for Atlantic Salmon, American Shad, river herring, and other diadromous fish species past the Project via a vertical slot fishway.

[1] Unless otherwise noted, all elevations referenced in this license application refer to the National Geodetic Vertical Datum of 1929 (NGVD29), U.S. feet.

- Provide downstream passage for diadromous fish via the Project's downstream fish passage facility consisting of a surface sluice and tailrace discharge pipe.
- Implement measures in the Final SPP to protect Atlantic Salmon, Shortnose Sturgeon, and Atlantic Sturgeon.
- Provide public access and use of Project lands and waters; and provide for and maintain the existing Project recreation sites including the 250th Anniversary Park, Fishway Viewing Area, and the Summer Street Overlook.

3.3 Proposed Action

The Proposed Action is to continue to operate and maintain the Project and continue the existing environmental measures, as described above, and implement certain environmental PME measures as described in the license application over the term of the new license.

3.3.1 Proposed Project Facilities

BWPH is proposing no power-related modifications of the existing Project facilities. The existing dam, powerhouse, and appurtenant features are all well maintained and in good working order. No changes to these facilities that are outside normal maintenance practices or the Commission's safety requirements are required or proposed.

3.3.2 Proposed Project Operation

BWPH is proposing no changes to Project operations and proposes to operate the Project in a run-of-river mode by maintaining the impoundment within 2 ft of the spillway crest, such that inflow approximates outflow.

3.3.3 Proposed Project Boundary

BWPH is proposing no changes to Project boundary.

3.3.4 Proposed Environmental Measures

At this time, BWPH proposes the following PME measures.

- Continue to operate the Project in a run-of-river mode by maintaining the impoundment within 2 ft of the spillway crest, such that inflow approximates outflow.
- Develop and implement a Operations Compliance Monitoring Plan.
- Continue consultation with the applicable resource agencies regarding upstream and downstream fish passage improvements for Atlantic Salmon, American Shad, river herring, and Sea Lamprey as the remaining outstanding relicensing studies are completed. Once the remaining relicensing studies have been completed, BWPH will identify additional PME measures for the Project related to upstream and downstream fish passage for inclusion in the FLA. In the interim BWPH proposes to:

  - Continue to provide upstream passage for Atlantic Salmon, American Shad, river herring, and other diadromous fish species past the Project via the Project's vertical slot fishway.
  - Continue to provide downstream passage for diadromous fish via the Project's downstream fish passage facility consisting of a surface sluice and tailrace discharge pipe.
  - Continue to implement measures in the Final SPP to protect Atlantic Salmon, Shortnose Sturgeon, and Atlantic Sturgeon.
- Installation and operation of a temporary portable American Eel ramp for two passage seasons (June 1 through September 15) to further identify a suitable location for a permanent upstream American Eel ramp. The temporary portable eel ramp will be installed during the first full passage season after the effective date of the new license.
- Installation and operation of a permanent upstream American Eel ramp based on the results of the temporary portable ramp evaluation. The permanent ramp will be installed during the third full passage season after the effective date of the new license.
- Develop and implement a Fishway Operations and Maintenance Plan.
- Avoid tree clearing (i.e., removal of all trees greater than three inches in diameter at breast height) on Project lands from April 15 through October 31, unless a tree poses an immediate threat to human life or property, to minimize potential impacts to northern long-eared bat and tricolored bat.
- Continue to operate and maintain the existing FERC-approved Project recreation sites with proposed facility enhancements as described in Section 4.9.3.
- Develop and implement a Historic Properties Management Plan.

3.4 Alternatives Considered but Eliminated from Detailed Analysis

3.4.1 Federal Government Takeover of Project Facilities

In accordance with 18 CFR § 16.14 of the Commission's regulations, a federal department or agency may file a recommendation that the United States exercise its right to take over a hydroelectric power project with a license that is subject to sections 14 and 15 of the FPA.

FERC indicated in SD2 that it did not consider federal takeover to be a reasonable alternative. Federal takeover of the project would require congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence showing that federal takeover should be recommended by Congress. No party has suggested that federal takeover would be appropriate, and no federal agency has expressed interest in operating the project.

3.4.2 Issuance of Non-Power License

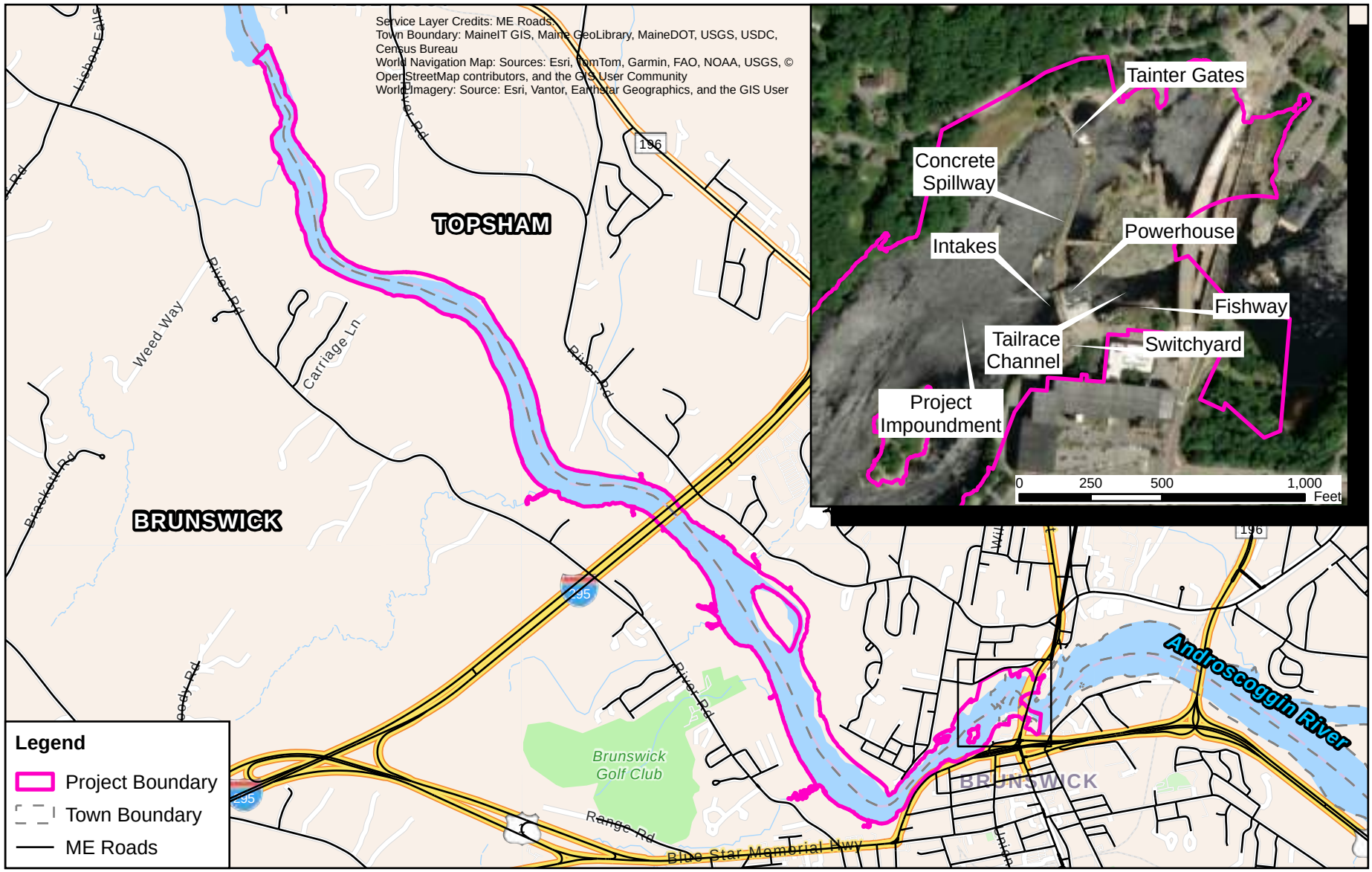
A non-power license is a temporary license the Commission would terminate whenever it determines that another governmental agency is authorized and willing to assume regulatory authority and supervision over the lands and facilities covered by the non-power license.

FERC indicated in SD2 that no governmental agency has suggested a willingness or ability to take over the project. No party has sought a non-power license, and FERC has no basis for concluding that the Project should no longer be used to produce power. Therefore, FERC does not consider a non-power license a reasonable alternative to relicensing the Project.

3.4.3 **Decommissioning**

Decommissioning of the Project could be accomplished with or without dam removal. Either alternative would require denying the relicense application and surrender or termination of the existing license with appropriate conditions. There would be significant costs involved with decommissioning the Project and/or removing any Project facilities. The Project provides a viable, safe, and clean renewable source of power to the region. With decommissioning, the Project would no longer be authorized to generate power.

FERC indicated in SD2 that no party has suggested Project decommissioning would be appropriate in this case, and FERC has no basis for recommending it. Thus, FERC does not consider Project decommissioning a reasonable alternative to relicensing the Project with appropriate environmental measures.



BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Brookfield

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Figure 3.2.1-1:
Project Boundary and Facilities

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4 ENVIRONMENTAL ANALYSIS

This section of Exhibit E (1) provides a general description of the Androscoggin River basin, (2) identifies resources that have the potential to be cumulatively affected and identifies the geographic and temporal scope of the cumulative effects analysis, (3) provides a description of the environment for resources that have the potential to be affected by the proposed action, (4) provides an environmental analysis of the effects (positive or negative) of the proposed action and proposed PME measures, and (5) describes any unavoidable adverse effects that may still remain after implementation of PME measures. The Commission defines unavoidable adverse effects as "any adverse environmental effects that cannot be avoided should the proposal be implemented, including effects of protection, mitigation, and enhancement measures".

As noted in Section 1.2.1, BWPH prepared or is completing 13 individual comprehensive studies that were developed in consultation with the active stakeholders to address specific resource issues and to collect up-to-date baseline information on resources in the Brunswick Project area. In addition to updating baseline resource information, BWPH performed the studies to aid in evaluating the effects, if any, of continued project operation and maintenance on the human and natural environment. The resource descriptions in the following sections summarize the existing conditions and results of the studies. The environmental analysis is based largely upon the information that BWPH collected during study implementation in 2025-2026, supplemented with information originally reported in the PAD.

4.1 Cumulative Effects

According to the Council on Environmental Quality's regulations for implementing NEPA (40 CFR 1508.7), an action may cause cumulative effects if its effects overlap in space and or time with the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

4.1.1 Resources that could be Cumulatively Affected

In SD2, the Commission identified water quality, aquatic habitat and migratory fisheries as resources that could be cumulatively affected by the continued operation and maintenance of the Brunswick Project in combination with other hydroelectric projects and other activities in the Androscoggin River Basin. The effects analyses for the resources identified as having the potential to be cumulatively affected appear in the applicable resource area sections.

4.1.2 Geographic Scope of Cumulative Effects Analysis

The geographic scope of analysis for cumulatively affected resources is defined by the physical limits or boundaries of: (1) the proposed action's effect on the resources, and (2) contributing effects from other hydropower and non-hydropower activities within the Androscoggin River

Basin. In SD2, FERC identified the geographic scope for water quality to include the Androscoggin River from the upstream extent of the Brunswick reservoir to where the Androscoggin River flows into Merrymeeting Bay. FERC noted that this geographic scope was chosen because the operation and maintenance of the Brunswick Project, in combination with other developments in the Androscoggin River Basin may affect water quality and/or aquatic habitat in this segment of the Androscoggin River.

FERC identified the geographic scope for migratory fisheries to include the Androscoggin River Basin. FERC chose this geographic scope because the operation and maintenance of the Brunswick Project, in combination with other hydroelectric projects in the Androscoggin River Basin may affect migratory fisheries resources in the Androscoggin River Basin. There are no less than 28 dams on the mainstem Androscoggin River from its headwaters to the point where it flows into Merrymeeting Bay.

4.1.3 Temporal Scope of Cumulative Effects Analysis

The temporal scope of the cumulative effects analysis will include a discussion of past, present, and reasonably foreseeable future actions and their effects on each resource that could be cumulatively affected. Based on the potential term of a new license, the temporal scope will look 30 to 50 years into the future[2], concentrating on the effect on the resources from reasonably foreseeable future actions. The historical discussion will, by necessity, be limited to the amount of available information for each resource. The quality and quantity of information, however, diminishes as FERC analyzes resources further away in time from the present.

4.2 Resource Issues

FERC identified a list of environmental issues to be addressed in the Environmental Assessment in their SD2. This list is not intended to be exhaustive or final, but contains those issues raised to date that could have substantial effects. Issues denoted with an asterisk [*] are to also be considered for cumulative effects and site-specific effects.

4.2.1 Geology and Soils Resources

- None

4.2.2 Aquatic Resources

- Effects of continued project operation on water quality from the project headwaters downstream to where the Androscoggin River flows into Merrymeeting Bay.*
- Effects of continued project operations on aquatic habitat in the Project area for migratory and resident fish species.*

[2] SD2 identifies a temporal scope of 30-50 years, however, a 2017 Policy Statement (161 FERC ¶ 61,078) sets the default license term for hydropower projects at 40 years.

- Effects of continued project operation on passage of migratory and resident fish species in the Androscoggin River.*

4.2.3 Terrestrial Resources

- Effects of project maintenance (e.g., vegetation management) on special status species including bats and migratory birds.
- Effects of the project on the spread and control of invasive species.

4.2.4 Threatened and Endangered Species

- Effects of project operation and maintenance on the Atlantic salmon and its critical habitat, Atlantic sturgeon and its critical habitat, shortnose sturgeon, and the Northern long-eared bat which are federally listed as endangered; the tri-colored bat which is federally proposed as threatened; and the monarch butterfly, which is a candidate species for federal listing.

4.2.5 Recreation and Land Use

- Effects of continued project operation and maintenance on recreational use and experience in the Project area, including the adequacy of existing recreation access, education and interpretive opportunities, and facilities in meeting current and anticipated recreation needs.

4.2.6 Environmental Justice

- Effects of continued project operation and maintenance on identified environmental justice communities.

4.2.7 Cultural Resources

- Effects of continued project operation and maintenance activities on historic and archaeological resources, traditional cultural properties, and access to exercise traditional practices and treaty rights.

4.2.8 Developmental Resources

- Effects of proposed environmental measures and associated costs on project economics.

4.3 General Description of the River Basin

4.3.1 Androscoggin River Basin

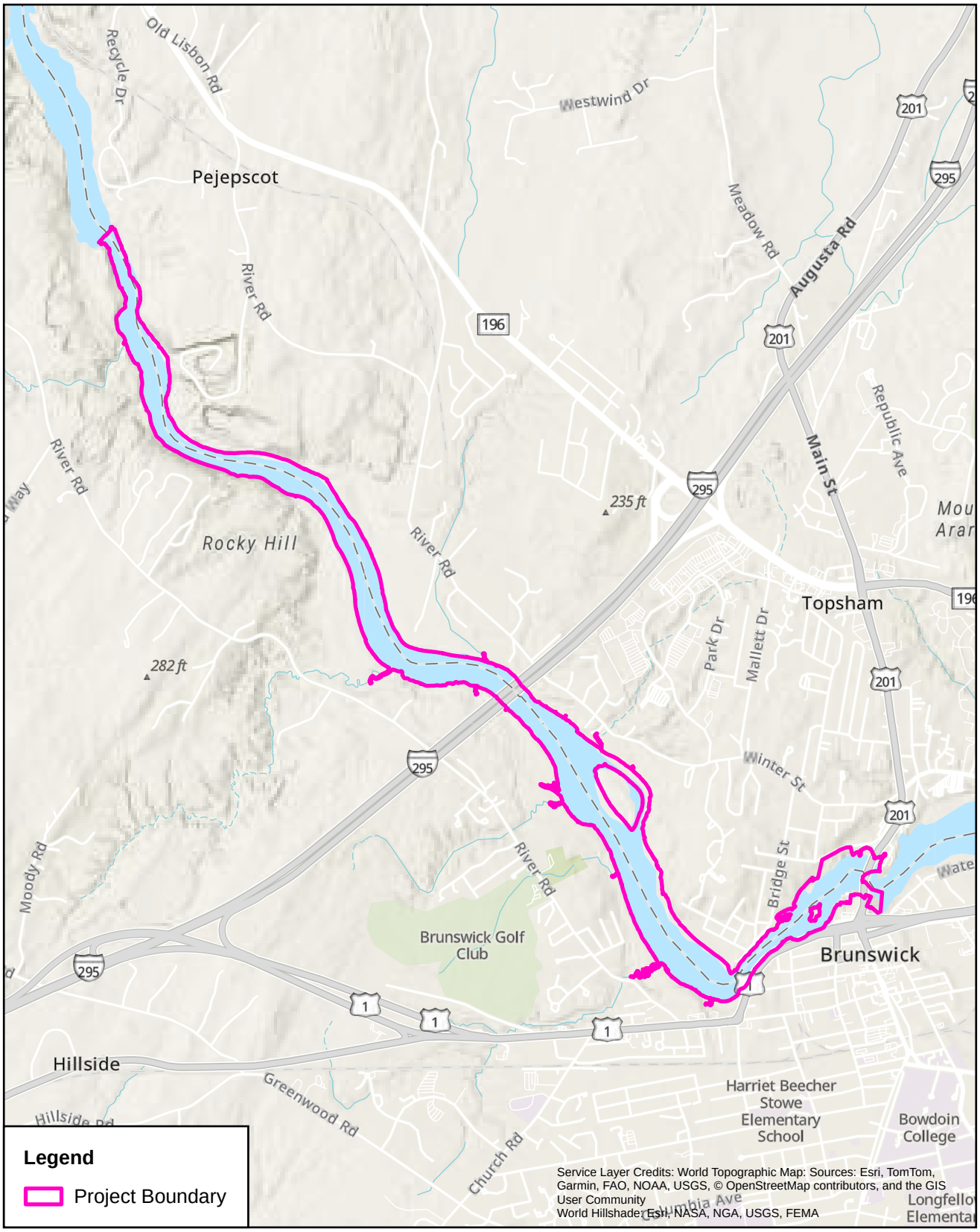
The Androscoggin River watershed (Figure 1-1) has a total drainage area of 3,530 sqm. The Androscoggin River originates at the outlet of Umbagog Lake in northern New Hampshire and flows south and east in New Hampshire and Maine approximately 178 miles to the tidal portion of the Kennebec River in Merrymeeting Bay along the coast of Maine. The river basin at Umbagog Lake has a drainage area of about 1,045 sqm and includes portions of the rugged and heavily forested northeastern New Hampshire and northwestern Maine. Upstream of Umbagog Lake, are large reservoirs including Kennebago, Mooselookmeguntic, Upper and Lower Richardson, and Aziscohos which are primarily operated as storage reservoirs. Umbagog Lake and these reservoirs have a combined storage capacity of about 644,000 acre-ft and account for most of the regulated water storage in the basin. Major tributaries to the Androscoggin River include the Swift, Little Androscoggin, Ellis, and Nezinscot rivers (USGS, 1986). There are approximately 16 major tributaries within the Androscoggin watershed that have drainage areas ranging from 60 to 470 sqm each with a total drainage equaling 3,530 sqm (ENSR, 2007). There are nine minor tributaries that feed directly into the Project impoundment, which have a combined drainage area of about 43 sqm. From upstream to downstream, these include Simpson Brook and eight other unnamed streams. The only outlet of the impoundment is through the Project itself.

The Brunswick Project is at the downstream end of the non-tidal portion of the river and has a drainage area of approximately 3,437 sqm. The Project impoundment extends about 4.5 miles upstream to the Pejepscot Dam tailwaters. The river below the Project is tidally influenced. Figure 1-1 presents a map of the Androscoggin River watershed.

4.3.2 **Topography**

The Project is located within the New England physiographic province, which is part of the Appalachian Highlands physiographic division. More specifically, the Project lies within the Seaboard Lowland section of the New England province. The Seaboard Lowland section encompasses most of the coastal region of Maine up to the St. Croix River bordering Canada. This section is lower in elevation and less hilly than the bordering New England Upland physiographic section. Elevations found throughout the Seaboard Lowland section can range from 0 to 500 ft.; however, topographic relief is limited to less than approximately 200 ft. in most places. The Seaboard Lowlands are often considered as the sloping margin of the New England Uplands and coincide with the area inundated by the ocean and areas of large pro-glacial lakes during the last glacial retreat (Flanagan *et al.*, 1999).

Although the Androscoggin River in the vicinity of the Project is in the Seaboard Lowlands, the topography of the river basin varies greatly from its headwaters at Lake Umbagog (1,250 ft) to the Project (39.4 ft) before continuing to the river mouth at Merrymeeting Bay at sea level. Consistent with the characteristics of the Seaboard Lowlands, elevations surrounding the Brunswick impoundment typically remain below 200 ft and decrease gradually to the impoundment shoreline (normal pool elevation 39.4 ft). The general topography of the Androscoggin River watershed in the vicinity of the Project is shown in Figure 4.3.2-1.



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Figure 4.3.2-1:
Topography in the Vicinity of the Project

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4.3.3 Climate

The Androscoggin River basin has mild and humid summers and cold and snowy winters. At Bath, ME, the nearest NOAA NOWData weather station, is located approximately 5 miles east of the Project. July temperatures range from a daily average maximum of 79° F to a daily average minimum of 57° F. January temperatures range from a daily average maximum of 31° F to a daily average minimum of 10° F. The upper part of the watershed has generally lower temperatures, especially during the winter with Rangeley, ME January temperatures ranging from a daily average maximum of 23° F to a daily average minimum of 0° F. The basin averages between 40 and 50 inches of precipitation per year, which is, on average, relatively evenly disturbed throughout the year. Total average annual snowfall at Durham, ME is about 70 inches. Annual snowfall in the northern part of the watershed exceeds 110 inches (NOAA, 2023).

4.3.4 Major Land Uses

The Androscoggin River watershed upstream of the Project is primarily undeveloped. Based on review of the available land-use data, approximately 75% of the watershed is classified as either mixed forest (31.7%), deciduous forest (25.0%), or evergreen forest (20.7%). Woody wetlands, shrub/scrub, open water, pasture/hay, and developed open space collectively account for 16% of the land in this area. The remaining 6.6% is a mix of various categories (e.g., shrub/scrub, grassland/herbaceous, etc.), none of which account for greater than 2% of the land area (NLCD, 2021). Table 4.3.4-1 provides a breakdown of the various land-use classifications found throughout the Androscoggin River watershed upstream of the Project, while Figure 4.3.4-2 shows the location of the various land-use classifications in relation to the Project.

Within 1,000 ft of the Project boundary, the land-use is dominated by open water (19.4%) (i.e., the Project impoundment), and various forest classifications (i.e., mixed (16.4%), evergreen (10%), or deciduous (10%)), barren land composed of rock, sand, or clay (11%), and land with various degrees of development (13%). The remaining land use classifications found within 1,000 ft of the Project boundary are a combination of shrub/scrub, various types of wetlands, pasture/hay fields, cultivated crops, and grassland/herbaceous land (NLCD, 2021). Table 4.3.4-2 provides a breakdown of the land-use classifications found within 1,000 ft of the Project boundary, and Figure 4.3.4-2 shows the location of the various land-use classifications in this same area. Additional information pertaining to land use near the Project is discussed in Section 4.9.

Table 4.3.4-1. Androscoggin River Watershed Land-Use Upstream of the Project

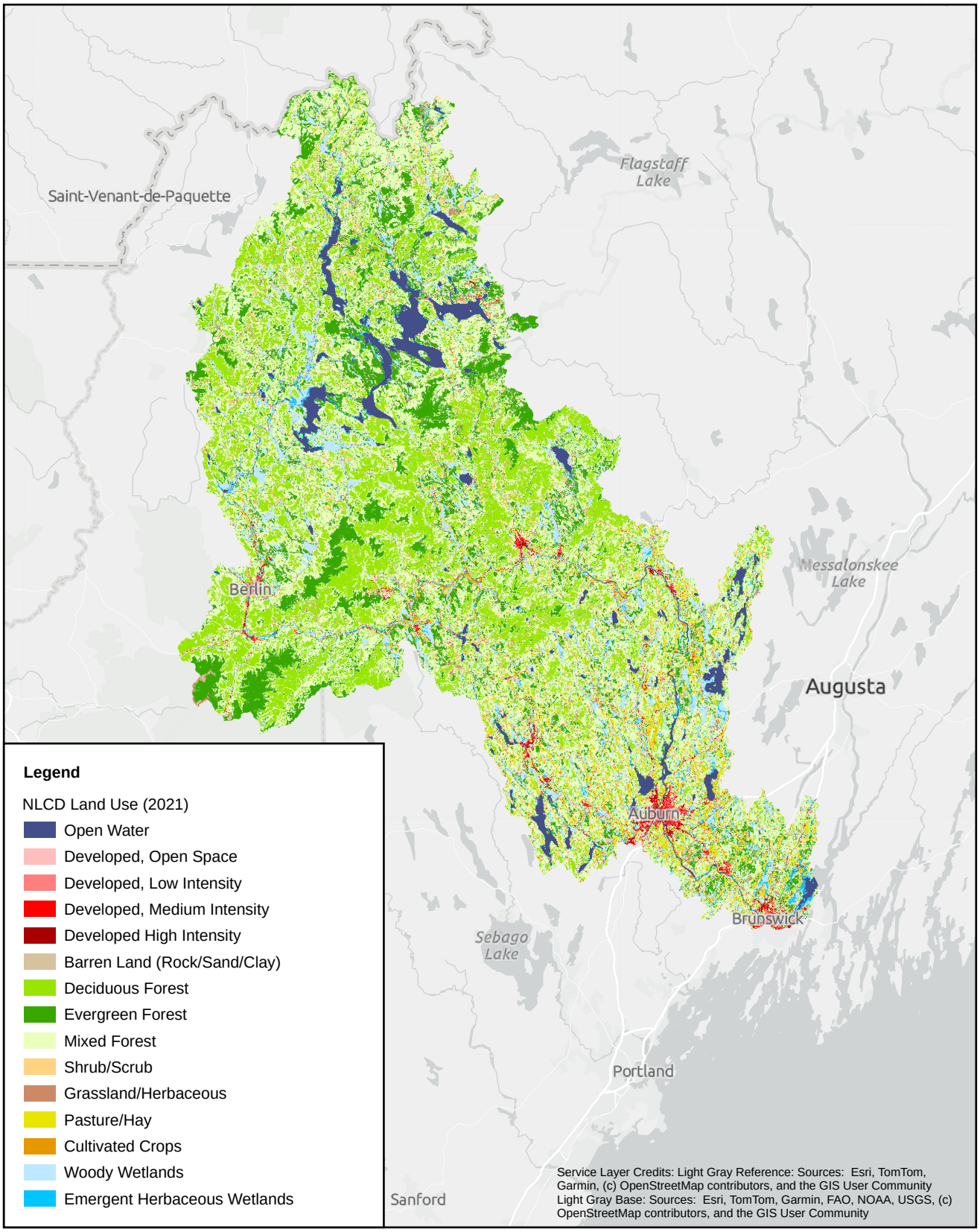
Land Use Classification	Area (acres)	Total (%)
Mixed Forest	714,732	31.7%
Deciduous Forest	565,276	25.0%
Evergreen Forest	467,946	20.7%
Woody Wetlands	144,806	6.4%
Open Water	102,078	4.5%
Pasture/Hay	59,094	2.6%
Developed, Open Space	55,242	2.4%
Shrub/Scrub	41,977	1.9%
Developed, Low Intensity	36,178	1.6%
Grassland/Herbaceous	21,062	0.9%
Developed, Medium Intensity	19,782	0.9%
Emergent Herbaceous	13,794	0.6%
Developed High Intensity	5,731	0.3%
Barren Land (Rock/Sand/Clay)	5,160	0.2%
Cultivated Crops	4,222	0.2%
Total	2,257,080	100%

Source: NLCD 2021

Table 4.3.4-2. Land-Use within 1,000 ft. of the Project Boundary

Land Use Classification	Area (acres)	Total (%)
Open Water	331.6	19.4%
Mixed Forest	279.3	16.4%
Deciduous Forest	227.2	13.3%
Developed, Low Intensity	164.4	9.6%
Evergreen Forest	151.2	8.9%
Developed, Open Space	143.1	8.4%
Developed, Medium Intensity	137.9	8.1%
Woody Wetlands	91.1	5.3%
Developed, High Intensity	55.8	3.3%
Pasture/Hay	42.2	2.5%
Barren Land (Rock/Sand/Clay)	24.9	1.5%
Grassland/Herbaceous	22.6	1.3%
Emergent Herbaceous Wetlands	20.8	1.2%
Shrub/Scrub	15.1	0.9%
Total	1,707.2	100%

Source: NLCD 2021



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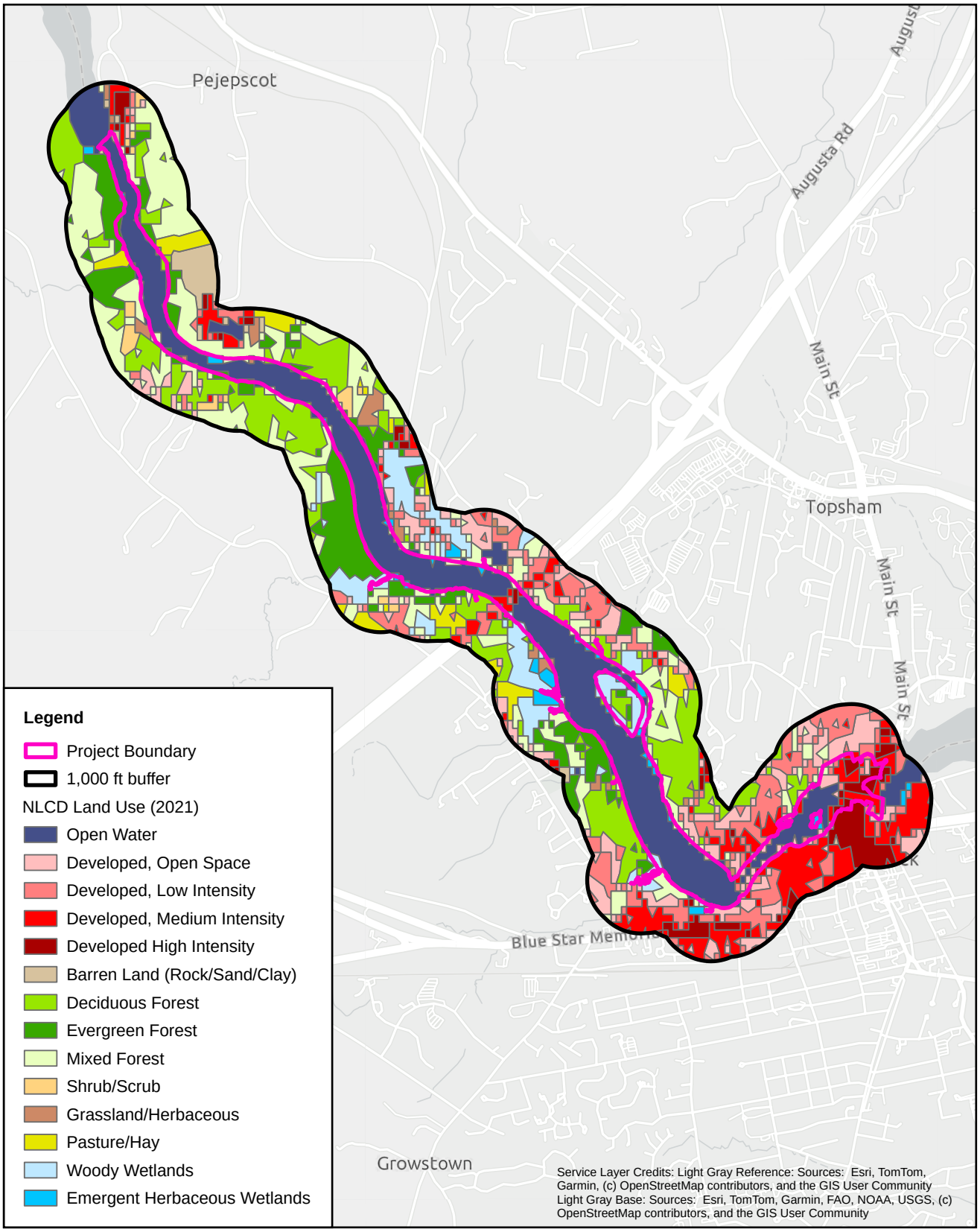
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Figure 4.3.4-1:
Androscoggin River
Watershed Land-Use Classification
Upstream of the Project

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Figure 4.3.4-2:
Land-Use within 1,000 feet of the Project boundary

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4.3.5 Major Water Uses

Principal water uses in the Androscoggin River basin in Maine are industrial and hydropower facilities along the mainstem of the Androscoggin River in the towns of Rumford, Livermore Falls, Jay, Lewiston, Topsham, and Brunswick (USGS, 1986). The Androscoggin River has a long history of industrial and municipal use over the last 200 years. Beginning in the early 1800s, many dams were constructed for mills, primarily in the lower part of the river. By the late 1800s, many textile and lumber mills were in operation, mostly from Lewiston to Brunswick. Discharging of pollutants to the river became regulated with the passage of the Clean Water Act of 1972, with significant improvements to and recovery of water quality in the ensuing period (MDEP, 2019).

Along the Androscoggin River, there are numerous facilities that hold individual National Pollutant Discharge Elimination System permits allowing them to discharge treated wastewater. Upstream of the Project, the Town of Lisbon has a permit to discharge 2.025 million gallons per day (MGD) of secondary treated municipal sanitary wastewater to the Little River. Immediately downstream of the Project, the Brunswick Sewer District has a permit to discharge 3.85 MGD of secondary treated municipal wastewater from the publicly owned treatment works to the Androscoggin River. There are no Drinking Water Treatment Plants along the river (EPA, 2026a & 2026b).

In 2022, approximately 52.39 million gallons of Combined Sewer Overflows (CSO) were discharged into the Androscoggin River watershed (MDEP, 2023). CSO's discharge untreated wastewater from municipal sewage systems and may include a mixture of sanitary sewage, storm water, and industrial waste.

The annual mean daily flow into the Project is approximately 7,018 cfs, pro-rated from the U.S. Geological Survey (USGS) Gage No. 01059000 Androscoggin River near Auburn, ME (USGS, 2026a). The maximum peak annual water year flow recorded during the period of record (May 1929 to December 2025), as measured at the USGS Gage No. 01059000 upstream of the Project, was approximately 135,000 cfs, which occurred in March 1936. The lowest annual water year peak flow recorded during that period was approximately 17,300 cfs, which occurred in April 1985 (USGS, 2026b).

4.3.6 Basin Dams

The Androscoggin River basin contains over 200 dams according to a combination of data from the NH Geodata Portal and Maine geographic information systems (GIS) dam layers. While many of these dams are on tributaries, there are 22 dams on the mainstem of the Androscoggin River below Errol, NH.

The FERC licensed hydroelectric projects on the mainstem of the Androscoggin River and the headwater storage dams are provided in Table 4.3.6-1. This table does not include the six developments on the Lewiston Canal System which are part of the Lewiston Falls Project, nor

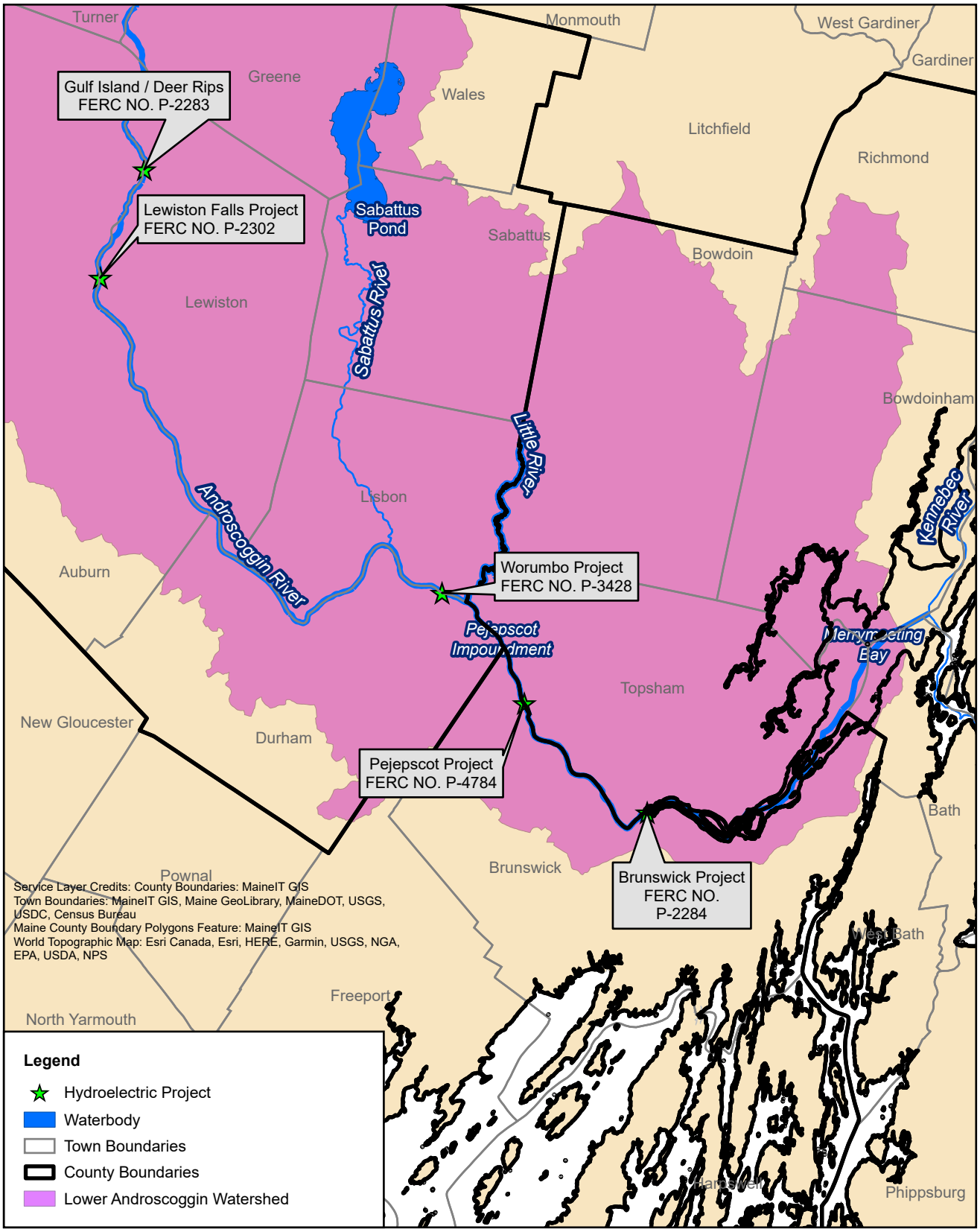
numerous dams and FERC licensed hydropower projects on tributaries to the Androscoggin River. Figure 4.3.6-1 provides a map of the hydroelectric projects and key features within the vicinity of the Project along the lower mainstem of the Androscoggin River.

Table 4.3.6-1. Dams on the Mainstem of the Androscoggin River and the headwaters above Umbagog Lake (Upstream to Downstream)

Project Name	State	FERC No.	Owner/Operator
Mahaney	ME	4413	Kennebago Hydro Corp
Kennebago Falls	ME	4413	Kennebago Hydro Corp
Rangeley	ME	N/A	Brookfield White Pine Hydro, LLC
Upper Dam	ME	11834	Brookfield White Pine Hydro, LLC
Middle Dam	ME	11834	Brookfield White Pine Hydro, LLC
Aziscohos	ME	4026	Androscoggin Reservoir Company
Errol	NH	3133	Brookfield White Pine Hydro, LLC and Errol Hydroelectric Company, LLC
Pontook	NH	2861	Pontook Operating Limited Partnership
Sawmill	NH	2422	Great Lakes Hydro American, LLC
Riverside	NH	2423	Great Lakes Hydro American, LLC
J. Brodie Smith	NH	2287	Patriot Hydro, Inc
Cross Power	NH	2326	Great Lakes Hydro American, LLC
Cascade	NH	2327	Great Lakes Hydro American, LLC
Gorham	NH	2311	Great Lakes Hydro American, LLC
Gorham	NH	2288	Patriot Hydro, Inc
Shelburne	NH	2300	Great Lakes Hydro American, LLC
Upper Rumford Falls	ME	2333	Rumford Falls Hydro, LLC
Lower Rumford Falls	ME	2333	Rumford Falls Hydro, LLC
Riley	ME	2375	Eagle Creek Renewable Energy
Jay	ME	2375	Eagle Creek Renewable Energy
Otis	ME	8277	Eagle Creek Renewable Energy
Livermore Falls	ME	2375	Eagle Creek Renewable Energy
Gulf Island	ME	2283	Brookfield Renewable Energy Group
Deer Rips / Androscoggin No.3	ME	2283	Brookfield Renewable Energy Group
Lewiston Falls	ME	2302	Brookfield White Pine Hydro, LLC
Worumbo	ME	3428	Eagle Creek Renewable Energy
Pejepscot	ME	4784	Topsham Hydro Partners
Brunswick	ME	2284	Brookfield White Pine Hydro, LLC

Notes: Headwater Storage Reservoirs include: Umbagog, Aziscohos, Middle Dam, and Upper Dam.

Source: (FERC, 2026)



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Figure 4.3.6-1:
Mainstem Hydroelectric Projects and Key Features in the Vicinity of the Project

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4.3.7 References

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4.4 Geology and Soils

4.4.1 Affected Environment

4.4.1.1 Existing Geological Features

4.4.1.1.1 Bedrock Geology

The bedrock geology found at the Project and surrounding area consists primarily of the Ordovician-Precambrian Z Cushing (OZc) Formation and the Silurian-Ordovician Vassalboro (SOv) Formation. The geologic age of the OZc formation ranges from Ordovician (488 million years old) to Precambrian Z (1 billion-year-old) and the SOv formation ranges from Silurian (443 million years old) to Ordovician (488 million years old). The OZc formation is weakly metamorphosed and containing local occurrences of prehnite and pumpellyite. The SOv formation is usually made up of sandstone, is massive in size, and bluish gray in color and it is locally quartzite with shaly layers that have been transformed to pyritiferous mica schists and contains numerous calcareous beds. The lithologic constituents of OZc include mafic-volcanic and felsic-volcanic (major) while the lithologic constituents of SOv include limestone (minor), and quartzite and schist (incidental) (USGS, 2026a and USGS, 2026b).

4.4.1.1.2 Surficial Geology

The surficial characteristics observed near the Project area are dominated by thin drift areas, stream alluvium, the Presumpscot foundation, and braided-stream alluvium which collectively account for 82% of the total area analyzed. The remaining 18% is composed of a variety of surficial classifications. Summary statistics for all surficial characteristics found near the Project are provided below; descriptions of the dominant classifications (i.e., accounting for greater than 10% of the area) are also provided. Figure 4.4.1.1.2-1 depicts the surficial characteristics which exist near the Project and surrounding area.

- Thin-drift areas (Ptd): 39%
- Stream alluvium (Ha): 18%
- Presumpscot foundation (Pp): 13%
- Braided-stream alluvium (Pa): 12%
- Regressive marine delta (Pmdr): 6%
- Pejepscot fan (Pmfp): 5%
- Marine nearshore deposits (Pmn): 4%
- Freshwater wetlands (Hw): 2%
- Artificial fill (af): 1%
- Eolian deposits (Pe): 1%

Thin-drift areas: Thin drift areas generally have less than 10 ft of drift over the bedrock it covers and can be found on ridge crests and hillslopes (MGS, 1997).

Stream alluvium: Gray to brown fine sand and silt with some gravel. Comprises flood plains along present streams and rivers. Extent of alluvium approximates areas of potential flooding MGS, 1997).

Presumpscot foundation: Presumpscot foundation, also known as the Presumpscot formation or "blue clay," is a glacial marine mud containing ground-up minerals that make up bedrock found in Maine (MGS, 2000). It can be a massive to laminated layer with occasional shelly horizons that lie over rock and till. It is interbedded with marine fan deposits as well as end moraines (MGS, 1997).

Braided-stream alluvium: Pleistocene alluvium consisting of fluvially deposited sand and gravel; trough-crossbeds with rare mud drapes and intraclasts are representative of braided streams and coastal braid-delta environment formed during the marine regression (MGS, 1997).

4.4.1.1.3 Soils

Windsor loamy sand, 0 to 35% slopes, is the dominant soil type found in the Project area, accounting for approximately 21% of area. Other prominent soil types found in this area include Adams loamy sand; Ondawa fine sandy loam; Lyman-Tunbridge complex; Suffield silt loam; Podunk silt loam; and Charles silt loam. Collectively, these five soil types account for 68% of the area analyzed. The remaining 32% is comprised of a combination of 25 other soil types. Summary statistics and descriptions of the prominent soil types found in the Project area (i.e., those soils which account for greater than 5% of the area analyzed) are provided below. Figure 4.4.1.1.3-1 depicts the soil types near the Project and Table 4.4.1.1.3-1 provides a breakdown of the various soils found within 1,000 ft of the Project boundary.

- Windsor loamy sand, 0 to 8%, 8 to 15%, and 15 to 35% slopes (WmB, WmC, and WmD): 21%
- Adams loamy sand, 0 to 8%, 8 to 15%, and 15 to 35% slopes (AaB, AaC, and AaD): 15%
- Lyman-Tunbridge complex, 0 to 8%, 8 to 15%, and 15 to 35% slopes, rocky (HrB, HrC, and HrD): 10%
- Ondawa fine sandy loam, 0 to 3% slopes, occasionally flooded (On): 7%

Windsor: The Windsor series slopes between 0 and 35% within the vicinity of the Project but may slope up to 60% elsewhere. It consists of a mixed, excessively drained soil and can be found very deep in sandy outwash or eolian deposits. The upper layer ranges in thickness from 10 to 36 inches. Areas associated with this series may be forested or used for agriculture (NRCS, 2026). Depth to bedrock is 5 ft or more (USDA et. al, 1974).

Adams: The Adams series slopes between 0 and 30% within the vicinity of the Project but may slope up to 70% elsewhere. It is formed in glacial-fluvial or glacio-lacustrine sand and can be found within Northern New York and New England. It is an excessively drained soil series present on outwash planes, kames, terraces, eskers, and lake planes. The thickness of upper layer ranges from 16 to 35 inches. The depth to bedrock is over 72 inches (NRCS, 2016).

Lyman-Tunbridge: The Lyman-Turnbridge complex series is comprised of Lyman and Tunbridge soils. The soil complex slopes between 0 and 35% within the vicinity of the Project but may slope up to 80% elsewhere. The Lyman series consists of shallow, somewhat excessively drained soils on glaciated uplands. The Tunbridge series consists of moderately deep, well drained soils on glaciated uplands. They both formed in loamy supraglacial till and the estimated saturated hydraulic conductivity is moderately high or high throughout the mineral soil. In the Lyman series, the thickness of upper layer ranges from 10 to 20 inches and corresponds to the depth of bedrock. The thickness of the upper layer of Tunbridge soils range from 14 to 38 inches and the depth to bedrock ranges from 20 to 39 inches (NRCS, 2016).

Ondawa: The Ondawa series slopes between just 0 and 3% within the vicinity of the Project and, in general, does not slope more than 3% anywhere it is located. It consists of very deep, well drained soils formed in recent alluvium on floodplains. The thickness of the upper layer ranges from 20 to 40 inches and the depth to bedrock is greater than 60 inches (NRCS, 2016).

Soil Erodibility

Erosion factors for the soils identified above were gathered from the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS, 2026). The erosion factor, or K factor, indicates the susceptibility of a soil to sheet and rill erosion by water and is one of several factors used in the Universal Soil Loss Equation and the Revised Universal Soil Loss Equation to predict the average annual rate of soil loss. K factor values range from 0.02 to 0.43, with the higher the K factor value typically indicating a higher susceptibility to erosion (NRCS, 2026). Table 4.4.1.1.3-2 shows the K factor for the fine-earth fraction, also referred to as the Kf factor, of the prominent soils found in the vicinity of the Project. As shown in the table, these soils are characterized as having low to moderate erodibility. The Windsor series, the most common soil type found in the Project area, was found to have the second lowest erodibility, while the Lyman-Tunbridge complex and Ondawa series were found to have moderate erodibility.

4.4.1.1.4 Impoundment Shoreline and Streambanks

The Project impoundment extends approximately 3 miles upstream of the Pejepscot Dam and includes approximately 6.6 miles of shoreline. In general, the shoreline is mostly forested with a mixture of evergreen and deciduous trees; however, shoreline characteristics, including sediment composition, topography, and vegetative cover, tend to vary. Shoreline soils found in the upper portion of the impoundment are dominated by the Adams series, which has a low erodibility factor. Shoreline soils found throughout the middle and lower portions of the impoundment are a combination of the Adams, Hartland, Hinckley, Windsor, and Suffield series, which have low to moderate erodibility factors (Table 4.4.1.1.3-2). In general, erosion is not a concern along the impoundment.

The area from the Pejepscot Dam to the downstream extent of the Project boundary includes approximately 475 ft of shoreline, which consists almost entirely of rock outcrops, ledge, or stone masonry and concrete walls.

Table 4.4.1.1.3-1 Soils within 1,000 ft of the Project Boundary

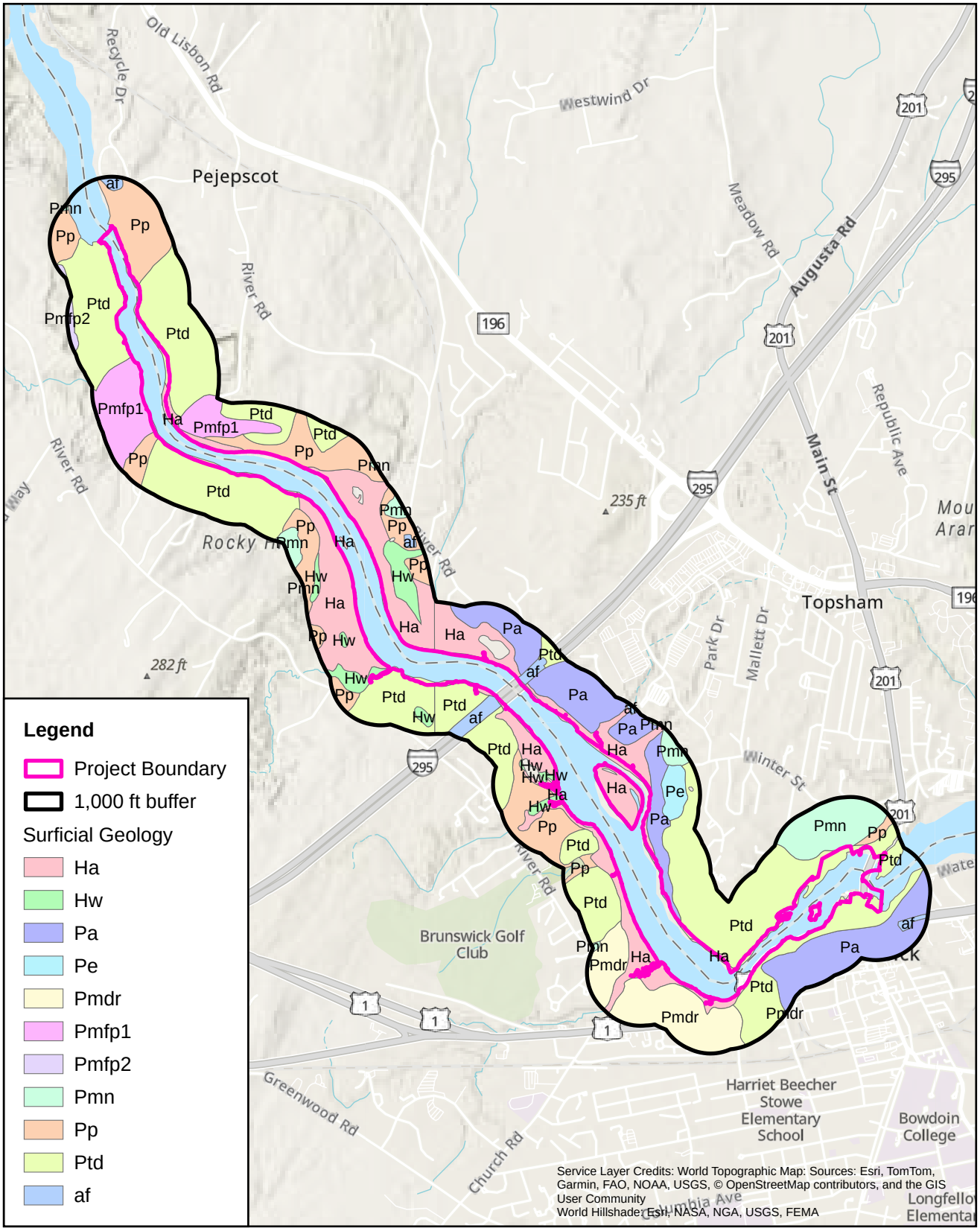
Soil Symbol	Soil Classification	Area (acres)	Total (%)
AaB	Adams loamy sand, 0 to 8% slopes	59	3.4%
AaC	Adams loamy sand, 8 to 15% slopes	98	5.7%
AaD	Adams loamy sand, 15 to 30% slopes	43	2.5%
Au	Au Gres loamy sand	3	0.2%
BgB	Nicholville very fine sandy loam, 0 to 8% slopes	23	1.3%
BgC	Nicholville very fine sandy loam, 8 to 15% slopes	1	0.0%
BgC2	Nicholville very fine sandy loam, 8 to 15% slopes	11	0.6%
BuB	Lamoine silt loam, 3 to 8% slopes	3	0.2%
BuC2	Buxton silt loam, 8 to 15% slopes	3	0.2%
Cu	Cut and fill land	23	1.4%
DeA	Deerfield loamy fine sand, 0 to 3% slopes	4	0.2%
DeB	Deerfield loamy fine sand, 3 to 8% slopes	13	0.8%
DP	Dumps	3	0.2%
EmB	Elmwood fine sandy loam, 2 to 8% slopes	8	0.5%
Gp	Gravel pits	0	0.0%
GP	Sand and gravel pits	42	2.4%
HfB	Hartland very fine sandy loam, 3 to 8% slopes	5	0.3%
HfC2	Hartland very fine sandy loam, 8 to 15% slopes, eroded	13	0.7%
HfD2	Hartland very fine sandy loam, 15 to 25% slopes, eroded	35	2.1%
HkC	Hinckley gravelly sandy loam, 8 to 15% slopes	3	0.1%
HkD	Hinckley gravelly sandy loam, 15 to 25% slopes	24	1.4%
HlB	Hinckley loamy sand, 3 to 8% slopes	0	0.0%
HlC	Hinckley loamy sand, 8 to 15% slopes	4	0.3%
HrB	Lyman-Tunbridge complex, 0 to 8% slopes, rocky	48	2.8%
HrC	Lyman-Tunbridge complex, 8 to 15% slopes, rocky	85	5.0%
HrD	Lyman-Tunbridge complex, 15 to 35% slopes, rocky	8	0.5%
HsB	Lyman-Abram complex, 0 to 8% slopes, very rocky	26	1.5%
HsC	Lyman-Abram complex, 8 to 15% slopes, very rocky	27	1.6%
HsD	Lyman-Abram complex, 15 to 35% slopes, very rocky	3	0.2%
HsE	Lyman-Abram complex, 15 to 35% slopes, very rocky	10	0.6%
Lk	Charles silt loam, 0 to 2% slopes, occasionally flooded	55	3.2%

Soil Symbol	Soil Classification	Area (acres)	Total (%)
Ls	Limerick-Saco silt loams	4	0.2%
MeC	Melrose fine sandy loam, 8 to 20% slopes	1	0.1%
MkB	Merrimac fine sandy loam, 0 to 8% slopes	15	0.9%
MkC2	Merrimac fine sandy loam, 8 to 15% slopes, eroded	5	0.3%
MkD2	Merrimac fine sandy loam, 15 to 25% slopes, eroded	12	0.7%
NgB	Ninigret fine sandy loam, 0 to 8% slopes	32	1.9%
On	Ondawa fine sandy loam, 0 to 3% slopes, occasionally flooded	96	5.6%
PbB	Paxton fine sandy loam, 3 to 8% slopes	17	1.0%
Py	Podunk fine sandy loam, 0 to 3% slopes, occasionally flooded	69	4.1%
Ru	Rumney fine sandy loam, 0 to 3% slopes, frequently flooded	32	1.9%
ScA	Scantic silt loam, 0 to 3% slopes	2	0.1%
Sn	Scantic silt loam, 0 to 3% slopes	5	0.3%
SuD2	Suffield silt loam, 15 to 25% slopes, eroded	1	0.0%
SuE2	Suffield silt loam, 25 to 45% slopes, eroded	70	4.1%
W	Water	357	20.9%
Wa	Walpole fine sandy loam	16	1.0%
WmB	Windsor loamy sand, 0 to 8% slopes	147	8.6%
WmC	Windsor loamy sand, 8 to 15% slopes	27	1.6%
WmD	Windsor loamy sand, 15 to 35% slopes	109	6.4%
Wn	Winooski silt loam	5	0.3%
AaB	Adams loamy sand, 0 to 8% slopes	59	3.4%
AaC	Adams loamy sand, 8 to 15% slopes	98	5.7%
AaD	Adams loamy sand, 15 to 30% slopes	43	2.5%
Au	Au Gres loamy sand	3	0.2%
BgB	Nicholville very fine sandy loam, 0 to 8% slopes	23	1.3%
BgC	Nicholville very fine sandy loam, 8 to 15% slopes	1	0.0%
BgC2	Nicholville very fine sandy loam, 8 to 15% slopes	11	0.6%
BuB	Lamoine silt loam, 3 to 8% slopes	3	0.2%
BuC2	Buxton silt loam, 8 to 15% slopes	3	0.2%

Table 4.4.1.1.3-2. Erodibility of Soils in the Vicinity of the Project

Soil Series	Kf Factor
Windsor	0.15
Adams	0.1 – 0.15
Lyman-Tunbridge	0.32 - 0.43
Ondawa	0.32

Source: NRCS, 2026 and NRCS, 2014



BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

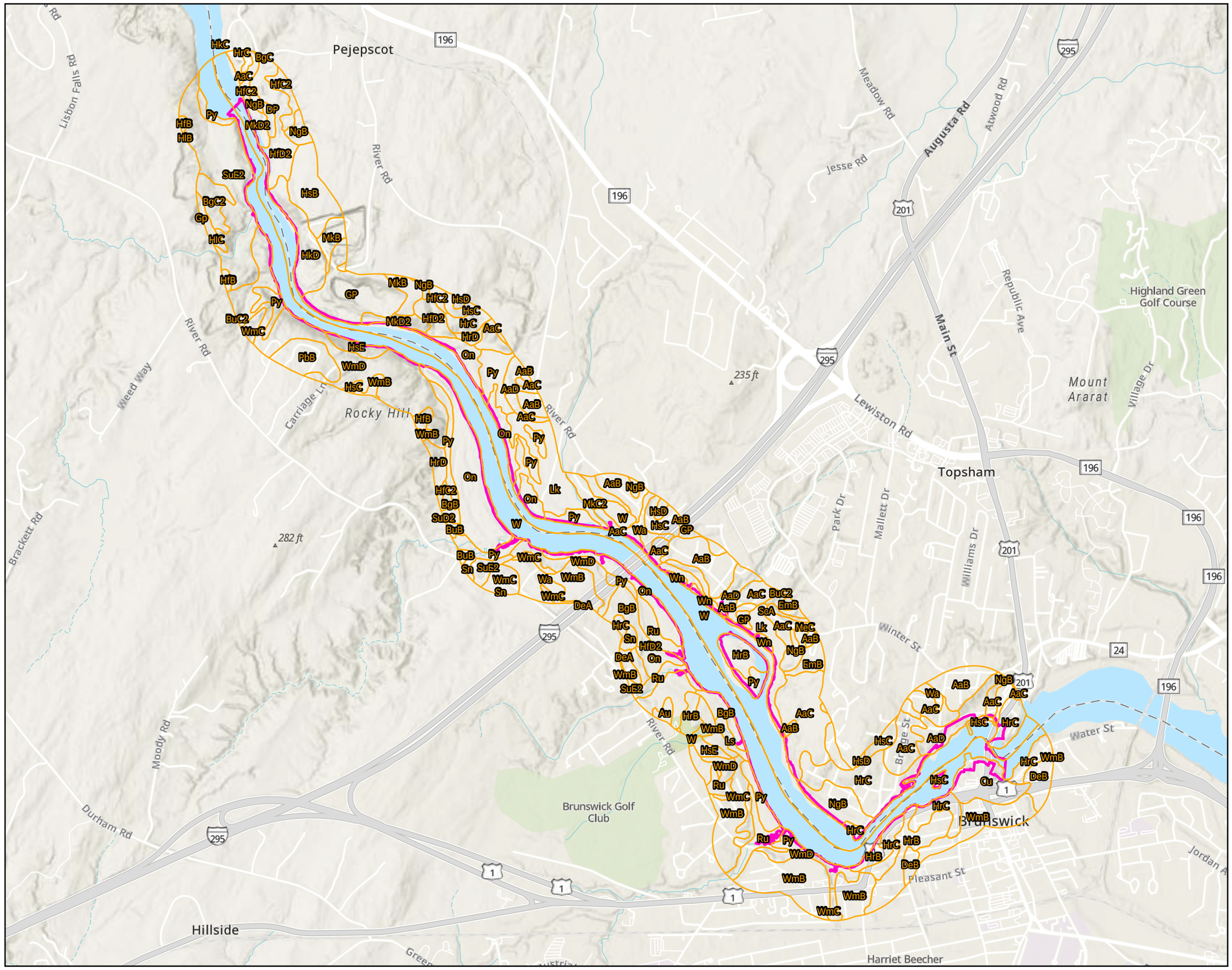
Brookfield

N

0 0.25 0.5 1 Miles

Figure 4.4.1.1.2-1:
Surficial Geology within 1,000 feet of the Project boundary

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BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Figure 4.4.1.1.3-1:
Soils in the Vicinity of the Project

Legend

- Major Soil Units
- Project Boundary

Service Layer Credits: World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
World Hillshade: Esri, NASA, NGA, USGS, FEMA
National Geographic World Map: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

N

0 1,000 2,000 4,000 Feet

Brookfield

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4.4.2 Environmental Analysis

FERC's SD2 did not identify any specific resource issues relating to geology or soil resources. Project operations appear to have limited impacts to geology and soils. Erosion is expected along the shoreline of any dynamic river system regardless of whether it is dam-controlled or not. The rates of active erosion observed, as part of other relicensing studies, in the vicinity of the Project do not appear to exceed background rates that would be anticipated to occur in the absence of the Project. BWPH operates the Project in run-of-river mode and has maintained relatively stable impoundment levels during normal operations, outside of maintenance and high flow situations. Downstream of the Project, the proposed run-of-river operation does not alter flow or velocity in the river, or their effects on erosion.

4.4.3 Proposed Environmental Measures

BWPH is proposing to maintain the run-of-river mode of operating the Project, which has little fluctuation in the impoundment level, limiting the potential for Project-induced erosion in the Project impoundment. Therefore, BWPH is not proposing additional PME measures specific to geology and soil resources at the Project.

4.4.4 Unavoidable Adverse Effects

Some small amounts of erosion and sedimentation may occur within the Project boundary or in downstream reaches as a result of normal river flows.

4.4.5 References

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4.5 Water Resources

4.5.1 Affected Environment

4.5.1.1 Water Quantity

The Androscoggin River flows approximately 178 miles from its headwaters at Umbagog Lake in Errol, NH to Merrymeeting Bay (FERC, 1996). Approximately one-fifth of the watershed (approximately 716 sqm) is in New Hampshire. The Androscoggin watershed is surrounded by the Kennebec River watershed to the east, the Upper Connecticut, Saco, and the Presumpscot River Watersheds to the west. The northern edge of the watershed lies on the international boundary between the United States and Canada. The drainage area at Merrymeeting Bay where the Androscoggin River ends is 3,470 sqm (FERC, 1996). The following sections discuss the hydrology of the Project including its drainage area, flow statistics, and operations.

4.5.1.1.1 Drainage Area

The drainage area of the Project is approximately 3,437 sqm, which is approximately 99% of the total watershed area.

4.5.1.1.2 Streamflow, Gage Data, and Flow Statistics

Flow from the Upper Androscoggin River Storage System, including Mooselookmeguntic Lake (Upper Dam), Richardson Lake (Middle Dam), Aziscohos Lake, and Umbagog Lake (Errol Dam) is used to augment Androscoggin River flow during low flow periods and to provide flood control during high flow periods. Outflow from the storage system is managed in cooperation with downstream hydroelectric power generators to provide a relatively uniform flow regime.

The USGS operates a streamflow gaging station (No. 01059000 Androscoggin River near Auburn, ME) approximately 21.5 miles upstream of the Project dam. This gage has a drainage area of 3,263 sqm and has been in operation since 1928. Annual and monthly flow duration curves are presented in Figures 4.5.1.1.2-1 thru 4.5.1.1.2-5. Daily flow data from the Auburn gage was prorated by the ratio of drainage areas (The proration factor between USGS gage and Project is 1.053). The period of January 1987 – December 2025 was analyzed to reflect current hydrological conditions as affected by upstream hydroelectric project operations (Figure 4.5.1.1.2-6). Table 4.5.1.1.2-1 shows an annual and monthly summary of this data. The mean annual daily inflow for this period is about 7,002 cfs. The peak streamflow at the Project during this period was approximately 104,911 cfs on April 2, 1987. The peak streamflow for the period of record at the USGS gage is about 135,000 cfs on March 20, 1936. Streamflow is normally at its peak throughout the spring freshet during snowmelt, while short-term inflow depends in part upon upstream hydropower project storage operations and in part upon numerous intervening tributary river and stream inflows to the mainstem of the river.

4.5.1.1.3 Existing and Proposed Uses of Water

The Project is operated as a run-of-river facility and does not have a bypass reach. Due to the on/off nature of Units 2 and 3 and the small pond available, the impoundment fluctuates a maximum of 2 ft to allow the units to operate efficiently as required by the FERC license.

Impoundment fluctuations are limited to less than 2 ft below the top of the spillway. There is no minimum flow requirement in the existing license; however, Project outflow approximates Project inflow as a result of run-of-river operations. During fishway operation (typically May 1 to November 15 as conditions allow, with the exact timing determined annually based on resource agency consultation), the upstream fishway flow is 100 cfs and downstream fishway flow is approximately 20 cfs regardless of unit operations.

4.5.1.1.4 Existing Water Rights

BWPH holds all the flowage rights necessary to operate the Project. There is no development within the Project boundary other than the Project facilities. There are no streams located within the Project boundary or within the vicinity of the Project that are significantly affected by impoundment operations or by generation releases.

Table 4.5.1.1.2-1. Daily Average Streamflow (cfs) at Brunswick Dam January 1987 – December 2025

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min	1,675	1,791	1,907	2,876	1,675	1,517	1,348	1,338	1,106	1,296	1,654	1,612
Max	36,340	24,226	44,872	104,911	65,201	61,514	31,073	40,869	48,137	48,348	42,660	74,681
Median	5,014	4,740	6,794	12,851	9,059	4,961	3,455	2,876	2,633	3,718	5,440	5,540
Average	5,820	5,091	8,266	16,090	10,769	6,598	4,846	3,850	3,282	5,374	6,796	7,230

Figure 4.5.1.1.2-1. Annual Flow Duration Curve (1987-2025)

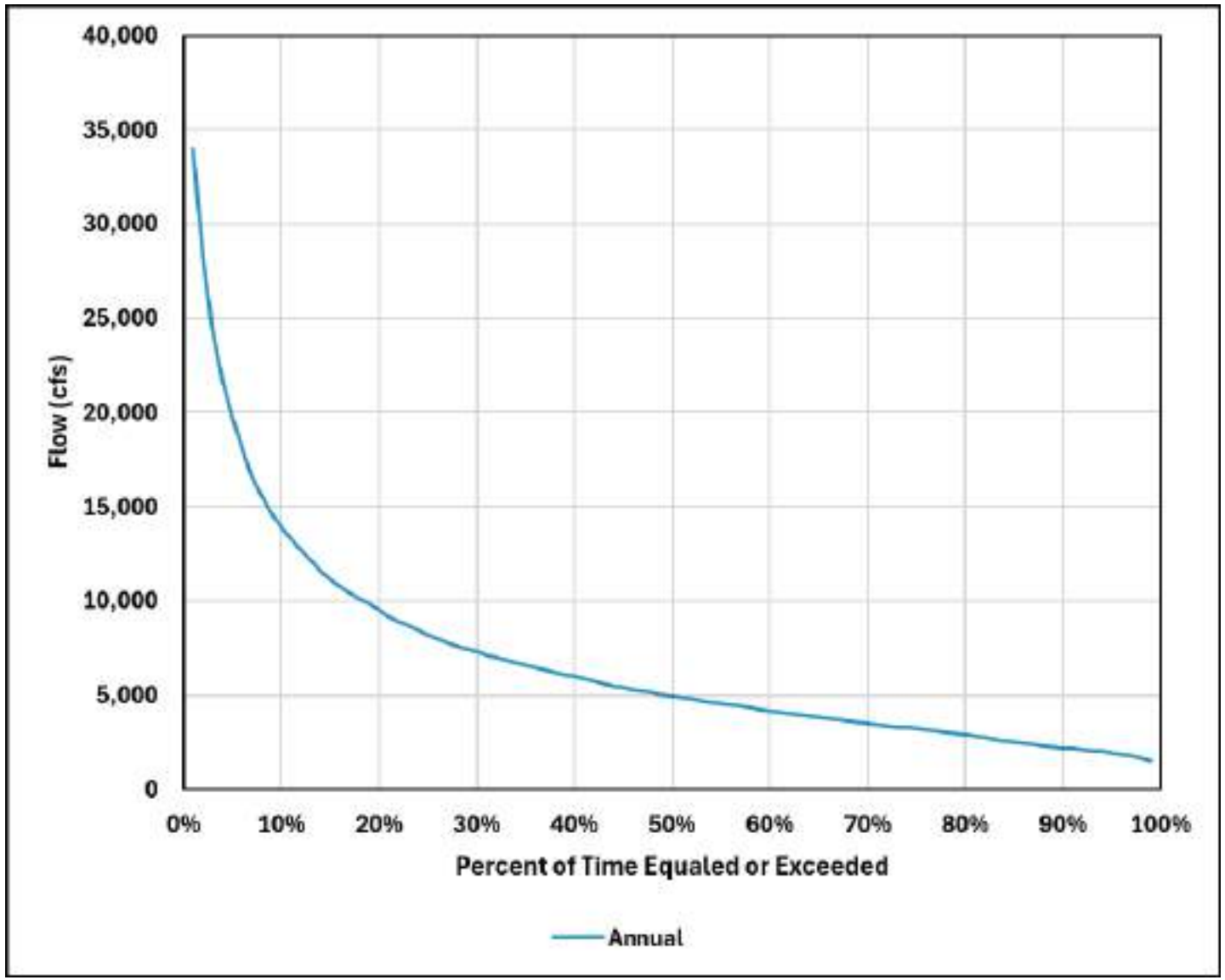


Figure 4.5.1.1.2-2. January, February, and March Flow Duration Curve (1987-2025)

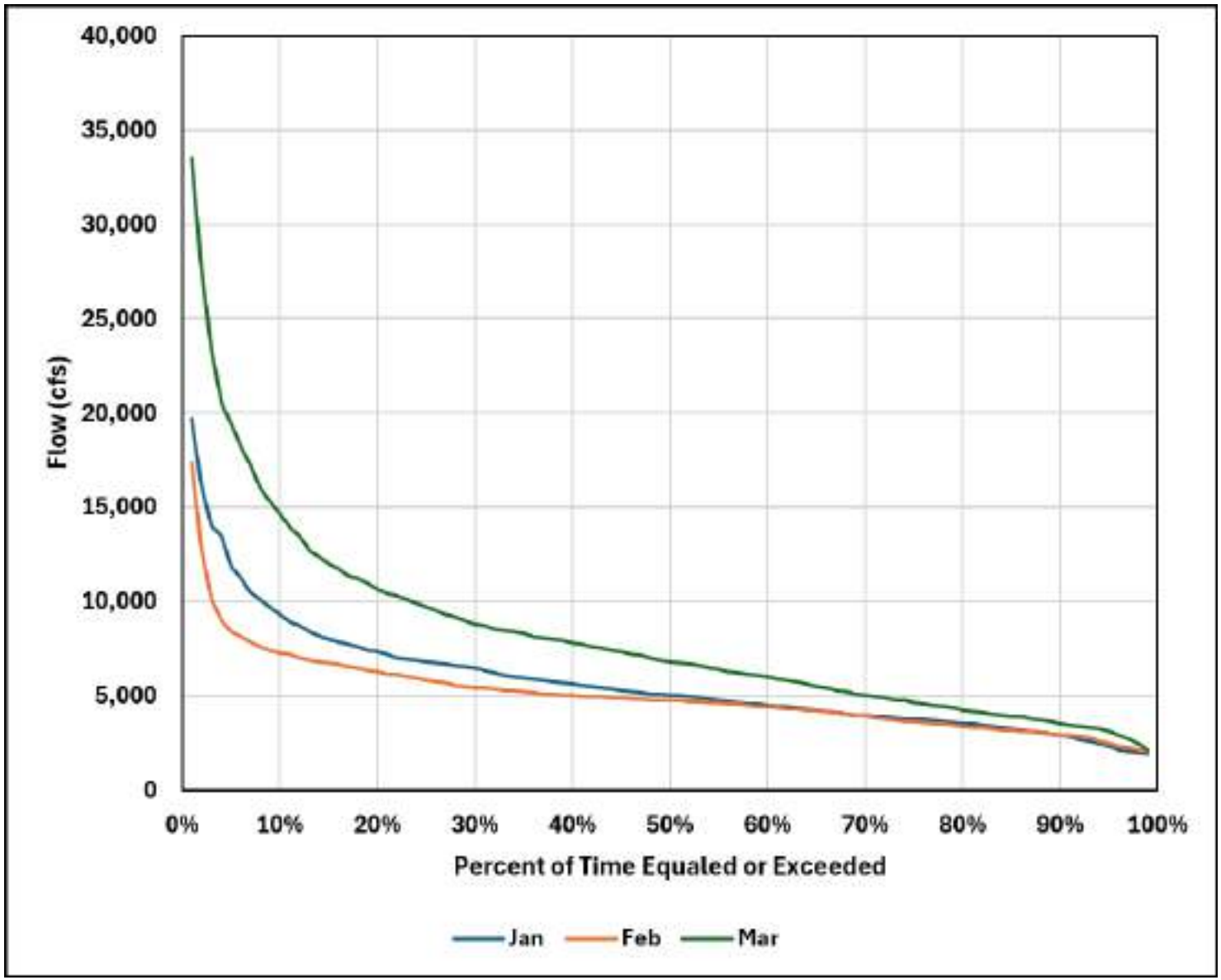


Figure 4.5.1.1.2-3. April, May, and June Flow Duration Curve (1987-2025)

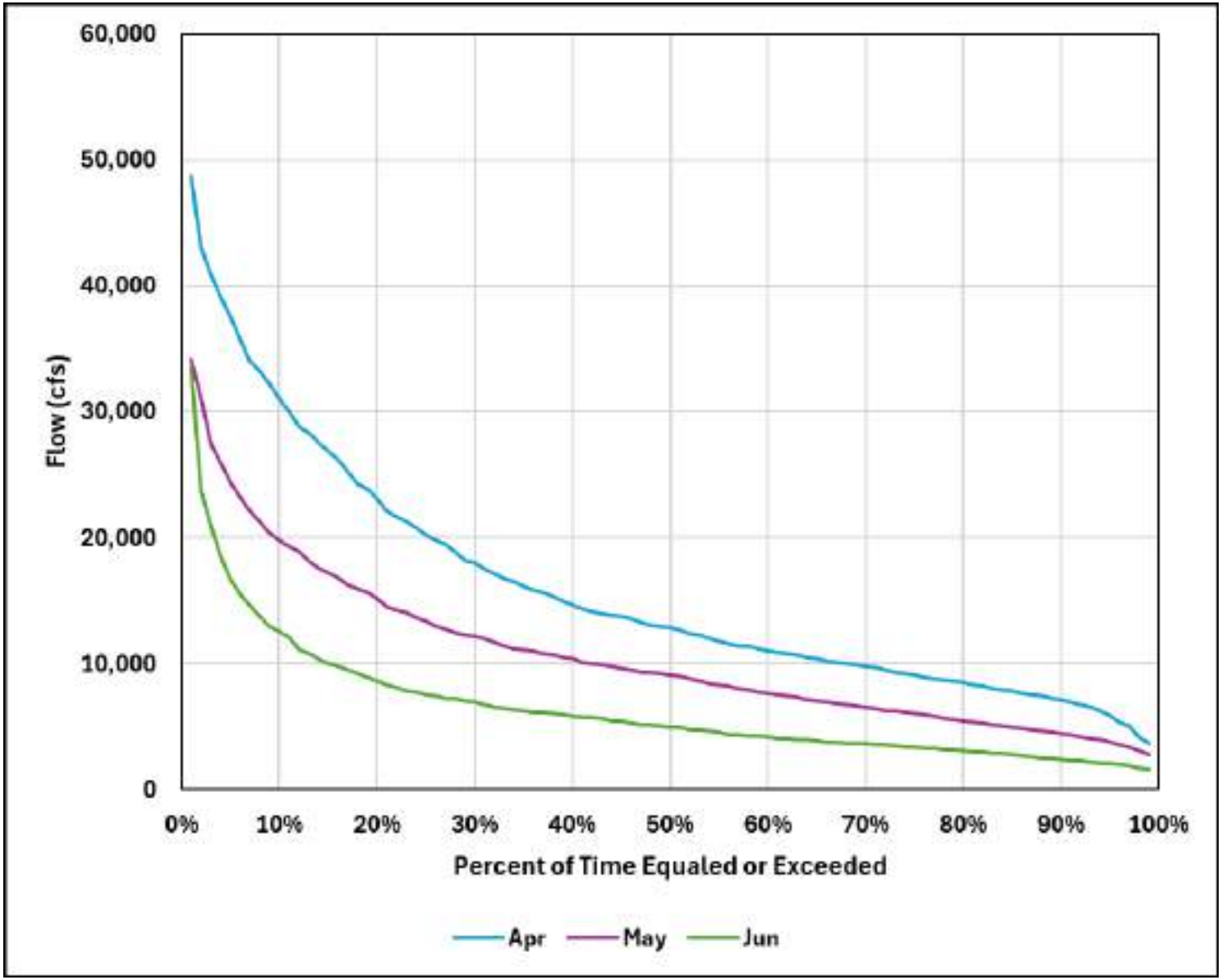


Figure 4.5.1.1.2-4. July, August, and September Flow Duration Curve (1987-2025)

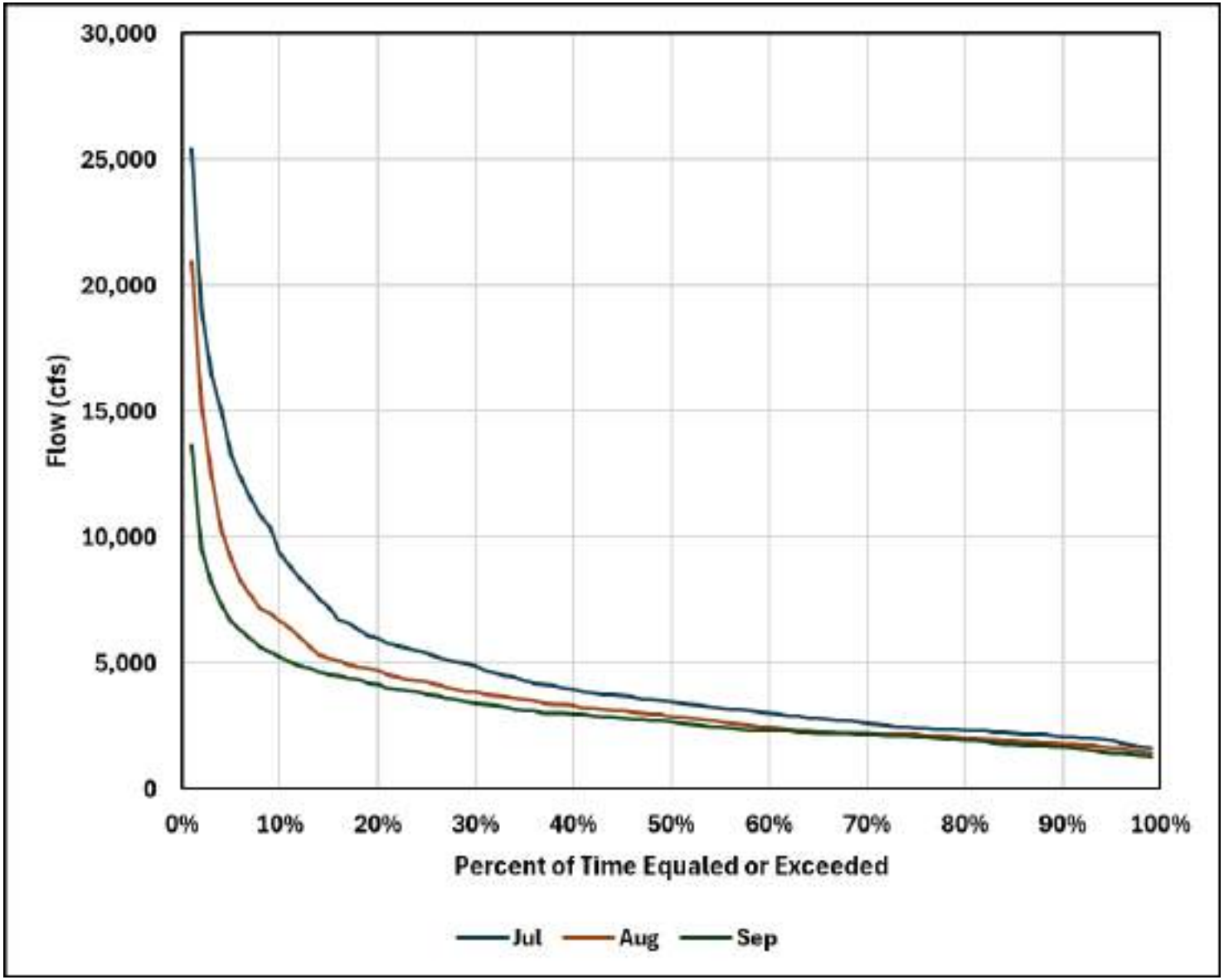


Figure 4.5.1.1.2-5. October, November, and December Flow Duration Curve (1987-2025)

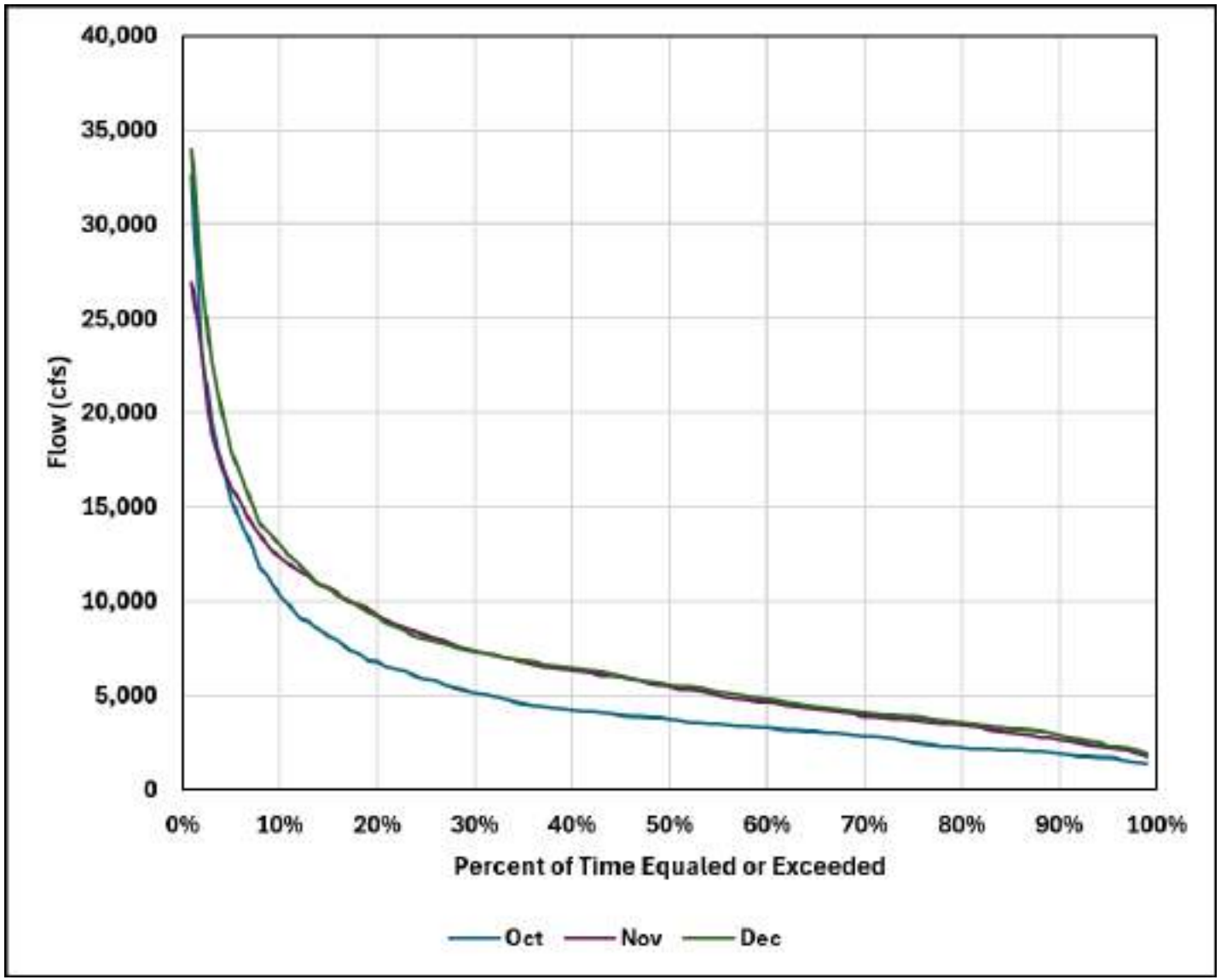
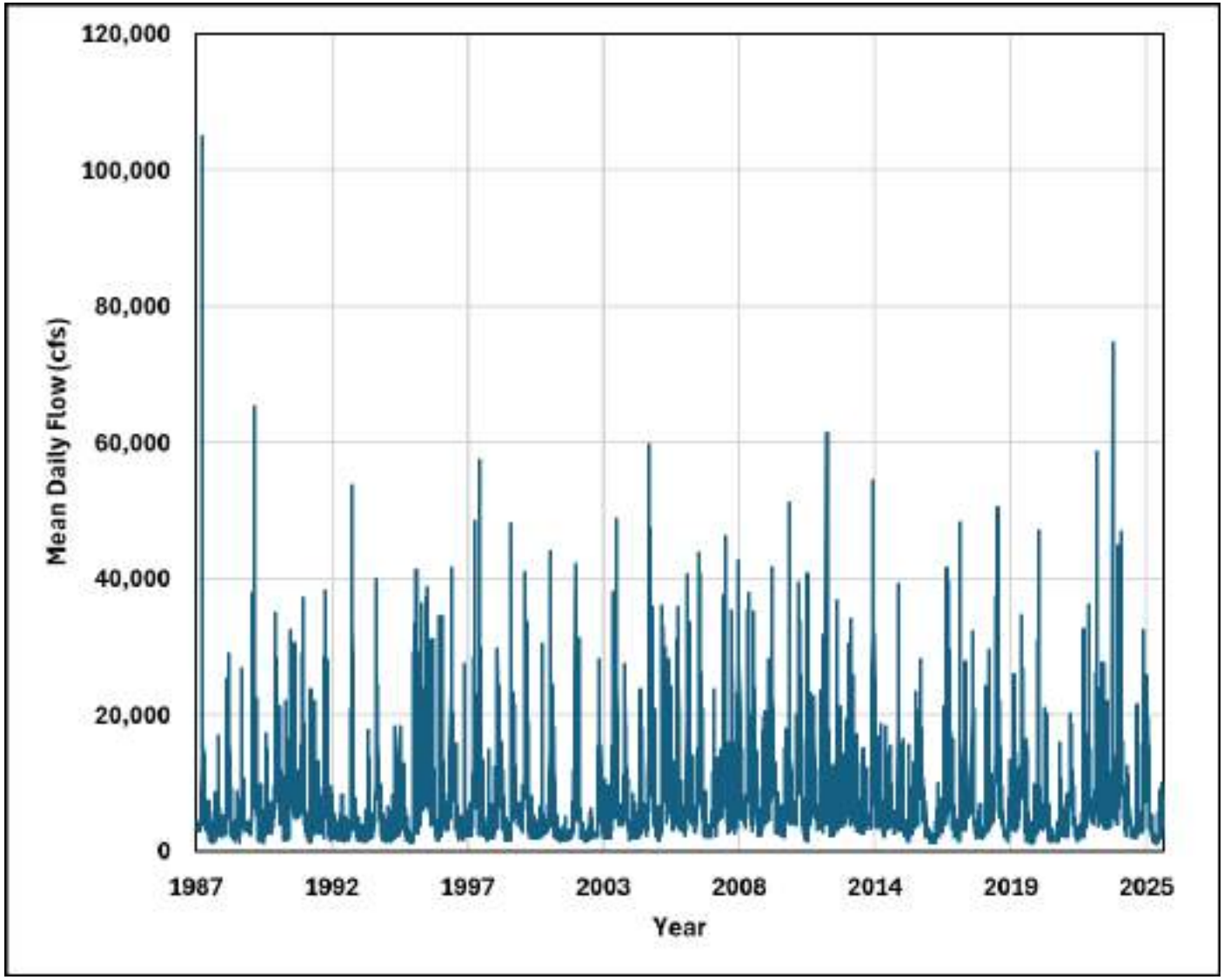


Figure 4.5.1.1.2-6. Mean Daily Flow at USGS 01059000 Androscoggin River Near Auburn, Maine



4.5.1.2 Water Quality

The following sections discuss water quality standards and classifications applicable to waterbodies in the Project vicinity. The results from water quality investigations that pertain to the waterbodies at the Project area are also discussed.

4.5.1.2.1 Water Quality Standards

Federal Clean Water Act

In 1972, the Federal Water Pollution Control Act Amendments established the Clean Water Act (CWA) as the foundation of modern surface water quality protection in the United States. Sections 303 and 305 of the CWA guide the national program on water quality. Three subparts of Section 303 are relevant to this water quality discussion – Sections 303(a-c), which discuss the process by which all states are to adopt and periodically review water quality standards. Section 305(b) directs states to periodically prepare a report that assesses the quality of waters in the state.

State Water Quality Standards

Title 38, Article 4-A of the Maine Revised Statutes (38 M.R.S §§464-470) establishes the State's Water Classification Program. The classifications and details of major river basins are covered in §467 (MRS 2021a). The mainstem of the Androscoggin River from the Worumbo Dam in Lisbon Falls and continuing downstream through the Project to a line formed by extension of the Bath-Brunswick boundary across Merrymeeting Bay (approximately 6 river miles downstream of the Brunswick Dam) is a Class B waterbody.[3]

Class B waters must meet standards ensuring they are suitable for the designated uses of drinking water supply after treatment, agriculture, fishing, recreation in and on water, industrial process and cooling water supply, navigation, habitat for fish and other aquatic life (the habitat must be characterized as unimpaired), and hydroelectric power generation, except as prohibited under Title 12, section 403 (MRS 2021b). Water quality standards for Class B waters are provided in Table 4.5.1.2.1-1.

Waterbodies that fail to meet water quality standards are placed on the 303(d) impaired waterbodies list and included in the 305(b) report as required under the CWA. This information is reported by the state of Maine in the Integrated Water Quality Monitoring and Assessment Report (Integrated Report) every two years (MDEP, 2024). The Integrated Report assesses the attainment criteria of water bodies and determines whether designated uses are threatened or if the waterbody is impaired. The CWA requires Total Maximum Daily Loads (TMDL), the

[3] The reach of the Androscoggin River from the Worumbo Dam in Lisbon Falls to Merrymeeting Bay, which contains the Brunswick Project, was reclassified from Class C to Class B in 2022 (MDEP 2022a, USEPA 2022).

maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards, be calculated for identified pollutants in impaired waterbodies.

According to the most recent Integrated Report, several sections of the Androscoggin River in the vicinity of the Project are listed under Category 4 or Category 5 (MDEP, 2024) (Table 4.5.1.2.1-2). The mainstem Androscoggin River from the Pejepscot Dam to the Brunswick Dam is listed in Category 4-B for dioxins, Category 4-C-FPB for fish passage barrier, and Category 5-D for being impaired due to legacy polychlorinated biphenyls (PCBs) found in fish tissue (Table 4.5.1.2.1-3). The Androscoggin River from Brunswick Dam downstream to Merrymeeting Bay is listed in Category 4-B for dioxins and Category 5-D for PCBs. Two unnamed tributaries to the Brunswick Project impoundment are listed in Category 4-A and are covered under the Statewide Impervious Cover TMDL (MDEP 2012); these sites were listed as impaired due to urban stormwater runoff from impervious cover. The reaches in Category 4-B for dioxins are expected to be in attainment by 2030. MDEP noted that the impact from legacy pollutants cannot be addressed with a TMDL but will diminish naturally over time (MDEP, 2024).

Table 4.5.1.2.1-1. MDEP Water Quality Standards for Class B Waterbodies

Parameter	Standard
Dissolved oxygen (DO)	Minimum of 7 mg/L or 75% saturation, whichever is higher, except for October 1 to May 14 to ensure spawning and egg incubation of indigenous fish, the 7 day mean DO concentration may not be less than 9.5 mg/L and the one day minimum may not be less than 8 mg/L in identified salmonid spawning areas
Aquatic Life	Discharges may not cause adverse impacts to aquatic life in that the receiving waters must be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community
pH	6.5-9.0 (discharges only)
Chlorophyll-a	Spatial geometric mean in a season (June to September) ≤ 8.0 µg/L and no value > 10.0 µg/L
Total Phosphorus	Geometric mean in a season (June to September) ≤ 30.0 µg/L

Source: MDEP, 2025; MRS, 2021b

** µg/L = microgram per liter, mg/L=milligram per liter*

Table 4.5.1.2.1-2. Integrated Water Quality Report Category Definitions

Category	Definition
Category 1	Attaining all designated uses and water quality standards, and no use is threatened
Category 2	Attains some of the designated uses; no use is threatened; and insufficient data or no data and information is available to determine if the remaining uses are attained or threatened (with presumption that all uses are attained)

Category 3	Insufficient data and information to determine if designated uses are attained (with presumption that one or more uses may be impaired)
Category 4	Impaired or threatened for one or more designated uses, but does not require development of a TMDL 4-A: TMDL completed 4-B: Other pollution control requirements are reasonably expected to result in attainment of standards in the near future. 4-C: Impairment not caused by a pollutant.
Category 5	Waters impaired or threatened for one or more designated uses by a pollutant(s), and a TMDL report is required 5-A: Impairment caused by pollutants (other than those listed in 5-B through 5-D) 5-B: Impairment caused solely by bacteria contamination 5-C: Impairment caused by atmospheric deposition of mercury 5-D: Impairment caused by a "legacy" pollutant

Source: MDEP, 2024

Table 4.5.1.2.1-3: Androscoggin River Reaches near the Brunswick Project Listed in the Integrated Report

Assessment Unit ID	Segment Name	Cause	Category
ME0104000210_420 R01	Unnamed Tributary to Androscoggin River (Brunswick 2, near River Rd. in Brunswick)	Benthic Macroinvertebrates Bioassessments	Category 4-A (Statewide Impervious Cover TMDL completed)
		Habitat Assessment	
ME0104000210_420 R05	Unnamed tributary to Androscoggin River (Topsham 4, Drains Topsham Fair Mall)	Benthic Macroinvertebrates Bioassessments	Category 4-A (Statewide % Impervious Cover TMDL completed)
ME0104000210_425 R_01_01	Androscoggin River from Pejepscot Dam to Brunswick Dam	PCBs	Category 5-D (legacy pollutant cannot be addressed with a TMDL or permit. Pollutant effects will continue to diminish naturally over time. Fish tissue monitoring revealed legacy PCBs.)
		Dioxin (including 2,3,7,8-TCDD)	Category 4-B
		Fish Passage Barrier	Category 4-C (Aquatic Life impairment due to inadequate fish passage for American shad at the Brunswick Dam)
ME0104000210_426 R	Androscoggin River from Brunswick Dam	Dioxin (including 2,3,7,8-TCDD)	Category 4-B

	to Brunswick-Bath Boundary (Merrymeeting Bay)	PCBs	Category 5-D (legacy pollutant cannot be addressed with a TMDL or permit. Pollutant effects will continue to diminish naturally over time. Fish tissue monitoring revealed legacy PCBs.)

Source: MDEP, 2024

4.5.1.2.2 Historic Water Quality Data

MDEP Volunteer River Monitoring Program

The MDEP Volunteer River Monitoring Program (VRMP) has collected water quality data at two sites in the Brunswick impoundment and one within the riverine reach downstream of the dam. Data for water temperature and dissolved oxygen (DO) (concentration and percent saturation) were collected once per month from May through October 2020 to 2025. The monitoring sites were:

- Brunswick Interstate Ledges (BIL) – approximately 2.5 river miles upstream of the Brunswick dam in the impoundment;
- Brunswick Canoe Mooring/Portage (BCM/BCP) – approximately 0.6 river miles upstream of the Brunswick dam in the impoundment; and
- Brunswick Water Street (BWS) – approximately 0.9 river miles downstream of the Brunswick dam.

Data collected at the BIL, BCM/BCP, and BWS sites from 2020 to 2025 are presented in Table 4.5.1.2.2-1. Both the DO concentration and percent saturation met Class B standards (> 7 mg/L or 75 percent saturation) at the three monitoring sites (except for one reading of 6.4 mg/L at BIL in August 2022). Overall, the water temperature was similar at the three monitoring sites with a range of 11.2°C to 26.5°C and average values from 2020 to 2025 of 19.6°C to 19.9°C.

Table 4.5.1.2.2-1. Average (Range = Minimum-Maximum) DO (concentration and percent saturation) and water temperature data collected in 2020 through 2025 by the VRMP

Year	DO (mg/L)	DO (percent saturation)	Water Temperature (°C)
BIL			
2020	8.4 (7.3 – 10.7)	90.1 (81.5 – 97.5)	19.3 (11.2 – 25.4)
2021	8.1 (7.1 – 9.0)	88.5 (85 – 94.8)	20.1 (14.5 – 25.5)
2022	7.7 (6.4 – 9.0)	85.3 (77.9 – 92.3)	20.4 (14.4 – 24.9)
2023	8.8 (7.5 – 9.9)	94.9 (87.5 – 98.1)	19.2 (14.8 – 22.9)
2024	8.7 (7.7 – 10.8)	95.9 (86 – 103.3)	20.4 (12.1- 26.5)
2025	8.3 (7.2 – 10.0)	90.3 (84 – 99.5)	20.2 (15.1 – 24.5)
2020-2025	**8.3 (6.4 – 10.8)**	**90.8 (77.9 – 103.3)**	**19.9 (11.2 – 26.5)**

BCM/BCP			
2020	9.0 (8.0-11.6)	97.9 (90.1-108)	19.4 (11.6-25.0)
2021	8.3 (7.2-9.9)	90.0 (81-97.1)	19.4 (14.0-23.3)
2022	8.3 (7.5-9.7)	91.1 (87.2-99.1)	20.2 (14.3-25.0)
2023	8.8 (7.8-9.8)	93.4 (87.8-98.8)	19.1 (14.5-22.6)
2024	8.8 (8.0-10.1)	101.6 (91.8-110.2)	20.0 (11.9-25.9)
2025	8.6 (7.7-9.5)	93.1 (90.3-97.4)	19.5 (15.0-23.3)
2020-2025	**8.6 (7.2-11.6)**	**94.5 (81-110.2)**	**19.6 (11.6-25.9)**
BWS			
2020	9.3 (8.3-11.9)	99.2 (91.0-107.3)	19.3 (11.6-25.0)
2021	8.6 (7.6-10.3)	94.2 (86.7-100.6)	20.2 (14.0-25.7)
2022	8.7 (7.8-10.0)	95.8 (91.4-102.0)	19.8 (14.3-25.0)
2023	8.9 (7.6-10.3)	95.4 (86.9-100.5)	19.1 (14.6-22.5)
2024	9.1 (8.2-9.1)	102.1 (92.9-106.0)	20.4 (12.0-26.5)
2025	8.9 (7.9-10.2)	97.6 (92.9-101.5)	20.2 (14.9-24.7)
2020-2025	**8.9 (7.6-11.9)**	**97.4 (86.7-107.3)**	**19.8 (11.6-26.5)**

Source: MDEP 2026

4.5.1.2.3 2025 Water Quality Study

BWPH completed a water quality study in 2025 in support of the Project relicensing (BWPH 2026a). The study had two components: an impoundment trophic state study and a water temperature and DO study. Both studies were completed in accordance with the 2022 MDEP *Sampling Protocol for Hydropower Studies* (MDEP 2022b). The goals of the study were to collect baseline information and document water quality conditions upstream and downstream of the Project dam to determine if existing MDEP standards and guidelines are met. The objectives of the study were to:

- Asses the trophic state of the impoundment.
- Conduct a water temperature and DO study in the impoundment and in the tailwater area during low flow, warm water temperature conditions.

Methods

BWPH completed the impoundment trophic state study at the deepest, safely accessible spot in the impoundment upstream of the boat barrier twice per month for five consecutive months (June through October 2025). The sample site was approximately 2,900 ft (0.55 miles) upstream of the Project dam with a depth of approximately 33 ft (10 meters) of water (Figure 4.5.1.2.3-1). Sample parameters included water transparency (i.e., Secchi disk depth), water temperature and

DO vertical profiles (1-meter intervals), and epilimnetic core samples of total phosphorus, chlorophyll-a, color, pH, and total alkalinity. Additional water samples were collected during one of the late summer sampling events on August 20, 2025.

BWPH continuously monitored water temperature and DO downstream of the powerhouse once per hour with an Onset HOBO U-26 data logger during the low flow, high temperature period. Monitoring occurred over an approximately 10-week period between June 30 and September 17, 2025. The monitoring site was on the river left, approximately 900 ft downstream of the powerhouse in an area representative of the main flow (Figure 4.5.1.2.3-1).

Trophic State Study Results

The water chemistry and transparency results are presented in Table 4.5.1.2.3-1. Total phosphorus ranged from 11 µg/L to 20 µg/L, and chlorophyll-a ranged from 1.8 µg/L to 4.5 µg/L. The criteria for total phosphorus and chlorophyll-a are based on the geometric mean between June and September (Table 4.5.1.2.1-1). The geometric mean for total phosphorus was 15.3 µg/L and was below the criteria (30 µg/L). The geometric mean for chlorophyll-a was 2.9 µg/L which was below the standard (8 µg/L). pH ranged from 6.6 to 6.8 with an average of 6.7. Color ranged from 21 PCU to 30 PCU with an average of 23.8 PCU. Total alkalinity in the Brunswick impoundment ranged from 12 mg/L to 21 mg/L with an average of 16.2 mg/L.

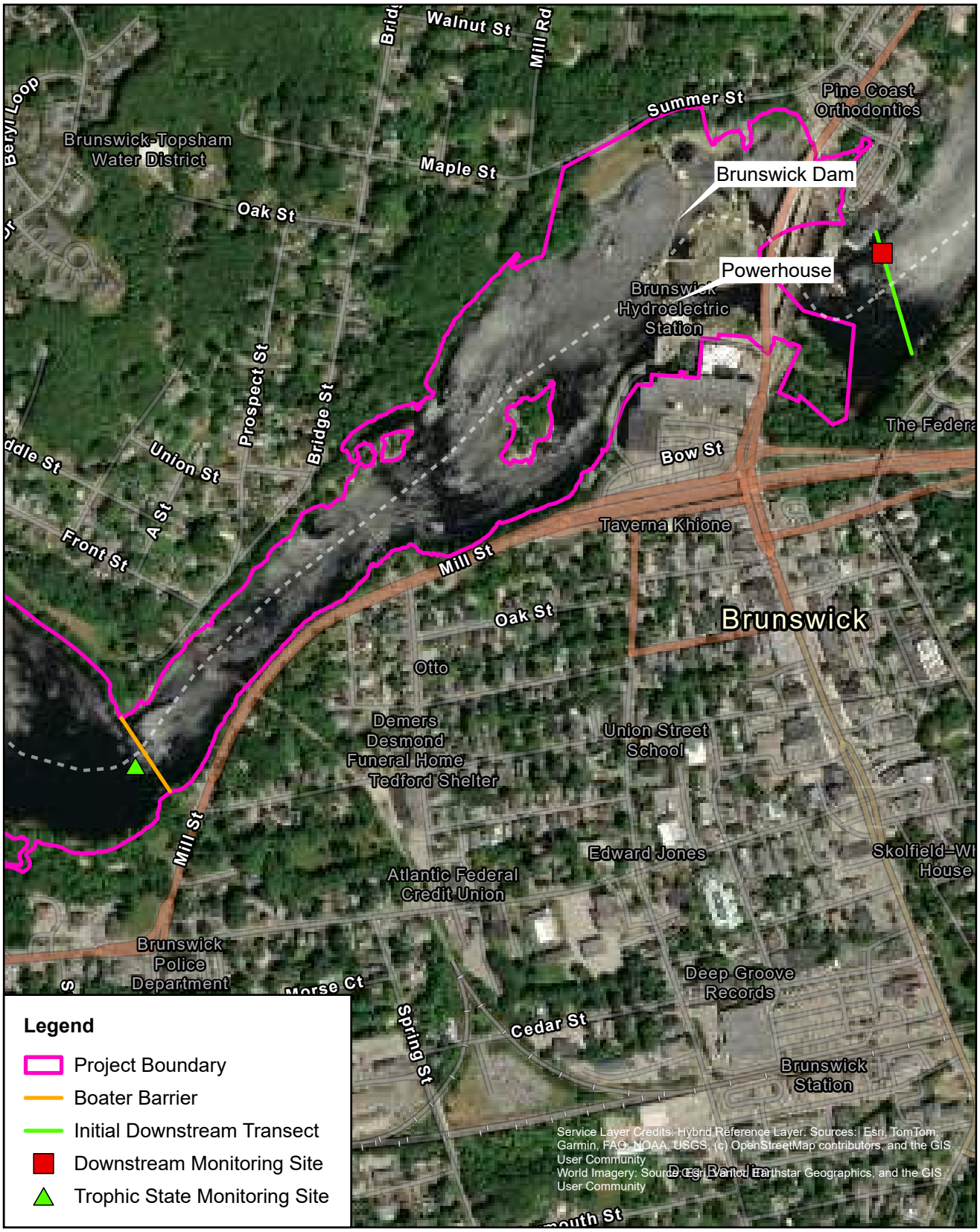
The water transparency ranged from 3.7 meters to 6.4 meters with an average of 4.9 meters (Table 4.5.1.2.3-1). MDEP has often used a water transparency of less than 2 meters as an indicator of algal blooms (MDEP 1996, 2024). The water transparency in the Brunswick impoundment was above the 2.0-meter threshold throughout the sampling period.

Table 4.5.1.2.3-1. Water Chemistry and Transparency Results for the Brunswick Impoundment

Date	Total Phosphorus (µg/L)	Color (PCU)	Chlorophyll-a (µg/L)	Total Alkalinity (mg/L)	pH	Water Transparency (m)
6/23/2025 11:50	17	29	4.1	12	6.6	3.7
6/30/2025 14:50	18	30	1.8	14	6.8	4.0
7/9/2025 13:30	15	24	3.0	13	6.7	4.1
7/24/2025 9:50	18	26	2.7	14	6.7	4.8
8/6/2025 11:25	13	22	4.5	13	6.6	5.2
8/20/2025 11:55	11	22	2.9	16	6.7	5.6
9/9/2025 12:15	16	21	2.6	19	6.7	6.2
9/22/2025 10:50	16	21	2.3	20	6.8	6.4
10/9/2025 10:30	20	21	2.3	21	6.7	4.7

10/16/2025 11:25	18	22	2.6	20	6.6	4.9
Minimum	11	21	1.8	12	6.6	3.7
Maximum	20	30	4.5	21	6.8	6.4
Average	15.3*	23.8	2.9*	16.2	6.7	4.9

*Geometric mean of June through September samples only.



BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Brookfield

N

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Feet

Figure 4.5.1.2.3-1:
2025 Water Quality Study Monitoring Sites at the Brunswick Project

Path: D:\Brookfield\02456\GIS\Maps\DLA\DLA.aprx

Vertical Profile Results

The DO concentration and percent saturation in the impoundment were above the state of Maine's standards for Class B waters (7 mg/L and 75% saturation) throughout the June through October 2025 monitoring period. The impoundment was not stratified[4] during the monitoring events, and the water temperature and DO were generally uniform throughout the water column (Tables 4.5.1.2.3-2 through 4.5.1.2.3-4).

The water temperature at the impoundment trophic state sampling site ranged from 14.1ºC on October 16 to 25ºC on July 9 (Table 4.5.1.2.3-2). The average water temperature throughout the water column ranged from 14.1ºC on October 16 to 24.9ºC on July 9. The DO concentration ranged from 7.8 mg/L (at a depth of 4 meters and below on August 20) to 9.9 mg/L on October 16 (Table 4.5.1.2.3-3). The average DO concentration throughout the water column ranged from 7.8 mg/L on August 20 to 9.9 mg/L on October 16. The DO percent saturation ranged from 92.4% at a depth of 8 meters and below on August 20 to 102% on August 6 (Table 4.5.1.2.3-4). The average DO percent saturation throughout the water column ranged from 92.8% on August 20 to 101.6% on August 6.

Downstream Water Temperature and DO Study Results

Downstream of the Brunswick Dam, the water temperature ranged from 20.2ºC on September 11 to 27.3ºC on August 15 (Table 4.5.1.2.3-5, Figure 4.5.1.2.3-2). The average water temperature throughout the monitoring period was 24.0ºC, and the median was 24.3ºC. DO ranged from 7.4 mg/L on August 1 to 9.7 mg/L on September 16 (Table 4.5.1.2.3-5, Figure 4.5.1.2.3-3). The average and median DO concentration over the entire monitoring period was 8.6 mg/L. The DO percent saturation ranged from 89.3% on August 1 to 114.8% on July 7 (Table 4.5.1.2.3-5, Figure 4.5.1.2.3-4). The average and median DO percent saturation was 101.1% throughout the study. The DO concentration and percent saturation both exceeded the standards for Class B waters throughout the entire study period (7.0 mg/L and 75% saturation).

[4] Thermal stratification is defined as a greater than 1°C change in water temperature per 1 m below a depth of 2 m from the water surface (MDEP 2022b)

Table 4.5.1.2.3-2: Vertical profiles of water temperature (°C) at the deep spot in the Brunswick Impoundment

Depth (m)	6/23/2025 11:30	6/30/25 13:30	7/9/25 12:48	7/24/25 9:31	8/6/25 11:05	8/20/25 11:13	9/9/25 12:00	9/22/25 10:50	10/9/25 10:14	10/16/25 10:55
0.25	23.4	24.0	25.0	24.3	24.8	23.8	21.6	19.4	17.2	14.1
1	23.3	24.0	25.0	24.1	24.8	23.9	21.4	19.5	17.4	14.1
2	23.3	24.0	25.0	24.1	24.7	23.9	21.3	19.4	17.4	14.1
3	23.2	24.0	24.9	24.1	24.7	23.9	21.2	19.4	17.5	14.1
4	23.1	23.9	24.9	24.1	24.7	23.9	21.1	19.4	17.4	14.1
5	23.1	24.0	24.9	24.1	24.7	23.9	21.1	19.4	17.4	14.1
6	23.1	23.9	24.9	24.1	24.7	23.9	21.1	19.4	17.5	14.1
7	23.1	24.0	24.9	24.1	24.7	23.9	21	19.4	17.5	14.1
8	23.1	24.0	24.9	24.1	24.7	23.9	21	19.3	17.5	14.1
9	23.0	24.0	24.9	24.1	24.7	23.9	21	19.3	17.5	14.1
10	23.1	24.0	24.9	24.1		23.9			17.5	14.1
11									17.5	14.1
Minimum	23.0	23.9	24.9	24.1	24.7	23.8	21.0	19.3	17.2	14.1
Maximum	23.4	24.0	25.0	24.3	24.8	23.9	21.6	19.5	17.5	14.1
Average	23.2	24.0	24.9	24.1	24.7	23.9	21.2	19.4	17.4	14.1

Table 4.5.1.2.3-3: Vertical profiles of the DO concentration (mg/L) at the deep spot in the Brunswick Impoundment

Depth (m)	6/23/25 11:30	6/30/25 13:30	7/9/25 12:48	7/24/25 9:31	8/6/25 11:05	8/20/25 11:13	9/9/25 12:00	9/22/25 10:50	10/9/25 10:14	10/16/25 10:55
0.25	8.5	8.3	8.0	8.0	8.4	7.9	8.5	9.1	9.4	9.9
1	8.5	8.3	8.0	8.0	8.5	7.9	8.5	9.0	9.3	9.9
2	8.5	8.3	8.0	8.0	8.4	7.9	8.5	9.0	9.3	9.9
3	8.5	8.4	8.0	8.0	8.4	7.9	8.5	9.0	9.2	9.9
4	8.5	8.3	8.0	7.9	8.4	7.8	8.6	8.9	9.2	9.9
5	8.5	8.3	8.0	7.9	8.4	7.8	8.6	8.9	9.1	9.9
6	8.5	8.3	8.0	7.9	8.4	7.8	8.6	8.9	9.1	9.9
7	8.5	8.3	8.0	7.9	8.5	7.8	8.6	8.9	9.1	9.9
8	8.5	8.3	8.0	7.9	8.5	7.8	8.6	8.9	9.1	9.9
9	8.5	8.3	8.0	7.9	8.4	7.8	8.6	8.9	9.1	9.9
10	8.5	8.3	8.0	7.9		7.8			9.1	9.8
11									9.1	9.8
Minimum	8.5	8.3	8.0	7.9	8.4	7.8	8.5	8.9	9.1	9.8
Maximum	8.5	8.4	8.0	8.0	8.5	7.9	8.6	9.1	9.4	9.9
Average	8.5	8.3	8.0	8.0	8.4	7.8	8.6	9.0	9.2	9.9

Table 4.5.1.2.3-4: Vertical profiles of the DO percent saturation (%) at the deep spot in the Brunswick Impoundment

Depth (m)	6/23/25 11:30	6/30/25 13:30	7/9/25 12:48	7/24/25 9:31	8/6/25 11:05	8/20/25 11:13	9/9/25 12:00	9/22/25 10:50	10/9/25 10:14	10/16/25 10:55
0.25	99.5	98.8	97.1	95.8	101.9	93.3	96.6	98.3	97.9	96
1	99.7	98.4	97.1	95.5	101.9	93.5	96.5	97.7	96.9	96.1
2	99.7	99.0	97.1	95.3	101.4	93.5	96.3	97.4	96.6	96.1
3	99.6	99.2	96.6	94.9	101.6	93.2	96.1	97.3	96.3	96
4	98.9	98.6	96.3	94.4	101.5	92.6	96.1	97	95.5	96
5	98.9	98.6	96.3	94.4	101.5	92.5	96.3	97	95.4	95.9
6	99.0	98.3	96.9	94.6	101.6	92.5	96.3	97	95.4	95.8
7	98.9	98.5	96.9	94.5	102	92.5	96.3	97	95.2	95.8
8	98.9	98.3	96.9	94.4	101.6	92.4	96.3	96.9	95.2	95.8
9	98.9	98.4	96.6	94.4	101.3	92.4	96.1	96.9	95.1	95.7
10	99.1	98.3	96.4	94.3		92.4			95.1	95.7
11									95.1	95.7
Minimum	98.9	98.3	96.3	94.3	101.3	92.4	96.1	96.9	95.1	95.7
Maximum	99.7	99.2	97.1	95.8	102.0	93.5	96.6	98.3	97.9	96.1
Average	99.2	98.6	96.7	94.8	101.6	92.8	96.3	97.3	95.8	95.9

Table 4.5.1.2.3-5: Water temperature (ºC), DO concentration (mg/L), and DO percent saturation statistics downstream of the Brunswick Dam, June 30 to September 17, 2025

Statistic	Water Temperature (°C)	DO (mg/L)	DO (Percent Saturation)
July 1-31			
Minimum	23.0	7.5	91.3
Maximum	27.0	9.4	114.8
Median	24.8	8.4	101.0
Average	24.8	8.4	101.1
August 1-31			
Minimum	21.7	7.4	89.3
Maximum	27.3	9.3	110.4
Median	24.5	8.5	101.0
Average	24.5	8.5	101.2
September 1-17			
Minimum	20.2	8.0	91.2
Maximum	22.8	9.7	107.8
Median	21.4	9.0	101.3
Average	21.5	9.0	101.2
June 30 – September 17			
Minimum	20.2	7.4	89.3
Maximum	27.3	9.7	114.8
Median	24.3	8.6	101.1
Average	24.0	8.6	101.1

Figure 4.5.1.2.3-2: Water temperature (°C) downstream of the Brunswick Dam, June 30 to September 17, 2025.

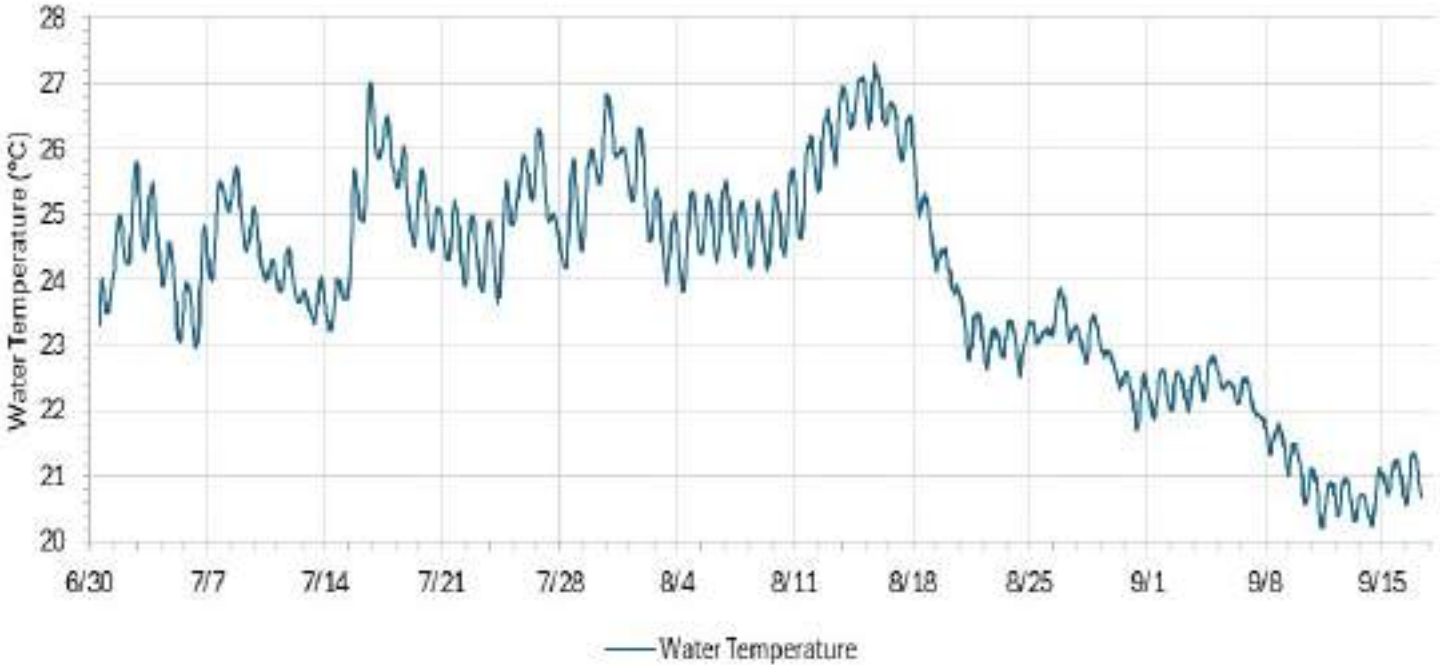


Figure 4.5.1.2.3-3: DO concentration (mg/L) downstream of the Brunswick Dam, June 30 to September 17, 2025.

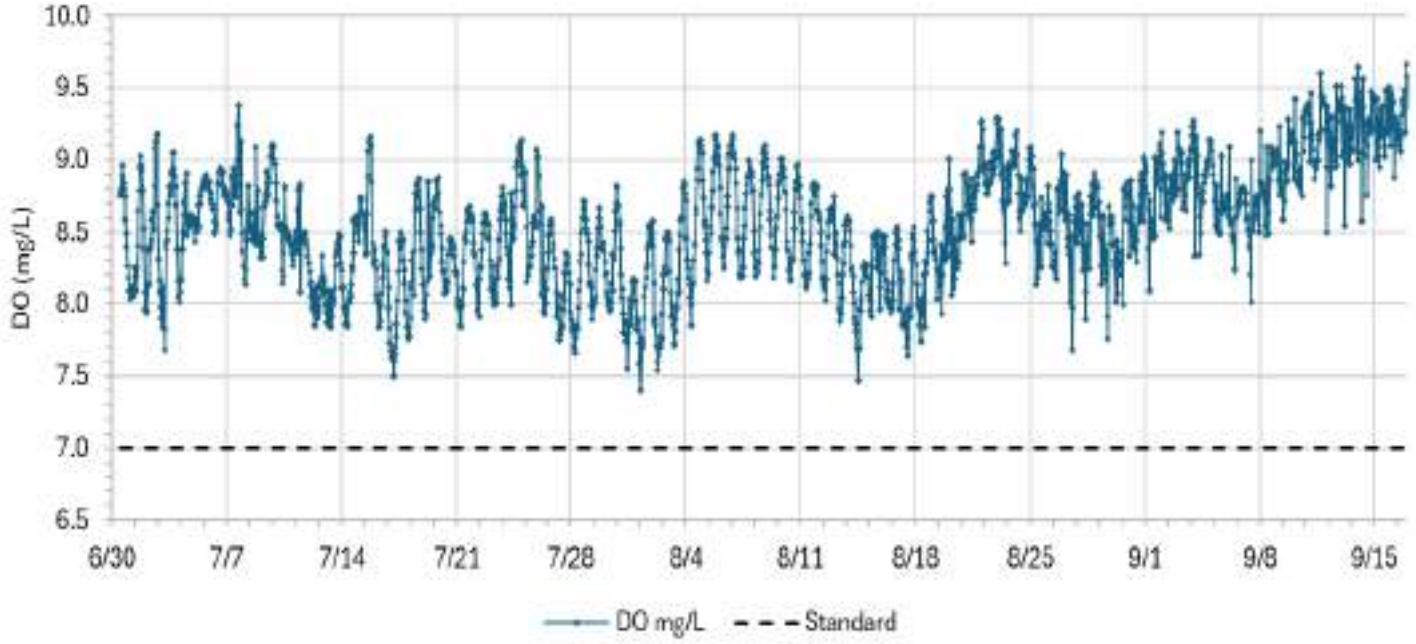
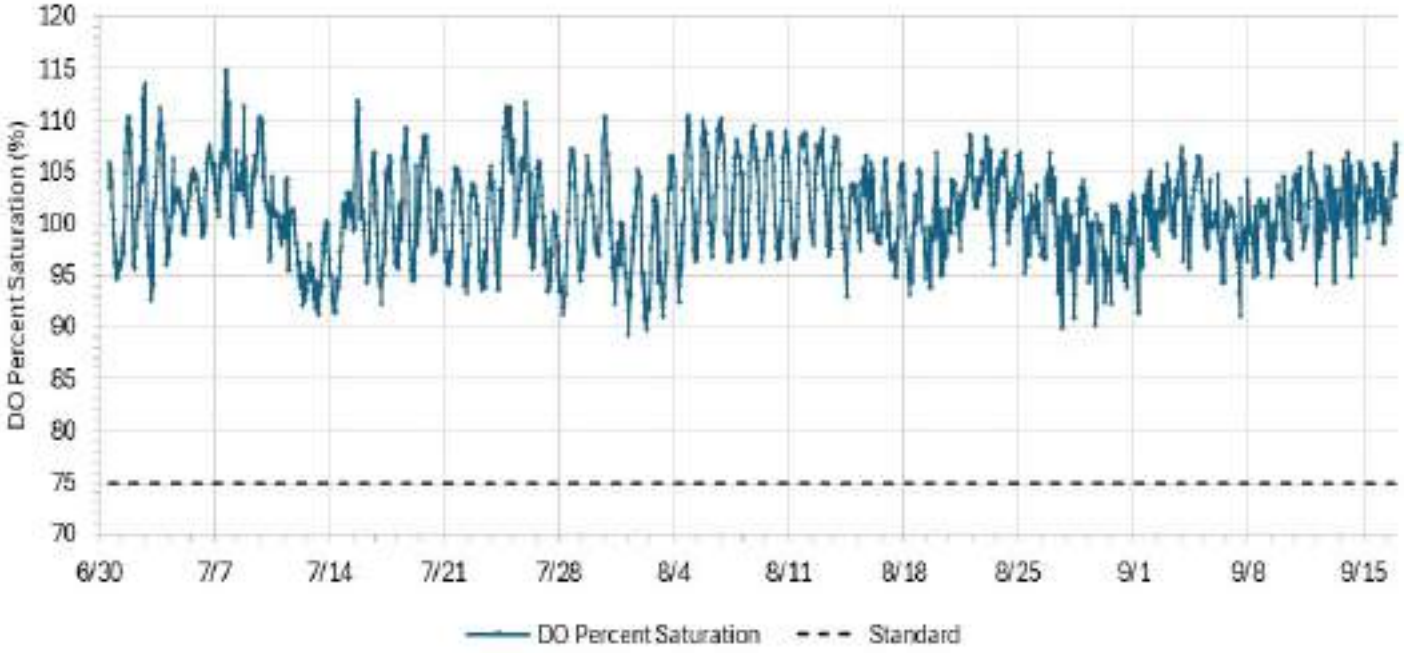


Figure 4.5.1.2.3-4: DO percent saturation (%) downstream of the Brunswick Dam, June 30 to September 17, 2025.



4.5.1.2.4 Historical Macroinvertebrate Data

Benthic macroinvertebrates are aquatic insects, mollusks, arthropods, snails, and other organisms that reside on the bottom of waterbodies. Various taxa groups have wide ranges of pollution tolerances, resulting in the use of macroinvertebrate community composition as an indicator of water quality. Seventeen common taxa groups of benthic macroinvertebrates have been documented in Maine as part of water quality biomonitoring (Table 4.5.1.2.4-1) (MDEP 2020).

Aquatic Insects

MDEP's Biological Monitoring Program calculates several indices to assess benthic macroinvertebrate communities as part of the Department's linear discriminant analysis. Species richness, or the number of species within a defined region, is the simplest measure of species diversity. Species richness is important because it maintains ecosystem functioning. Species evenness is a measure of the relative abundances of species within a community (Justus 2011). Evenness is high when the abundance of all species within a sample are similar, and low when only a handful of species are numerically dominant. Generally, higher species richness and evenness will lead to communities that are more resilient to perturbations (Justus 2011). The Shannon-Wiener Generic Diversity Index measures both richness and evenness at a sampled site. Values range from 0 to 4.5 (but are typically between 1.5 and 3.5), with a lower value indicating a less stable community. Several indices were also included to indicate whether the sampled community generally consisted of tolerant or sensitive species. The Hilsenhoff Biotic Index provides a measure of the general tolerance level of the sampled community toward organic enrichment (i.e., nutrients). This index ranges from 0 (no apparent organic pollution) and 10 (severe organic pollution). Richness of taxa in the orders Ephemeroptera, Plecoptera, and Trichoptera (EPT) also gives an idea of community-level tolerances, as many species in these taxa are intolerant of low water quality. Generally, the number of individuals in EPT orders decrease with a decrease in water quality, though specific species can be tolerant of certain types of pollution (Balloch et al. 1976; Norris 1986). Taxa in the order Diptera are typically tolerant of a wide range of water quality conditions, therefore, the ratio of EPT to Diptera generic richness can give a general indication of the ratio of sensitive to tolerant species richness.

As part of MDEP's Biological Monitoring Program, three sites have been sampled in the Project impoundment, which extends upstream approximately 4.5 miles to below the tailrace of the Pejepscot Project. Indices calculated for each site are presented in Table 4.5.1.2.4-2. Aquatic life classification at all sites except the furthest site upstream had a final determination of Class C (MDEP, 2026b). The site immediately below the Pejepscot Project (S-954) was sampled in 2010, 2018, and 2021, with final determinations of Class B, Class A, and Class B for these years, respectively. This site consistently had relatively high total mean abundance and generic richness, with a much higher EPT generic richness and EPT/Diptera ratio than the other sites. The upstream site did see some variation between the two years it was sampled (2010 and 2021) across the indices measured. The Shannon-Wiener Diversity Index, Hilsenhoff Biotic Index, and EPT richness values were relatively similar between these two sites. However, more Diptera genera were present at the site downstream with three of the dominant taxa in this genera

(*Polypedilum*, *Dicrotendipes*, *Rheotanytarsus*), which is reflected in the EPT/Diptera ratio with a value below 1. The three upstream sites had more intolerant species present than tolerant, as seen in the value of EPT/Diptera greater than 1. Dominant taxa at these upstream sites consisted of caddisflies, mayflies, dragonflies/damselflies, snails, oligochaetes, and midges.

Dragonflies and Damselflies

Damselflies (Zygoptera) and Dragonflies (Anisoptera) have aquatic and terrestrial life stages. Eggs are deposited in or close to water and several larval growth stages occur before the final metamorphosis into adults. In the MDEP biomonitoring macroinvertebrate surveys discussed above, six genera (*Argia*, *Coenagrionidae*, *Enallagma, Chromagrion*, *Somatochlora*, and *Neurocordulia*) of dragonflies or damselflies were identified in the vicinity of the Project from 1984-2021. A Maine Damselfly and Dragonfly Survey was formally conducted between 1999 and 2005, with additional volunteer records added between 2006 and 2016. Rare and unusual species are currently being added to this database as they are submitted. This dataset provides a township-level overview of Damselflies and Dragonflies that may be present in the Project area that was updated in February 2022 (MDDS 2026). The Maine Damselfly and Dragonfly Survey identified a total of 161 species in 9 Families present in the state. Of the 161 species, 43 species are found in one or more of the following four townships in the vicinity of the Project area: Durham, Lisbon, Topsham, and Brunswick (Table 4.5.1.2.4-3). Of these 43 species, 24 species are found in Topsham township, 4 species are found in Brunswick township, 7 species are found in Lisbon township, and 26 species are found in Durham township (MDDS 2026). None of these species were found in all four townships. Of the 43 species present in at least one township, 42 are not listed and 1 is listed as a Federal Species of Special Concern.

4.5.1.2.5 2025 Tailwater Benthic Macroinvertebrate Study

In 2025 as part of the relicensing of the Project, BWPH conducted a survey of benthic macroinvertebrates in the tailwater of the Project (BWPH 2026b). The goal of this study was to determine if the river reach downstream of the Project is attaining Class B aquatic habitat and life criteria. The study objective was to determine the composition of the benthic macroinvertebrate community within the tailrace reach. The study utilized MDEP's Methods for Biological Sampling and Analysis of Maine's Rivers and Streams (MDEP 2014).

Benthic macroinvertebrate samples were collected at a location within 1,000-ft of the tailrace using basket samplers. The rock baskets samplers were installed on July 28, 2025, and retrieved 28 days later on August 26, 2025. In general, aquatic habitat in the sampling area downstream of the Project was primarily a mix of sand (<1/8 inch) and bedrock, with an even distribution of boulder (<10 inches) and rubble (3-10 inches) substrates. Canopy cover was open (0-25% shaded), with 90% of daily direct sun. Habitat and water quality measurements (velocity, temperature, specific conductance, dissolved oxygen, pH, and total dissolved solids) were collected at the time of deployment and retrieval at both sampling locations.

A total of 825 individuals representing 38 genus-level taxonomic classifications were collected from the three samplers deployed downstream of Brunswick Dam. When examined by replicate, the number of genera observed among the three rock basket samples ranged between 20 and 28 (Table 4.5.1.2.5-1). The dominant taxon produced among all three replicates was a midge (*D. neomodestus*), a species with high tolerance for environmentally stressed conditions. This species represented 26.7% of all specimens enumerated from the samplers set downstream of Brunswick Dam. The Shannon Diversity index score of 2.59 trends towards balance in the distribution of individuals among all taxa present.

Metrics evaluating community tolerance/intolerance revealed that sensitive genera comprised just over one-quarter of the macroinvertebrate community downstream of the Project. Members of the orders Ephemeroptera, Plecoptera, and Trichoptera (EPT) are considered particularly sensitive to pollution and can provide important information to the condition of the benthic macroinvertebrate community. Among the 38 total taxa identified, 14 belong to EPT (Ephemeroptera [5], Plecoptera [1], or Trichoptera [8]) families. Individuals from the EPT assemblage were present at the downstream sampling location, comprising 20.7% of the total number of specimens collected.

The Hilsenhoff Biotic Index (HBI) rating provides an estimate of the overall tolerance of the community in the sample area. Values for the HBI index range from 0 to 10 with lower values reflecting a higher abundance of sensitive groups. For the sampling location downstream of the Project this value was estimated at 6.9.

Twenty-eight of the 38 genus level taxa were assigned a tolerance value based on the HI values from the MDEP Macroinvertebrate Taxa List. Six genera of the 28 identified were identified as intolerant, representing 5.6% of all specimens. Genera identified as tolerant (n = 9) represented 50.8% of all specimens.

The Project represents the head of tide and tidal fluctuation was calculated using hourly tailrace elevation measurements for the rock basket deployment period (July 28-August 26). The data indicates daily tidal fluctuations ranging from 4.63 ft to 6.49 ft (mean of 5.69 ft). The results of MDEP's linear discriminant analysis for the determination of attainment of water quality standards indicated that the results for the sampling site were indeterminate due to the sampling location being a freshwater tidal environment. The application of the MDEP linear discriminant model is currently not appropriate for these types of environs.

Table 4.5.1.2.4-1. Common Types of Benthic Macroinvertebrates in Maine

Common Name	Order
Flatworms	Turbellaria
Aquatic Earth Worms	Oligochaeta
Leeches	Hirudinea
Snails	Gastropoda
Clams & Mussels	Bivalvia
Mites	Acariformes
Aquatic Sow Bugs	Isopoda
Scuds	Amphipoda
Crayfish & Shrimps	Decapoda
Mayfly Larvae	Ephemeroptera
Dragonfly & Damselfly Larvae	Odonata
Stonefly Larvae	Plecoptera
True Bugs	Hemiptera
Dobsonfly & Alderfly Larvae	Megaloptera
Water Beetles	Coleoptera
Caddisfly Larvae	Trichoptera
True Fly Larvae	Diptera

Source: MDEP, 2020

Table 4.5.1.2.4-2. Macroinvertebrate Summary Indices from MDEP Biological Monitoring Program

Variable	Site						
Site ID	S-955		S-1203	S-954			
Town	Brunswick		Brunswick	Brunswick			
Approx. Location	0.6 rm upstream		2.5 rm upstream	4.5 rm upstream			
Year	2010	2021	2021	2010	2018 (rock bag)	2018 (rock basket)	2021
Final Determination	Class C	Class C	Class C	Class B	Class A	Class A	Class B
Statutory Class[5]	Class C	Class C	Class C	Class C	Class C	Class C	Class C
Dominant Substrate		sand/ silt	bedrock/ rubble/ cobble	rubble/ cobble	rubble/ cobble	boulder/ rubble/ cobble	rubble/ cobble
Total Mean Abundance	383.33	307.67	312.67	956	669.3	569	415.33
Generic Richness	50	29	33	37	47	42	50
EPT Generic Richness	16	12	13	21	25	21	24
Shannon-Wiener Generic Diversity Index	4.09	3.03	3.55	3.91	4.14	3.53	3.81
Hilsenhoff Biotic Index	6.15	6.26	5.60	4.05	4.46	4.15	5.82

[5] The reach of the Androscoggin River from the Worumbo Dam in Lisbon Falls to Merrymeeting Bay, which contains the Brunswick Project, was reclassified from Class C to Class B in 2022.

Variable	Site						
EPT Generic Richness/Diptera Richness	1.07	1.50	1.08	1.91	1.79	1.75	2.4

Source: MDEP 2023

Table 4.5.1.2.4-3. Dragonfly and Damselfly Species Observed in Brunswick, Topsham, Lisbon, and Durham Townships

Common Name	Scientific Name	Odonate Type	Family	Township	Status in Maine
Ebony Jewelwing	*Calopteryx maculata*	Damselfly	Calopterygidae	Topsham, Lisbon	Not Listed
Northern Spreadwing	*Lestes disjunctus*	Damselfly	Lestidae	Topsham, Durham, Lisbon	Not Listed
Slender Spreadwing	*Lestes rectangularis*	Damselfly	Lestidae	Topsham	Not Listed
Swamp Spreadwing	*Lestes vigilax*	Damselfly	Lestidae	Topsham, Durham	Not Listed
Sweetflag Spreadwing	*Lestes forcipatus*	Damselfly	Lestidae	Durham	Not Listed
Violet Dancer	*Argia fumipennis*	Damselfly	Coenagrionidae	Topsham	Not Listed
Powdered Dancer	*Argia moesta*	Damselfly	Coenagrionidae	Topsham	Not Listed
Stream Bluet	*Enallagma exsulans*	Damselfly	Coenagrionidae	Topsham	Not Listed
Hagen's Bluet	*Enallagma hageni*	Damselfly	Coenagrionidae	Topsham, Durham	Not Listed
Skimming Bluet	*Enallagma geminatum*	Damselfly	Coenagrionidae	Durham	Not Listed
Fragile Forktail	*Ischnura posita*	Damselfly	Coenagrionidae	Topsham	Not Listed
Eastern Forktail	*Ischnura verticalis*	Damselfly	Coenagrionidae	Topsham, Durham, Lisbon	Not Listed
Sphagnum Sprite	*Nehalennia gracilis*	Damselfly	Coenagrionidae	Topsham	Not Listed
Sedge Sprite	*Nehalennia irene*	Damselfly	Coenagrionidae	Topsham	Not Listed
Canada Darner	*Aeshna canadensis*	Dragonfly	Aeshnidae	Lisbon	Not Listed
Mottled Darner	*Aeshna clepsydra*	Dragonfly	Aeshnidae	Durham	Not Listed
Lake Darner	*Aeshna eremita*	Dragonfly	Aeshnidae	Brunswick, Lisbon	Not Listed
Black-Tipped Darner	*Aeshna tuberculifera*	Dragonfly	Aeshnidae	Durham	Not Listed

Common Name	Scientific Name	Odonate Type	Family	Township	Status in Maine
Shadow Darner	*Aeshna umbrosa*	Dragonfly	Aeshnidae	Topsham, Durham	Not Listed
Green-Striped Darner	*Aeshna verticalis*	Dragonfly	Aeshnidae	Durham	Not Listed
Common Green Darner	*Anax junius*	Dragonfly	Aeshnidae	Durham	Not Listed
Springtime Darner	*Basiaeschna janata*	Dragonfly	Aeshnidae	Durham	Not Listed
Fawn Darner	*Boyeria vinosa*	Dragonfly	Aeshnidae	Topsham, Durham	Not Listed
Cyrano Darner	*Nasiaeschna pentacantha*	Dragonfly	Aeshnidae	Durham	Not Listed
Black-Shouldered Spinyleg	*Dromogomphus spinosus*	Dragonfly	Gomphidae	Durham	Not Listed
Extra-Striped Snaketail	*Ophiogomphus anomalus*	Dragonfly	Gomphidae	Topsham	Federal Special Concern
Lancet Clubtail	*Phanogomphus exilis*	Dragonfly	Gomphidae	Topsham	Not Listed
Dusky Clubtail	*Phanogomphus spicatus*	Dragonfly	Gomphidae	Topsham, Durham	Not Listed
Stream Cruiser	*Didymops transversa*	Dragonfly	Macromiidae	Topsham, Durham	Not Listed
Swift River Cruiser	*Macromia illinoiensis*	Dragonfly	Macromiidae	Durham	Not Listed
Prince Baskettail	*Epitheca princeps*	Dragonfly	Corduliidae	Topsham	Not Listed
Uhler's Sundragon	*Helocordulia uhleri*	Dragonfly	Corduliidae	Topsham	Not Listed
Eastern Pondhawk	*Erythemis simplicicollis*	Dragonfly	Libellulidae	Durham	Not Listed
Frosted Whiteface	*Leucorrhinia frigida*	Dragonfly	Libellulidae	Durham	Not Listed
Dot-Tailed Whiteface	*Leucorrhinia intacta*	Dragonfly	Libellulidae	Topsham, Durham	Not Listed
Slaty Skimmer	*Libellula incesta*	Dragonfly	Libellulidae	Durham	Not Listed
Twelve-Spotted Skimmer	*Libellula pulchella*	Dragonfly	Libellulidae	Brunswick	Not Listed

Common Name	Scientific Name	Odonate Type	Family	Township	Status in Maine
Blue Dasher	*Pachydiplax longipennis*	Dragonfly	Libellulidae	Topsham, Durham, Lisbon	Not Listed
Eastern Amberwing	*Perithemis tenera*	Dragonfly	Libellulidae	Durham, Lisbon	Not Listed
Common Whitetail	*Plathemis lydia*	Dragonfly	Libellulidae	Brunswick	Not Listed
Saffron-Winged Meadowhawk	*Sympetrum costiferum*	Dragonfly	Libellulidae	Topsham	Not Listed
Cherry-Faced Meadowhawk	*Sympetrum internum*	Dragonfly	Libellulidae	Durham	Not Listed
Autumn Meadowhawk	*Sympetrum vicinum*	Dragonfly	Libellulidae	Brunswick, Topsham, Durham	Not Listed

Source: MDDS 2026

Table 4.5.1.2.5-1: Summary of Macroinvertebrate Metrics for Rock Basket Samplers Collected from the Tailwater Downstream of Brunswick, August 2025.

Metric	Replicate			
	1	2	3	All
Total Number of Individuals	224	322	279	825
Total Number of Taxa (genus level)	25	28	20	38
Number of EPT Taxa (genus level)	9	11	8	14
Number of Ephemeroptera Taxa (genus level)	4	4	3	5
Number of Plecoptera Taxa (genus level)	0	1	0	1
Number of Trichoptera Taxa (genus level)	5	6	5	8
Percent EPT Specimens	22.8%	25.2%	14.0%	20.7%
Percent Ephemeroptera Specimens	11.6%	6.8%	3.9%	7.2%
Number of Intolerant Taxa (genus level)	3	5	2	6
Number of Intermediate Taxa (genus level)	9	11	5	13
Number of Tolerant Taxa (genus level)	7	7	8	9
Percent Intolerant Organisms	6.3%	7.8%	2.5%	5.6%
Percent Intermediate Organisms	23.2%	20.8%	6.1%	16.5%
Percent Tolerant Organisms	47.3%	43.8%	61.6%	50.8%
Percent Dominant Taxon (genus level)	33.0%	17.4%	32.3%	26.7%
Hilsenhoff Biotic Index	6.60	6.60	7.52	6.90
HBI Water Quality Rating	Fairly Poor	Fairly Poor	Poor	Fairly Poor
Shannon Diversity (base e)	2.41	2.71	2.16	2.59

4.5.2 Environmental Analysis

In 2025, BWPH completed a Water Quality Assessment and Tailwater Benthic Macroinvertebrate Study at the Project. The trophic state study in June through October 2025 demonstrated that the impoundment did not thermally stratify and that the DO concentration, DO percent saturation, total phosphorus concentration, and chlorophyll-a concentration were in attainment with Class B standards and criteria. The DO concentration and percent saturation were also in attainment with Class B standards downstream of the Brunswick Dam from July through September 2025. The Project generated throughout the June through October 2025 study period demonstrating that operation of the Project did not impact water quality.

4.5.2.1 Cumulative Effects

In SD2, water quality was identified as a resource that could be cumulatively affected by the proposed continued operation and maintenance of the Project. The geographic scope for water quality was identified as the Androscoggin River from the upstream extent of the Brunswick reservoir to where the Androscoggin River flows into Merrymeeting Bay. Water quality data collected throughout the Brunswick Project by the MDEP VRMP and by BWPH in 2025 has consistently demonstrated that operation of the Project maintains conditions consistent with Class B water quality standards. The results of the 2025 water quality studies found that the Project is operating in a manner that protects and maintains Class B water quality and is supportive of designated uses.

4.5.3 Proposed Environmental Measures

BWPH is proposing to continue to operate the Project in a run-of-river mode, with little fluctuation in the impoundment level, such that inflow approximates outflow as is currently required under the existing license. Studies conducted by BWPH demonstrated that the Project and its continued operation do not adversely affect water resources. BWPH is also proposing to develop and implement an Operations Compliance Monitoring Plan to ensure compliance with the water level and flow requirements of the new license.

4.5.4 Unavoidable Adverse Effects

The continued operation of the Project will not result in new unavoidable impacts to water resources.

4.5.5 References

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4.6 Aquatic Resources

4.6.1 Affected Environment

4.6.1.1 Fish Assemblage

The fish assemblage in the Androscoggin River reflects natural and anthropogenic gradients from its upper reaches in New Hampshire to the tidal waters near Brunswick, ME (Yoder et al., 2006). Upstream of Rumford Falls (a natural barrier to fish movement located approximately 72 miles upstream of the Project), the river is referred to as the Upper Androscoggin. The Upper Androscoggin is managed for recreational cold-water salmonid fishing by the states of Maine and New Hampshire within their respective borders. Though wild populations of Brook Trout and Rainbow Trout contribute to the fishery, it is dependent upon annual stocking of Brook Trout, Rainbow Trout, Brown Trout, and Landlocked Salmon (Brautigam and Pellerin, 2014). Brook Trout are stocked below the Worumbo Project, and all four species have been captured in the Brunswick fishway at least once between 1999-2023.

In the lower Androscoggin River, downstream of Rumford Falls, including the Project impoundment, the fish assemblage consists of a resident warm-water community and stocked coldwater salmonids.

Electrofishing surveys were performed at two sites within the Project impoundment (1.5 and 4.3 RM upstream of the dam) and two sites downstream of the Project (0.2 and 2.6 RM downstream of the dam) by Yoder et al. (2006) in late July of 2003 (Table 4.6.1.1-1 and Table 4.6.1.1-2).

A total of 935 individual fish representing 12 species were captured in the impoundment. As the timing of these surveys was after diadromous fish upstream migrations, results may be more representative of the resident fish community. Total fish abundance was higher at the upstream site (636 fish) (4.3 RM upstream of the Project dam) than the downstream impoundment site (299 fish, 1.5 RM upstream of the Project dam), primarily due to large numbers of Fallfish, Redbreast Sunfish, and Smallmouth Bass. Young-of-year Alewife and American Shad were sampled at the upstream site but were absent at the downstream impoundment site. The downstream site, however, had a higher species richness, with 10 species sampled compared to 8 sampled at the upstream site.

A total of 1,572 individual fish representing 14 species were captured downstream of the Project. Total fish abundance was higher at the downstream site (1,452 fish) (2.6 RM downstream of the Project dam) than the upstream site (120 fish, 0.2 RM downstream of the Project dam), primarily due to large numbers of American Eel, Spottail Shiner, and White Sucker. In addition, young-of-year Alewife and American Shad were sampled at the upstream site but were absent at the downstream impoundment site. The downstream site had a higher species richness, with 13 species sampled compared to 7 sampled at the upstream site.

Other species such as Atlantic Tomcod, Shortnose Sturgeon, and Atlantic Sturgeon not sampled by Yoder et al. (2006) are likely to be found in the Project area (Table 4.6.1.1-3). The overall freshwater fish community in the Project area is likely dominated by cyprinids (minnows) and centrarchids (sunfishes) (MDMR and MDIFW, 2017; Yoder et al., 2006). Brown Trout and Rainbow Trout are stocked within the Lower Androscoggin and may move downstream into the Project area. Brook Trout are stocked downstream of the Worumbo Project, and some could be found within the Project area, although many of these fish likely perish due to higher water temperatures during the summer season (MDMR and MDIFW, 2017).

The Androscoggin River immediately below the Project dam is influenced by tidal waters. The Androscoggin River terminates in Merrymeeting Bay, which is a large estuary where the waters from the Kennebec River, Androscoggin River, and some smaller tributaries ultimately join. Merrymeeting Bay supports a diverse fish community, including eleven species of diadromous fish that utilize both fresh and saltwater habitats to fulfill their life history (Table 4.6.1.1-3). Some of these diadromous species, including Atlantic Salmon, American Shad, Alewife, Blueback Herring, Sea Lamprey, and American Eel migrate to and beyond the Project area to access spawning and rearing habitats. Diadromous fish that have been captured and counted at the Brunswick fishway are typically passed upstream into the Brunswick headpond or transported to several areas within the watershed upstream, with the location depending on the species. Counts at the fishway vary from year to year (Table 4.6.1.1-4).

Several diadromous species do not migrate or are not passed by MDMR or BWPH at the Project dam. Striped Bass collected at the Project fishway are not passed upstream due to concerns about the efficacy of downstream passage within the Lower Androscoggin River (NOAA, 2020). Atlantic Sturgeon and Shortnose Sturgeon are not passed upstream as it is thought that these species did not historically migrate past Brunswick Falls on which the Project dam is built. Spawning habitat for both sturgeon species has been identified immediately downstream of the Project between the dam and the railroad bridge (MDMR and MDIFW, 2017). Rainbow Smelt have been observed spawning along the outer wall of the Project fishway (MDMR and MDIFW, 2017). This species typically spawns in coastal rivers immediately above the head-of-tide in freshwater and are therefore not passed upstream of the Project. Atlantic Tomcod are also found downstream of the Project, but spawn in estuarine habitat and are therefore not passed upstream of the dam.

4.6.1.1.1.1 2025 Fish Assemblage Study

In 2025 as part of the relicensing of the Project, BWPH conducted a fish assemblage study within the Project impoundment (BWPH 2026a). The goal of this study was to characterize the current fish community within the Project waters and provide additional information on the bass fishery in the impoundment. Specifically, the study aimed to document fish species presence and relative abundance through standardized surveys, collect length and weight data for Largemouth and Smallmouth Bass, and identify the locations and elevations of bass nests where observed.

The survey was conducted on June 23 and 24, 2025 within the Project impoundment. Fish sampling was completed using boat electrofishing and seine netting. Two electrofishing transects were conducted, totaling approximately 3,400 ft, with one transect completed along each side of the river. Four seine nets (each 100 ft long by 6 ft deep) were deployed, with one haul conducted per net. In addition, a visual bass nest survey was performed along the impoundment shoreline while traveling between sampling locations and water quality data was collected.

A total of 211 fish and 12 species were collected during the survey. The dominant cyprinid forage species identified were the Eastern Silvery Minnow, Common Shiner, and Fallfish, in order of relative abundance. Smallmouth bass were the primary gamefish identified within the study area. Two diadromous fish species were observed in the fish community included American Eel and Sea Lamprey. Species compositions per survey site are shown in Table 4.6.1.1.1.1-1 and Table 4.6.1.1.1.1-2.

A total of two bass nests were observed during the survey and no fish were recorded to be present in or around the nest. Table 4.6.1.1.1.1-3 summarizes the field observations and elevation data collected for each nest location. During the 2025 black bass spawning season (May 1 through June 30), impoundment elevations ranged from 38.5 to 42.7 ft, with an average of 40.1 ft and remained above 38.71 ft approximately 99% of the time. These stable water levels indicate that Project operations were unlikely to have impacted bass nests within the impoundment. Even at the lowest recorded elevation, sufficient water depth remained over documented nests, and actual depths were likely greater due to upstream hydraulic control maintaining higher localized water levels.

Water quality measurements were taken at each survey site in the Project impoundment throughout the surveying period. One measurement was taken at the beginning of each survey at each respective site. The average water temperature across all sites was 23.8 °C, ranging from 23.0 °C to 24.6 °C (Table 4.6.1.1.1.1-4) The average dissolved oxygen measured was 8.52 mg/L, ranging from 8.10 mg/L to 9.32 mg/L (Table 4.6.1.1.1.1-4). The average specific conductivity across all sites was 72.2 µS/cm², ranging from 71.1 µS/cm² to 73.1 µS/cm² (Table 4.6.1.1.1.1-4).

Table 4.6.1.1-1. Abundance of Fish in the Androscoggin River in the Vicinity of the Brunswick Project, 2003

Species	Number of Fish (n/km)					Relative Abundance			
	Project Impoundment	Project Impoundment	Downstream of Project	Downstream of Project		Project Impoundment	Project Impoundment	Downstream of Project	Downstream of Project
	4.3 RM upstream	1.5 RM upstream	0.2 RM downstream	2.6 RM downstream		4.3 RM upstream	1.5 RM upstream	0.2 RM downstream	2.6 RM downstream
Alewife (*Alosa pseudoharengus*)	91	-	-	1		13.9%	-	-	0.1%
American Eel (*Anguilla rostrata*)	3	2	36	615		0.5%	0.7%	30.0%	42.4%
American Shad (*Alosa sapidissima*)	33	-	-	-		5.0%	-	-	-
Chain Pickerel (*Esox niger*)	-	1	-	-		-	0.3%	-	-
Common Carp (*Cyprinus carpio*)	-	-	1	-		-	-	0.8%	-
Common Shiner (*Luxilus cornutus*)	-	51	-	-		-	17.1%	-	-
Eastern Banded Killifish (*Fundulus diaphanus*)	-	2	-	20		-	0.7%	-	1.4%
Fallfish (*Semotilus corporalis*)	303	23	-	-		46.2%	7.7%	-	-
Golden Shiner (*Notemigonus crysoleucas*)	-	32	-	12		-	10.7%	-	0.8%
Pumpkinseed Sunfish (*Lepomis gibbosus*)	-	-	-	14		-	-	-	1.0%
Redbreast Sunfish (*Lepomis auritis*)	111	25	28	82		16.9%	8.4%	23.3%	5.7%
Sea Lamprey (*Petromyzon marinus*)	-	-	-	4		-	-	-	0.3%
Smallmouth Bass (*Micropterus dolomieu*)	95	45	41	35		14.5%	15.1%	34.2%	2.4%
Spottail Shiner (*Notropis hudsonius*)	4	49	5	386		0.6%	16.4%	4.2%	26.6%
Striped Bass (*Morone saxatilis*)	-	-	-	7		-	-	-	0.5%
White Catfish (*Ameiurus catus*)	-	-	1	1		-	-	0.8%	0.1%
White Sucker (*Catostomus commersonii*)	16	69	8	270		2.4%	23.1%	6.7%	18.6%
Yellow Perch (*Perca flavescens*)	-	-	-	5		-	-	-	0.4%
All Species	636	299	120	1452		100.0%	100.0%	100.0%	100.0%

Source: Yoder et al. (2006)

Table 4.6.1.1-2. Biomass of Fish in the Androscoggin River in the Vicinity of the Brunswick Project, 2003

Species	Biomass of Fish (kg/km)					Relative Biomass			
	Project Impoundment	Project Impoundment	Downstream of Project	Downstream of Project		Project Impoundment	Project Impoundment	Downstream of Project	Downstream of Project
	4.3 RM upstream	1.5 RM upstream	0.2 RM downstream	2.6 RM downstream		4.3 RM upstream	1.5 RM upstream	0.2 RM downstream	2.6 RM downstream
Alewife (*Alosa pseudoharengus*)	0.15	-	-	0.10		0.4%	-	-	0.0%
American Eel (*Anguilla rostrata*)	1.40	1.00	3.36	13.68		4.0%	4.4%	16.0%	10.2%
American Shad (*Alosa sapidissima*)	0.01	-	-	-		0.0%	-	-	-
Chain Pickerel (*Esox niger*)	-	0.02	-	-		-	0.1%	-	-
Common Carp (*Cyprinus carpio*)	-	-	2.70	-		-	-	12.9%	-
Common Shiner (*Luxilus cornutus*)	-	0.33	-	-		-	1.5%	-	-
Eastern Banded Killifish (*Fundulus diaphanus*)	-	-	-	0.07		-	-	-	0.1%
Fallfish (*Semotilus corporalis*)	2.98	0.10	-	-		8.5%	0.4%	-	-
Golden Shiner (*Notemigonus crysoleucas*)	-	0.17	-	0.01		-	0.7%	-	0.0%
Pumpkinseed Sunfish (*Lepomis gibbosus*)	-	-	-	0.36		-	-	-	0.3%
Redbreast Sunfish (*Lepomis auritis*)	4.85	0.87	0.76	1.67		13.9%	3.8%	3.6%	1.2%
Sea Lamprey (*Petromyzon marinus*)	-	-	-	0.04		-	-	-	0.0%
Smallmouth Bass (*Micropterus dolomieu*)	10.56	9.45	4.64	2.20		30.3%	41.8%	22.1%	1.6%
Spottail Shiner (*Notropis hudsonius*)	0.03	0.30	0.04	0.26		0.1%	1.3%	0.2%	0.2%
Striped Bass (*Morone saxatilis*)	-	-	-	0.12		-	-	-	0.1%
White Catfish (*Ameiurus catus*)	-	-	0.22	0.12		-	-	1.1%	0.1%
White Sucker (*Catostomus commersonii*)	14.83	10.40	9.30	115.32		42.6%	45.9%	44.3%	86.0%
Yellow Perch (*Perca flavescens*)	-	-	-	0.18		-	-	-	0.1%
All Species	34.81	22.64	21.02	134.13		100.0%	100.0%	100.0%	100.0%

Source: Yoder et al. (2006)

Table 4.6.1.1-3. List of Diadromous and Resident Species Known to Occur or Likely Found in the Project Area

Common Name	Scientific Name	Upstream	Downstream	Status	Source
Diadromous Species					
Alewife	*Alosa pseudoharengus*	X	X	Not Listed	Yoder et al. 2006; MDMR and MDIFW 2017
American Eel	*Anguilla rostrata*	X	X	Not Listed	Yoder et al. 2006
American Shad	*Alosa sapidissima*	X		Not Listed	Yoder et al. 2006
Atlantic Salmon	*Salmo salar*	X	X	Federally Endangered	MDMR and MDIFW 2017
Atlantic Sturgeon	*Acipenser oxyrhynchus oxyrhynchus*	-	X	Federally Threatened	MDMR and MDIFW 2017
Blueback Herring	*Alosa aestivalis*	X	X	Not Listed	MDMR and MDIFW 2017
Rainbow Smelt	*Osmerus mordax*	-	X	Not Listed	MDMR and MDIFW 2017
Sea Lamprey	*Petromyzon marinus*	X	X	Not Listed	Yoder et al. 2006
Shortnose Sturgeon	*Acipenser brevirostrum*	-	X	Federally Endangered	MDMR and MDIFW 2017
Striped Bass	*Morone saxatilis*	-	X	Not Listed	Yoder et al. 2006
Atlantic Tomcod	*Microgadus tomcod*	-	X	Not Listed	NOAA 2020
Resident Species					
Black Crappie	*Pomoxis nigromaculatus*	X	X	Introduced	Topsham Hydro 2017
Brook Trout	*Salvelinus fontinalis*	X	X	Stocked in Androscoggin below Worumbo	MDMR and MDIFW 2017
Brown Trout	*Salmo trutta*	X	X	Stocked in watershed	MDMR and MDIFW 2017
Chain Pickerel	*Esox niger*	X		Introduced	Yoder et al. 2006
Common Carp	*Cyprinus carpio*		X	Exotic	Yoder et al. 2006
Common Shiner	*Luxilus cornutus*	X		Native	Yoder et al. 2006
Eastern Banded Killifish	*Fundulus diaphanus*	X	X	Native	Yoder et al. 2006
Eastern Silvery Minnow	*Hybognathus regius*	X	-	Introduced	2025 Fish Survey (BWPH)
Fallfish	*Semotilus corporalis*	X		Native	Yoder et al. 2006
Golden Shiner	*Notemigonus crysoleucas*	X	X	Native	Yoder et al. 2006
Northern Pike	*Esox lucius*	X	X	Introduced	MDMR and MDIFW 2017
Pumpkinseed Sunfish	*Lepomis gibbosus*		X	Native	Yoder et al. 2006
Rainbow Trout	*Oncorhynchus mykiss*	X	X	Stocked in watershed	MDMR and MDIFW 2017
Redbreast Sunfish	*Lepomis auritis*	X	X	Native	Yoder et al. 2006
Rock Bass	*Ambloplites rupestris*	X	X	Introduced	MDMR and MDIFW 2017
Smallmouth Bass	*Micropterus dolomieu*	X	X	Introduced	Yoder et al. 2006

Common Name	Scientific Name	Upstream	Downstream	Status	Source
Spottail Shiner	*Notropis hudsonius*	X	X	Introduced	Yoder et al. 2006
White Catfish	*Ameiurus catus*		X	Introduced	Yoder et al. 2006
White Sucker	*Catastomus commersonii*	X	X	Native	Yoder et al. 2006
Yellow Perch	*Perca flavescens*		X	Native	Yoder et al. 2006

Table 4.6.1.1-4. Diadromous Fish Captured at the Brunswick Fishway, 2000-2025.

Year	American Shad	River Herring	Sea Lamprey	Atlantic Salmon	American Eel	Striped Bass
2000	88	9,551	0	4	3	95
2001	26	18,218	0	5	5	0
2002	141	107,742	0	2	2	8
2003	15	53,815	0	3	0	3
2004	12	114,051	8	12	2	1
2005	0	26,629	0	10	0	18
2006	3	34,239	0	6	9	75
2007	6	60,662	10	21	4	2
2008	1	92,359	19	18	2	3
2009	0	44,725	15	24	0	0
2010	22	39,689	26	9	0	0
2011	0	54,886	19	44	2	1
2012	11	170,191	25	0	108	3
2013	16	69,104	26	2	100	103
2014	0	55,678	45	3	201	1
2015	53	71,887	129	1	1	1
2016	1,096	114,874	240	7	4	81
2017	1	49,923	21	0	3	2
2018	32	179,040	13	1	1	9
2019	63	81,025	48	1	1	25
2020	23	67	41	5	1	1
2021	550	54,906	345	5	2	2
2022	228	139,326	370	17	7	1
2023	13	67,927	491	8	3	0
2024	91	112,539	734	18	3	3
2025	11	19,761	475	7	2	0

Table 4.6.1.1.1.1-1: Species Composition across Electrofishing Sites in the Project Impoundment, 2025 (EF01-EF02)

Species	Catch (n)	Biomass (g)
American Eel	3	422
Common Shiner	30	127
Eastern Silvery Minnow	103	277
Fallfish	11	39.5
Pumpkinseed Sunfish	3	217
Redbreast Sunfish	2	317
Sea Lamprey	1	2
Smallmouth Bass	10	1438
White Sucker	5	3594
Yellow Perch	2	17

Table 4.6.1.1.1.1-2: Species Composition Across Seine Netting Sites in the Project Impoundment, 2025 (SN01-SN04)

Species	Catch (n)	Biomass (g)
Banded Killifish	1	1
Common Shiner	2	8
Fallfish	18	56
Pumpkinseed Sunfish	5	266
Sea Lamprey	1	680
Smallmouth Bass	10	717
Spottail Shiner	2	7

Table 4.6.1.1.1.1-3: Observed Bass Nest Locations

Nest Number	Bass Observed	Depth (ft)	Elevation (ft, NGVD29)
BN-01	No	2.2	37.60
BN-02	No	3.5	36.53

Table 4.6.1.1.1.1-4: Water Quality Conditions and Dominant Substrate Measured During Fish Surveys (June 23-24, 2025)

Site	Temp (C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm²)	Dominant Substrate	Large Woody Debris	Percent of Shoreline with Overhanging Shoreline Cover	Percent of Area with Aquatic Vegetation
SN01	23.50	9.32	71.10	Silt	Minimal	0%	5%
SN02	24.60	8.82	73.10	Silt	Absent	5%	5%
SN03	24.30	8.41	73.00	Silt/Cobble	Absent	70%	12%
SN04	23.60	8.41	73.00	Silt	Absent	15%	20%
EF01	23.50	9.30	71.10	Silt	Minimal	60%	20%
EF02	23.00	8.10	72.00	Cobble	Abundant	70%	10%

4.6.1.2 Diadromous Species and Fish Passage

4.6.1.2.1 Diadromous Species

Diadromous is a term for describing a species that utilizes both saltwater and freshwater habitats to complete their life cycle. Of the diadromous fish, most are anadromous, meaning that they mature in saltwater but return to freshwater to spawn. Alternatively, catadromous describes a life cycle whereby spawning occurs in saltwater and progeny grow to maturity in freshwater. Further, when all individuals die after spawning, the species is semelparous; when individuals may survive and return to spawn again, the species is iteroparous.

Recent fish passage records for the Project fishway indicate that Atlantic Salmon, American Shad, river herring (Alewife and Blueback Herring), Sea Lamprey, and American Eel utilize the lower Androscoggin River (BWPH 2026b). Striped Bass are captured at the Project fishway but are not currently passed upstream due to concerns about downstream passage. Though no formal fish passage exists for American Eel at the Project, they have been documented at the fishway and throughout much of the Lower Androscoggin during fisheries surveys both upstream and downstream of the Project (Yoder et al. 2006). Atlantic Sturgeon, Shortnose Sturgeon, Rainbow Smelt, and Atlantic Tomcod are present below the Project, but are not passed upstream if captured at the Project fishway as their historic upstream extent was the head of tide.

Atlantic Salmon

Atlantic Salmon (*Salmo salar*) are native to the North Atlantic Ocean; in the western Atlantic, they range from Iceland, southern Greenland, and Ungava Bay, Quebec to the Connecticut River (Danie et al. 1984). In the U.S., they historically ranged from Maine to Long Island Sound, but the Central New England and Long Island Sound DPSs have been extirpated (NMFS 2012). They are an anadromous, iteroparous species. After two years at sea, they average approximately 28-30 inches in length and 8-12 pounds and can reach 30 pounds (DSF 2015). Spawning adults return home to their natal rivers and stream, from the spring through fall with peak upstream migration from May through mid-July in Maine (NMFS 2012). They spawn in the late fall and will build nests in suitable substrate. The most suitable substrate is highly permeable gravel and cobble (NMFS 2012). Those that return to freshwater after only one year at sea are called “grilse” and are considered 1-sea-winter fish. Older fish are referred to by the number of winters they have been at sea (i.e., 2-sea-winter, 3 sea-winter). They build nests (redds) in gravel/cobble areas of moving water, and the eggs overwinter, hatching in March/April. After fry emerge from the substrate, they disperse from the redds and feed and grow, developing into a juvenile salmonid (parr). The parr will typically grow for 1-3 years in freshwater and undergo a physiological transformation that prepares them for life in saltwater, known as smoltification, after which they develop into smolts and emigrate to the ocean during the springtime (NMFS 2012). They will reach Newfoundland and Labrador by mid-summer and spend their first winter at sea to the south of Greenland (DSF 2015). Some will return to Maine rivers as grilse the following spring, but the majority will continue migrating and feeding to the south of Greenland and along the Labrador coast (DSF 2015). Most fish will return to Maine to

spawn after their second winter at sea. Post-spawn fish will overwinter in the river as "kelts" and will emigrate the following spring.

The Gulf of Maine (GOM) Distinct Population Segment (DPS) of Atlantic Salmon are a federally endangered species. The Project area is within the Merrymeeting Bay Salmon Habitat Recovery Unit (SHRU) for GOM DPS of Atlantic Salmon. The critical habitat designation for the Androscoggin River extends from its confluence with the Kennebec River upstream to the Lewiston Falls Project, with the Lower Androscoggin and Little Rivers designated as sub-basins. Historically, Atlantic salmon may have passed upstream as far as Rumford Falls, but currently the upstream extent of migration is the Lewiston Falls Project (NOAA 2020).

The Lower Androscoggin River in the Project area generally is designated as low-quality spawning habitat, though the mainstem is considered an important migration corridor (NMFS 2012; NASCO 2009). No high-quality spawning or rearing habitat is expected to occur in the Project impoundment or tailwater areas (NMFS 2012; NASCO 2009).

Accessible spawning habitat in the Androscoggin River is currently primarily restricted to the Little River, a tributary located between the Pejepscot and Worumbo Projects (NOAA 2020). No fish passage is currently present at barriers on the Little Androscoggin River, which contains much of the spawning habitat for Atlantic Salmon in the lower Androscoggin River watershed. Periodic electrofishing surveys within the Little River have indicated that juvenile Atlantic Salmon utilize this tributary for rearing habitat to some extent, but the amount and quality of available habitat has not recently been assessed (MDMR and MDIFW 2017).

Since the year 2000, salmon returns at the Brunswick Fishway have ranged from 0 to 44 fish per season, with an average of 9 fish per year (Table 4.6.1.2.1-1). These returns are quite low and Atlantic Salmon are considered extirpated in waters to the south of the Androscoggin River watershed (NMFS 2012). Returns of wild-origin salmon have historically been low, with a higher prevalence of hatchery-origin fish (Table 4.6.1.2.1-1). Atlantic Salmon stocking in the Androscoggin River watershed was attempted in the 1980s and 1990s, but the program was discontinued due to low returns. Stocking efforts began again in the Androscoggin River in 2001 at a limited capacity relative to many other large river systems in the GOM DPS. Approximately 18,000 fry stocked as of 2020 (USASAC 2015; NOAA 2020), the majority of which were stocked into the Little River annually by school groups.

In response to the listing of GOM DPS of Atlantic Salmon, BWPH developed an ISPP for the Brunswick Project.[6] The ISPP was developed in consultation with the fishery resource agencies, and the Project FERC license was amended on December 13, 2013, to incorporate the terms and conditions of the ISPP. In 2019, upon expiration of the ISPP, BWPH developed a final SPP for the Project, the terms of which were incorporated into the Project license by FERC on August 16, 2022. The purpose of both the ISPP and SPP is to guide Project operation and management,

[6] The ISPP for the Brunswick Project also includes provisions for listed Atlantic and Shortnose Sturgeon.

including fishway operations until relicensing. Terms and conditions of the ISPP include provisions for fishway operation and monitoring, Project operation, and the conduct of certain fish passage studies.

American Shad

American Shad (*Alosa sapidissima*) are North America's largest species of herring, with spawning populations native to the Atlantic coast from the St. John's River in Florida to the St. Lawrence River in Canada. They are anadromous and iteroparous, though the level of iteroparity varies by latitude with greater survival after spawning and a greater chance of repeat spawning in the northern parts of their range (Limburg et al. 2003). In Maine, iteroparity is likely high. They swim into natal rivers to spawn in May and June, and broadcast spawn over suitable substrates, primarily sand, gravel, or a mixture (Limburg et al. 2003). Shad typically make their first spawning run when they are 4-5 years old (Weiss-Glanz et al. 1986). Juvenile shad will feed and grow in freshwater habitats until they are triggered primarily by decreasing temperatures to emigrate downstream into estuaries in the late summer and fall (Weiss-Glanz et al. 1986). Upon entering the ocean, they will become long-range coastal migrants, with fish originating from different spawning stocks mixing in distinct winter and summer areas. In the summer and fall, they congregate in the Gulf of Maine and the Bay of Fundy (Weiss-Glanz et al. 1986). While in the ocean, American Shad filter feed on plankton. Immature shad may also enter estuaries seasonally to feed.

According to MDMR and MDIFW (2017) American Shad historically spawned from Merrymeeting Bay upstream through the mainstem Androscoggin River to Lewiston Falls and in the Little Androscoggin River up to Biscoe Falls, with an estimated 62 miles of spawning habitat available in the watershed. However, Taylor (1951) qualifies this by explaining that the falls at Brunswick near the head of tide, could have limited populations of American Shad on the Androscoggin River. The estimated production potential for the Lower Androscoggin River, including the Brunswick, Pejepscot, and Worumbo impoundments and the Little River, is 84,178 fish at an estimate of 50 fish/acre of spawning habitat. The vertical slot fishway at the Project was specifically designed to pass American Shad, with an annual design capacity of 85,000 fish (MDMR and MDIFW 2017). Its installation was part of a restoration program for American Shad that also involved stocking pre-spawn fish from in-state and out-of-state sources into spawning habitat below Lewiston Falls. Pre-spawn shad were stocked from 1985 to 2008, totaling approximately 8,000 adults over that period with 3 to 1,090 fish stocked annually. In addition, approximately 5.5 million hatchery-reared fry were stocked between 1999-2008 (MDMR and MDIFW 2017). However, despite these restoration efforts, the number of American Shad documented at the Project fishway has ranged from 0 to 1,096 fish from 2000-2025 (Table 4.6.1.1-4). Large fluctuations are seen in American Shad numbers, with 1-2 years of higher counts often followed by years with low counts. A spawning population of shad exists immediately below the Project, as evidenced by the presence of mature adults and the capture of eggs (MDMR and MDIFW 2017).

River herring

River herring is a collective term for anadromous Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*), both of which are native to Maine. Alewife are typically the most abundant of the two species in Maine waters. Alewife range from Newfoundland to northern South Carolina, whereas Blueback Herring range from Nova Scotia to the St. Johns River in Florida (Fay et al., 1983). Both species are anadromous and swim into rivers in the spring to spawn in May and June, with peak spawning of Alewife occurring approximately 2-3 weeks prior to Blueback Herring (Fay et al., 1983). Alewife spawn in a variety of habitats, from mid-river sites to ponds and lakes. Blueback Herring prefer to spawn in areas with current and hard substrates (Fay et al., 1983). River herring are iteroparous, and after spawning, surviving adults migrate back to the ocean relatively quickly. Repeat spawners will return to the same river to spawn again, with localized straying in adjacent rivers (Fay et al., 1983). However, homing to natal waters is not as strong as that of Atlantic Salmon. However, river herring do exhibit localized/regional straying among stocks (Reid et al 2018, Hare et al 2021). Most Alewives have spawned for the first time by four years of age, and mature female alewives typically produce 60,000 – 100,000 eggs (Fay et al., 1983). After the eggs hatch, the progeny will feed and grow in freshwater habitats before emigrating to estuarine rearing areas in the late summer and fall. Eventually, they will migrate to the ocean where they will mature before returning to freshwater to spawn.

River herring are, by far, the most abundant anadromous fish captured at the Project fishway (Table 4.6.1.1-4). After being captured, they are transported to locations within the Androscoggin River watershed; during recent years, the number captured at the Project has exceeded the MDMR stocking rate targets of 27,358 river herring into 4,562 acres of habitat (with the exception of 2020 due to COVID). Passage facilities are also present at the Pejepscot and Worumbo Projects, allowing fish passed at the Project to migrate as far as Lewiston Falls. Stocking programs of hatchery-reared fish into the watershed since 1983 have also affected abundance and run returns. Based on an Atlantic States Marine Fisheries Commission (ASMFC) estimate, the Androscoggin River could yield 2.3 million fish to the coastal stocks, but only 1/3 of the historical habitat for river herring is currently accessible due to dams without fish passage facilities (ASMFC 2016; ASMFC 2012). The status of the Alewife stock from the Androscoggin River was classified by the ASMFC as stable, with a recent increasing trend, though the status relative to historic levels was classified as unknown (ASMFC 2017). There is currently no commercial river herring fishery in the Androscoggin River. Coast-wide, the Alewife stock is considered depleted (ASMFC 2017). Little stock-specific information on Blueback Herring was found, likely due to higher prevalence of Alewife in Maine waters.

Sea Lamprey

Sea Lamprey (*Petromyzon marinus*) are found on both sides of the Atlantic Ocean, in North America and Europe, including the entire U.S. Atlantic coast as far south as northern Florida, along with areas in the Gulf of Mexico (Kircheis 2004). Sea Lamprey, with respect to the sea-run fish observed at the Project, are anadromous, but unlike the other anadromous species entering

the river system, are semelparous and will all die after spawning (Kircheis 2004). In the ocean, they are predatory and parasitic, latching onto and extracting nutrients and fluids from other fish; however, during their migration into freshwater, they do not feed. Mature adults swim into freshwater habitats in the spring and typically spawn in late May through early summer in the State of Maine (Kircheis 2004). They prefer to spawn in areas with flowing water and cobble/gravel substrate, where they modify habitat and build large nests out of gravel and small rocks (Kircheis 2004). After spawning, the adults die, and the eggs will take approximately 10-13 days to hatch. Larval lamprey (ammocoetes), which lack eyes and teeth, burrow into soft sediments, where they reside and grow, filter feeding for 4-8 years (Kircheis 2004). They then transform into a juvenile lamprey, developing eyes and working mouth parts, and emigrate to the ocean where they will grow to maturity before returning to spawn after 1.5-2 years at sea (Kircheis 2004).

Sea Lamprey were historically passed at the Project fishway in very low numbers. In recent years they have been captured in higher but varying abundance. Counts ranged from 345 to 734 from 2021-2025 (Table 4.6.1.1-4), with the highest numbers observed during the most recent years. No information on stock status was found, likely because this species has not been important commercially and often received a bad reputation due to its parasitic nature and tendency to become invasive when landlocked in freshwater systems.

American Eel

American Eel (*Anguilla rostrata*) is the only representative of the family Anguillidae in North America, ranging from the southern areas of Greenland, including all of the U.S. Atlantic coast, and the Gulf of Mexico, southward to the northern portions of the east coast of South America (Facey and Van Den Avyle 1987). They are catadromous, having been spawned in an oceanic environment in the Sargasso Sea but often living most of their life in freshwater (Facey and Van Den Avyle 1987). Unlike many of the anadromous species, for which spawning stocks are often segregated by river system, the American Eel population is panmictic, meaning a single population within which individuals from many different areas mix for random mating (Shepard 2015).

Little is known about the exact location of spawning and is based primarily on the observed distribution of larvae. After hatching, larvae will drift in oceanic currents as planktonic leptocephali before metamorphosing into juvenile eels, commonly known as glass eels due to their lack of pigmentation (Facey and Van Den Avyle 1987). Glass eels actively swim toward coastal waters, where they enter estuarine and riverine areas. Some will remain in estuarine waters, but many will swim upstream into freshwater where they may occupy a variety of habitats (Facey and Van Den Avyle 1987). As they swim upstream, they become pigmented and are typically termed “elvers” when they are still small. As the elvers grow, they are commonly referred to as “yellow eels”. They will reside in freshwater habitats until maturity, which can begin as early as three years, but can take as long as 30 years (Shepard 2015). When they

mature, their body morphology changes to become suited to an oceanic migration, including becoming more robust with a dark gray/silver coloration and enlarged eyes.

The spawning migration typically occurs in the late summer or fall in New England and eastern Canada, (Facey and Van Den Avyle 1987). Migration of eels can be initiated by a wide combination of environmental factors (i.e., changing water temperatures, moon phase, photoperiod, atmospheric pressure, turbidity), though runs with the greatest abundance typically occur during periods of increased discharge and low light conditions (Bruijs and Durif 2009). Silver eels may revert to yellow eels if environmental conditions are not ideal for migration, if migration becomes delayed, or if the fat content of the eel is too low (Shepard 2015). This species is assumed to be semelparous, with eels dying at sea after spawning given that post-spawn eels have never been observed (Facey and Van Den Avyle 1987).

The fish assemblage assessment by Yoder et al., (2006) found that American Eel were most abundant in the tidal river, downstream of Project Dam, relative to sampling sites in the Project impoundment. It is not known how many eels pass the Project through the existing fishway; however, eels are captured in the Project fishway in low numbers (Table 4.6.1.1-4). There are no other passage facilities specifically for eel at the Project. Eels may also pass the Project Dam by climbing over the spillway, as they often do at many low-head dams.

In 2010, the American Eel was petitioned for listing as threatened under the Endangered Species Act due to coast-wide declines. It was determined that a listing was not warranted in 2015 due to stable populations (USFWS 2015). The stock status of American Eel is depleted, and quotas restrict the glass eel fishery in Maine (ASMFC 2021). The 2023 stock assessment found that yellow eel populations were lower than the previous assessment, indicating that yellow eel harvest should be decreased (ASMFC 2023). Maine has one of the only operating glass eel fisheries remaining in the U.S., with the only other fishery currently in operation in South Carolina (Shepard 2015).

Striped Bass

Striped Bass (*Morone saxatilis*) range from the St. Lawrence River in Canada to the St. Johns River in Florida along the Atlantic coast, and in areas of the Gulf of Mexico (Fay et al., 1983b). They have also been introduced to the North American Pacific coast, and landlocked populations persist in many freshwater impoundments in North America (Fay et al. 1983). On the Atlantic coast, they range from Canada to Florida but are most prevalent from Maine to North Carolina. They are anadromous and iteroparous. They are a large predatory species, commonly 2-3 ft long and between 10 and 30 pounds but growing as large as 125 pounds. They swim into rivers and estuaries to spawn in the late spring and early summer. The only known spawning population in Maine occurs in the Kennebec system, due to the large estuarine area in Merrymeeting Bay. After spawning, the eggs drift in currents until they hatch in 1.5 to 3 days. Juveniles will feed and grow in estuaries, typically for at least three years before migrating in the ocean to mature. Females mature in approximately 4 to 6 years (Fay et al. 1983), after which they will return to freshwater to spawn for the first time. Larvae are considered the most important life stage for the

future of Striped Bass abundances, given their sensitivity to environmental conditions. High rates of larval success in any given year will yield occasional dominant year classes of adult fish (Fay et al. 1983). After spawning, many fish will leave the spawning grounds and emigrate back to the coastal area, though some may also remain in riverine and estuarine areas through the summer. In the fall, most Striped Bass from New England will migrate south to warmer-water areas off the mid-Atlantic coast.

Striped Bass are captured at the Project fishway in relatively low but varying abundance, with zero to 103 individuals counted per season since the year 2000 (Table 4.6.1.1-4). No information was found about stock status in the Androscoggin River specifically, though oceanic stocks have rebounded from extreme lows in the 1980's. ASMFC assesses and manages Striped Bass populations across the eastern U.S. according to the Atlantic Striped Bass Fisheries Management Plan. Female spawning stock biomass peaked around 2003 followed by a slow, steady decline with a low in 2017. The 2022 Stock Assessment Update indicated that the population is overfished, but no longer experiencing overfishing relative to updated reference points, which took into account recent years of low recruitment (ASMFC 2022a). Striped Bass were stocked in the Androscoggin River, with 35,000 individuals stocked from 1986-1991. Stocking does not currently occur. Striped Bass are not currently passed upstream of the Project due to concerns about a lack of safe downstream passage for these fish.

Atlantic Sturgeon

Atlantic Sturgeon (*Acipenser oxyrhynchus oxyrhynchus*) are distributed along the eastern coast of North American, with sightings reported from Labrador, Canada to the St. Johns River, Florida (NMFS 2017a). Atlantic Sturgeon are benthic forgers at all life stages. They are slow growing and long lived with a maximum age of 60 years, maximum length of 14 ft, and maximum weight of more than 800 pounds (MDMR and MDIFW 2017). Atlantic Sturgeon are anadromous. Adults migrate into rivers from approximately May to July in the northern part of their range to spawn from mid-June to mid-July. Studies have indicated that fish mature between the ages of 11 and 21 years in the Hudson River and between 22 to 34 years in the St. Lawrence River (NMFS 2017a). Mature adults typically do not spawn every year, with males typically spawning every 1 to 5 years and females every 2 to 5 years. Spawning typically occurs in flowing water upriver of the salt front of a coastal estuary, but below any major rapids or waterfalls (NMFS 2017a). Spawning habitat consists of hard bottom substrate with flowing water and variable depths, and spawning temperatures range from 55-79°F. After fertilization, eggs adhere to substrate for a relatively short period before larvae emerge after approximately 94 to 140 hours later at temperatures of 64-68°F. After another 8-12 days, demersal larvae begin moving downstream toward rearing grounds (NMFS 2017a). The juvenile stage occurs in the brackish waters of the estuary and may last months to years. Juveniles typically move into higher salinity water as they age, and temperature preference is driven primarily by salinity, temperature, and dissolved oxygen. Once able to tolerate salinity greater than 30 ppt, juveniles leave the estuary and become subadults, inhabiting the marine environment. Adults and

subadults aggregate in marine and estuarine habitat at certain times of the year and may travel long distances seasonally (NMFS 2017a).

Atlantic Sturgeon are listed as federally threatened. Spawning activity has been documented in the GOM DPS of Atlantic Sturgeon in the Kennebec River between RM 43.5 and RM 46.6 during the months of June and July (Wippelhauser et al. 2017). Spawning was confirmed with the capture of three Atlantic Sturgeon larvae in 2011 near RM 44.7 and RM 46.6. Atlantic Sturgeon, including one male in spawning condition, have been captured and/or detected in the Androscoggin River near RM 4.8, which suggests that spawning may be occurring in the Androscoggin River as well. However, additional evidence, such as capture of a spawning female, sturgeon eggs or larvae, have not yet been recovered in the Androscoggin River (Wippelhauser et al. 2017). The Androscoggin River mainstem from the Project dam downstream to where the mainstem river discharges into Merrymeeting Bay has been designated as critical habitat for the GOM DPS of Atlantic Sturgeon (NMFS 2017a). Atlantic Sturgeon are not passed upstream of the Project as the falls upon which the dam is built is thought to be the historical upstream extent of this species.

Shortnose Sturgeon

Shortnose Sturgeon (*Acipenser brevirostrum*) were historically distributed in major estuaries and rivers along the eastern coast or North American from Canada to Florida. Currently, Shortnose Sturgeon are found in 41 rivers and bays as three metapopulations. The Hudson, Saint John, and Delaware Rivers currently support the largest populations in the Northern and Mid-Atlantic metapopulations. Within these metapopulations, spawning has been documented in the Saint John, Androscoggin, Kennebec, and Connecticut Rivers. Shortnose Sturgeon, like Atlantic Sturgeon, are long lived and slow maturing (NMFS 2010). However, Shortnose Sturgeon are typically smaller than Atlantic Sturgeon, growing to a maximum of 4.5 ft long, a weight up to 60 pounds, and a maximum age in the Kennebec River of 40 years. This species could be considered amphidromous, meaning that individuals are born in freshwater and spend most of their life in freshwater, making only short feeding or migratory forays into the marine environment, with studies indicating that Shortnose Sturgeon make coastal movements to adjacent rivers. When they do enter the marine environment, Shortnose Sturgeon tend to stay close to shore (NMFS 2010). Spawning occurs in the spring, when adults move upstream. Males mature between 10-11 years of age and females between 12-18 years of age in the Saint John River, Canada. Males first spawn 1-2 years after reaching sexual maturation and spawn every 1-2 years. Females first spawn typically 5 years after maturation, with adults spawning every 3-5 years (NMFS 2010). About 8-12 days after emergence, larvae undergo rapid physiological changes and begin to disperse downstream. The juvenile phase is reached at approximately 57 mm total length, and growth in the first year is rapid. Older juveniles are better able to tolerate higher salinities, and typically shift their habitat use accordingly. Juveniles typically seek out deep river channels with sand and mud, only transitioning to higher salinity habitats at approximately 45 centimeters (cm) total length or 8 years of age (NMFS 2010). Subadults and adults may or may not overlap in habitat use, depending on the river they are inhabiting. Adults

may migrate within freshwater or perform coastal migrations between rivers, depending on the river system. Migrations may occur when adults leave overwintering areas to spawn upstream, when adults move back downstream after spawning to feed in the lower river, and when adults move to distinct overwinter sites in the fall. Spawning occurs at water temperatures of 9-15°C over hard substrate in areas with moderate river flow and variable depths. Feeding habitat for juveniles and adults consists of sandy and muddy substrate. Shortnose Sturgeon in northern rivers typically cease feeding and become inactive in the winter, with adults and juveniles forming large aggregations in deep areas of a river, either in fresh or brackish water (NMFS 2010).

Shortnose Sturgeon are listed as federally endangered throughout their range. It is believed that this species spawns at discrete locations within a river, with individuals returning to the same location. In the Androscoggin River spawning occurs from late April through early June (MDMR and MDIFW 2017) and has been documented in the 1-km reach downstream of the Project Dam and outside of the Project boundary (Squiers et al. 1982). Historically, it is thought that Shortnose Sturgeon likely swam as far upstream as they could to spawn, with the extent dependent on the characteristics of the river system. This would allow downstream drift of larvae to occur wholly within freshwater, as larvae and smaller juveniles cannot tolerate high salinities (NMFS 2010). However, it is unlikely that sturgeon historically moved upstream of the falls at the head of tide, which is the current location of the Project dam, and likely that the historic spawning location for Shortnose Sturgeon is where it is currently found directly downstream of the Project dam (NMFS 2010). Critical habitat has not been designated for Shortnose Sturgeon.

Tracking studies to identify spawning habitat were performed in 1993, and gill net catch-per-unit-effort was high, suggesting that the population had increased since previous surveys (NMFS 1998; Squiers et al. 1993). The adult population was estimated at 7,200 based on studies conducted between 1977-1981. Further population studies from 1998-2000 estimated the adult population at 9,488 fish (Squiers et al. 2003). Studies in 1983 and 1993 identified likely spawning habitat ~ 400 meters downstream of the Route 201 bridge and ~500 meters downstream of the Project dam, respectively, based on aggregations of ripe adults (Squiers et al. 1993; NMFS 2010); both areas are downstream of the Project boundary. Tracking studies have indicated that foraging habitat for Shortnose Sturgeon is primarily located in the Bath region of the Kennebec River, with overwintering habitat located in Merrymeeting Bay (NMFS 2010).

The Shortnose Sturgeon distinct population segment in the Kennebec System was considered for delisting in 1987 and again in 1996, but it was determined that this action was not warranted because 1) this population continued to face substantial threats to their habitat and/or range and existing regulatory mechanisms at the time were inadequate to ensure ongoing appraisal and management of these threats, and 2) there were questions regarding the population estimates and information was lacking in relation to population dynamics (NMFS 2010).

Rainbow Smelt

Rainbow Smelt (*Osmerus mordax*) are distributed from Labrador to New Jersey. This species is anadromous, entering freshwater streams to spawn from March to May. Rainbow Smelt are small and short-lived, occupying near-shore coastal waters as adults. They exhibit sexual dimorphism, with females larger and longer-lived than males (Bailey 1964). This species is highly fecund and may experience wide variability in annual abundance. Adults mature at 1-3 years of age and only travel a short distance upstream for spawning migrations, typically just above the head-of-tide (Chase et al. 2019). Spawning habitat consists of shallow riffle areas with some current. Eggs are adhesive and attach to rocks and vegetation. Larvae emerge within 2-4 weeks and drift downstream. Rainbow Smelt spawn in the mainstem Androscoggin River, and MDMR biologists have observed this species spawning along the outer wall of the Project fishway (MDMR and MDIFW 2017).

Table 4.6.1.2.1-1. Atlantic Salmon Counts at the Brunswick Fishway Indicating Hatchery and Wild Origin Individuals (1983-2025)

Year	Total Atlantic Salmon	Hatchery Origin	Wild Origin
1983	21	17	4
1984	91	84	7
1985	21	19	2
1986	81	73	8
1987	26	25	1
1988	14	13	1
1989	19	18	1
1990	185	175	10
1991	21	9	12
1992	15	11	4
1993	44	34	10
1994	25	19	6
1995	16	14	2
1996	39	22	17
1997	1	0	1
1998	4	4	0
1999	5	2	3
2000	4	4	0
2001	5	5	0
2002	2	2	0
2003	3	3	0
2004	12	11	1
2005	10	10	0
2006	6	6	0
2007	21	18	3
2008	18	15	3
2009	24	21	3
2010	9	7	2
2011	44	27	17
2012	0	0	0
2013	2	1	1
2014	3	2	1

Year	Total Atlantic Salmon	Hatchery Origin	Wild Origin
2015	1	1	0
2016	7	0	7
2017	0	0	0
2018	1	0	1
2019	1	0	1
2020	5	**	**
2021	5	**	**
2022	17	**	**
2023	8	**	**
2024	18	**	**
2025	7	6	1

** Hatchery vs. Wild origin not indicated in annual reports, but note of no clips/marks on fish captured at fishway

4.6.1.2.2 Fish Passage

Several studies have been conducted at the Project to assess both upstream passage effectiveness and downstream passage effectiveness, route of passage, and survival for various diadromous species. These studies are discussed in more detail below.

4.6.1.2.2.1 Upstream Fish Passage

Atlantic Salmon Upstream Passage Studies

The ISPP for the Project also included provisions for a study of upstream passage of pre-spawn adult Atlantic Salmon. with a sample of size of 40 Androscoggin River-origin adult salmon.

An initial upstream passage study was attempted during the 2013 and 2014 fish passage seasons (Normandeau 2014; 2015). A total of six adult salmon were collected in the trap facility at the Brunswick fishway; five were collected in June of 2013 and 2014, and one was collected in August 2014. The fish were radio-tagged and released at a boat launch approximately 1 mile downstream of the Project.

2013: Two individuals tagged during June 2013 left the Androscoggin River and were subsequently detected in the Kennebec River in the vicinity of Lockwood Dam and nearby river confluences. Both individuals returned to the vicinity of the Brunswick Project tailrace, with one being detected between July 15th – 16th, and the other between November 3rd – 22nd. Neither fish was detected passing the Brunswick Dam or detected elsewhere downstream after these occurrences.

2014: Two individuals tagged during June 2014 re-approached the Brunswick Dam following tagging and release and were detected in the tailrace for several days in late June and early July and did not successfully pass. Another individual tagged during June 2014 re-approached the Brunswick Dam following release and resided in the tailrace for 10 days before successfully passing upstream. This fish was detected falling back below Brunswick in early August and was not detected again. The final individual was captured, tagged, and released on August 22, 2014. It approached the Project on November 1 but did not successfully pass upstream. There were no detections of this individual at any of the monitoring locations within the Project fishway.

Following agency consultation, the study was discontinued due to the expected limited number of wild Androscoggin River origin adult Atlantic Salmon. Due to a current lack of stocking efforts within the watershed, and low natural recruitment, an adequate supply of fish for the study has not been available since the initial ESA listing of Atlantic Salmon. As a result of the lack of study fish for the foreseeable future, the study has been suspended indefinitely until an adequate source of study fish is available (FERC 2020).

American Shad Upstream Passage Studies

2019: A study by Weaver et. al. (2019) using counts from video cameras coupled with a radio telemetry study suggest that fewer fish are observed inside the fishway than are observed in the

tailrace immediately outside the fishway. Weaver et. al. (2019) made underwater video camera observations from 2001 to 2004 of high numbers of American Shad present downstream in the river (averaging 50,000 per year). Similar observations indicated that American Shad near the entrance of the upstream fishway or within its lower pools averaged < 8,000 per year. Very few fish (≤ 130 fish on average per year) were observed entering or exiting the first turning pool within the upstream fishway. These visual observations also indicated that the rates of observed American Shad on the side of the river near the fishway entrance were significantly higher (6.5–8.6 individuals/minute) when Unit 1 was not operating compared with when it was operating (4.1 individuals/minute).

The radio telemetry component of the Weaver et. al. (2019) study indicated the majority of tagged American Shad (34 of 57; 59%) were not detected after tagging and release. However, 22 out of the 34 American Shad were detected in the river adjacent to the fishway. Eleven of the 22 tagged fish American Shad were detected at the fishway entrance and of those 5 were detected in the lower fishway. Individuals that were detected were observed making multiple attempts at entering the fishway, but movements were restricted to the lower pools.

2022: A larger telemetry study of American Shad was conducted at the site in 2022 (Normandeau 2023). For this study 150 American shad were angled from below the Project, tagged, and released downstream of the Project. The results of the study demonstrated:

- 82 of the 150 radio-tagged American Shad moved upriver and approached the Frank J. Wood Bridge and Project Dam.

- 48% (39 out of 82) were detected at least as far upstream as the lower portion of the Project tailrace. Most radio-tagged American Shad detected in the lower portion of the Project tailrace channel were subsequently detected in the upper portion of the Project tailrace adjacent to the downstream side of the powerhouse (31 out of 39; 80%).

- Of those individuals, only two radio-tagged shad which approached the Project Dam were determined to have entered the nearfield attraction water flow area located proximate to the fishway entrance (2 out of 82; 2.4%).

- There were no recorded entries of radio-tagged adult American Shad into the Brunswick upstream fishway during the 2022 study period.

- Operation of Unit 1 was limited to the daytime hours during May. When inflow is less than 18,725 cfs, BWPH does not operate Unit 1 during the nighttime hours (defined as 2000 to 0700) during May to facilitate safe downstream passage opportunities for Atlantic salmon smolts during their outmigration period. After June 1, the operation of Brunswick Unit 1 was limited to a three-day period in June (i.e., June 10-12) and on a few dates during July, in association with increases in inflow at the Project. BWPH operated both Units 2 and 3 on a consistent basis during the study period. During the lowest flow portion of the study period from late June through mid-July Brunswick Unit 3 was prioritized.

- Flow conditions ranged between 1,543 – 10,887 cfs (median = 2,716 cfs) over the period of active telemetry monitoring (May 16 until July 29, 2022) and were between 3,120 – 3,250 cfs on the dates (June 1 and 2) when adult American Shad were tagged and released.

- River temperature was 18.0°C on the dates (June 1 and 2) when adult American Shad were tagged and released.

River Herring Upstream Passage Studies

2022: Normandeau also conducted an upstream passage telemetry study of river herring in 2022 (Normandeau 2023). Adult river herring were sourced from the trap and transport facility at the top of the existing Project fishway. Researchers tagged 132 fish and subsequently released them approximately 1 km downstream of the Project. The results of the study demonstrated:

- Of the 132 river herring which were radio-tagged and released into the Androscoggin River downstream of the Frank J. Wood Bridge and the Project Dam, only 13% (17 out of 132) moved upstream and approached the Project.

- The proportions of passage success for radio-tagged river herring approaching the Frank J. Wood Bridge and the Project were used to estimate (1) nearfield effectiveness, (2) fishway entrance efficiency, (3) total internal efficiency, (4) proximate internal efficiency, and (5) overall fishway effectiveness.

    - Nearfield effectiveness: 100.0% (based on 8 of 8 river herring detected in upper tailrace being subsequently detected in the fishway entrance nearfield).

    - Fishway entrance efficiency: 37.5% (based on 3 of 8 river herring detected in the fishway entrance nearfield being subsequently detected in the fishway entrance).

    - Total internal efficiency: 33.3% (based on 1 of 3 river herring detected in fishway entrance being subsequently detected at the fishway trap/exit flume).

    - Proximate internal efficiency: 50% (based on 1 of 2 river herring detected at the receiver immediately downstream of the turn pool being subsequently detected at the receiver immediately upstream of the turn pool).

- Operation of Unit 1 was limited to the daytime hours during May. When inflow is less than 18,725 cfs, BWPH does not operate Unit 1 during the nighttime hours (defined as 2000 to 0700) during May to facilitate downstream passage for Atlantic salmon smolts. After June 1, the operation of Brunswick Unit 1 was limited to a three-day period in June (i.e., June 10-12) and on a few dates during July, in association with increases in inflow at the Project. BWPH operated both Units 2 and 3 on a consistent basis during the study period. During the lowest flow portion of the study period from late June through mid-July Brunswick Unit 3 was prioritized.

- Mean daily river flow at the Project ranged between 5,830 and 9,280 cfs over the four dates (May 16, 18-20) where releases of tagged adult river herring were conducted.

- River temperature recorded on the four dates (May 16, 18-20) of adult herring releases ranged from 15.8°C to 17.3°C.

American Shad, River Herring and Sea Lamprey Upstream Movement and Behavior Studies

2026: BWPH is currently conducting a Diadromous Fish Behavior, Movement, and Project Interaction Study for several fish species, including river herring, American Shad, and Sea Lamprey. The goal of the study is to assess the Project's potential effects on select migratory fish species behavior in the tailrace and proximal downstream reach. The study is being conducted in consultation with NMFS, USFWS and MDMR. BWPH anticipates filing the results of the study with the USR.

Upstream Passage Alternatives Study

BWPH is currently conducting the Upstream Passage Alternatives Study to determine conceptual options and expected performance for improved upstream passage that will reduce delay and increase passage efficiency for upstream migrating fish, including river herring, American Shad, and Sea Lamprey. The study is being conducted in consultation with NMFS, USFWS, and MDMR. BWPH anticipates filing the results of the study with the USR.

Computational Fluid Dynamics Modeling – Upstream Passage

BWPH is currently conducting Computational Fluid Dynamics (CFD) modeling to evaluate the effect of flow pattern and velocity conditions on upstream passage at the Project. BWPH anticipates providing the results of the CFD modeling with the USR.

American Eel Upstream Passage Studies

2025: BWPH conducted a study of upstream American eel movement as part of the Project relicensing. Study objectives were to document eel presence and abundance at the Project and assess the need and potential locations for upstream passage (BWPH 2026c).

Nighttime visual surveys were conducted weekly over a 12-week period beginning on June 11 and ending August 26, 2025. The nighttime visual surveys were performed from three vantage points on existing Project structures: (A) the ogee spillway near the powerhouse, (B) the lower section of the upstream fishway through the 180-degree turn pool, and (C) the Topsham-side deck overlooking the Tainter gates (Figure 4.6.1.2.2.1-1). Nighttime visual surveys were initiated between 20:00 and 22:00 and were completed within 1 to 1.5 hours. Most surveys occurred on dates when water temperature was greater than 22 °C and weather conditions at the time of survey were clear or cloudy. Survey events were uniformly divided among dates where the percentage moon illumination ranged from 0-25%, 25-50%, 50-75% or 75-100%. Tidal conditions for most survey events consisted of ebb flows. At least one turbine was online during most survey events. Approximately 100 cfs passed through the river right Tainter gate during all survey events while overflow spill conditions were limited to only two dates. Survey timing and associated operational and environmental conditions are presented in Table 4.6.1.2.2.1-1.

More than 35,000 juvenile American eels were observed downstream of the Project during nighttime visual surveys conducted from all vantage points. Juvenile eels were observed on all twelve survey dates, with peak observations occurring in late June/early July and again in late July. Cumulative estimates then declined from late July through August. Based on size-class estimates, approximately 98% of observed eels were less than 6 inches in length, while individuals measuring 6–12 inches and greater than 12 inches collectively comprised about 2% of the total. Table 4.6.1.2.2.1-2 summarizes the visual estimates of eel abundance by survey date, vantage point (A, B, and C), and size class, along with cumulative totals for the 12-week study period.

During the initial survey on June 11, most observed eels were located within or downstream of the upstream fishway (vantage point B). In contrast, the subsequent eleven surveys recorded substantially higher numbers from the deck overlooking the Tainter gate structures (vantage point C), while no eels were observed from vantage point A overlooking the ogee overflow spillway adjacent to the powerhouse. Figure 4.6.1.2.2.1-2 shows the relative areas where the highest number of juvenile eels were observed.

Temporary eel ramps were installed during daylight hours prior to nighttime visual surveys, operated overnight, and removed the following day, with total catch documented. The first installation of temporary eel ramps occurred on June 19, 2025. No ramps were deployed during the June 11 nighttime visual survey due to elevated inflows at the Project, which eliminated safe access to the spillway bypass region. Three potential ramp locations were identified downstream of the Project (see Figure 4.6.1.2.2.1-1). However, upon further evaluation in the field, the third location was determined to be too steep and slippery to safely install and maintain a temporary eel ramp. Therefore, two temporary eel ramps were installed for the survey; one on ledge habitat located along the toe of the overflow section of Brunswick Dam located adjacent to the river side of the Tainter gate structure (Figure 4.6.1.2.2.1-3).

The total catch and associated estimates of catch per unit effort (CPUE) for juvenile eels per hour by date, trap, and size class are provided in Table 4.6.1.2.2.1-3. Weekly catch ranged from zero (Trap 1, August 26-27) to 5,400 juvenile eels (Trap 2, July 2-3) with Trap 2, the one immediately adjacent to the open Tainter gate, collecting a total of 21,169 eels and Trap 1 collecting 1,316 over the 12-week study. Nearly all the juvenile eels collected in the temporary eel ramps were classified as less than 6 inches in length (Table 4.6.1.2.2.1-4) with a minimal component of the total catch comprised of 6–12-inch eels and no individuals collected were greater than 12 inches. Catch rates reflected total catch with Trap 2 having a high CPUE of 279 eels per hour on July 2-3 and a low of 3 eels per hour on August 19-20. The CPUE for Trap 1 reached a high of 17 eels per hour on July 23-24 and recorded 0 eels per hour during the final survey week in late August. Trends in relative abundance in the temporary eel ramp catch followed those observed for the nighttime survey events with numbers increasing into early-July and again in late-July before tailing off through August (Figure 4.6.1.2.2.1-4).

Observations made during this study suggest that the greatest relative abundance of individuals is located on the spillway side of the river with large concentrations interacting with areas of

permanent leakage flow associated with the Tainter gates. Deployment of the temporary eel traps demonstrated the ability to attract juvenile eels through the introduction of artificial “leakage” flows onto ledge habitat downstream of the overflow spillway. The highest trap catches observed in closer proximity to spillway pool habitat being directly fed continuously by the 100 cfs supplied through the open Tainter gate.

Table 4.6.1.2.2.1-1. Operational and Environmental Conditions for Each Brunswick Juvenile Eel Nighttime Visual Survey During 2025.

Survey Date	Start Time (hh:mm)	Survey Duration (hh:mm)	Weather	Water Temp (ºC)	Air Temp	Moon Percent Illum.	Unit 1 (cfs)	Unit 2 (cfs)	Unit 3 (cfs)	Spill Observed at Survey Area A	Spill Observed at Survey Area C	Spill at Tainter Gates
6/11/2025	21:25	0:59	Clear	19.1	18.8	100	4,537	1,333	1,304	No	No	Yes
6/19/2025	21:20	1:25	Mostly Clear	20.7	22.8	36	4,018	0	0	No	No	Yes
6/26/2025	21:10	1:38	Mostly Cloudy	23.5	15.6	4	0	1,422	1,394	*Yes	*Yes	Yes
7/2/2025	21:00	1:10	Mostly Clear	25.6	22.2	52	4,167	475	0	*Yes	*Yes	Yes
7/10/2025	20:58	1:00	Cloudy	24.3	17.8	100	0	1,368	1,349	No	No	Yes
7/17/2025	20:48	0:57	Mostly Clear	26.2	23.9	50	4,598	0	0	No	No	Yes
7/23/2025	20:45	1:01	Mostly Clear	25.0	19.4	11	0	1,359	1,015	No	No	Yes
7/30/2025	20:35	0:59	Mostly Cloudy	27.0	22.8	36	0	1,339	1,073	No	No	Yes
8/6/2025	20:26	0:59	Cloudy	25.4	18.8	94	0	1,375	1,084	No	No	Yes
8/12/2025	20:18	1:08	Clear	26.7	24.4	84	0	1,341	0	No	No	Yes
8/19/2025	20:13	0:42	Mostly Cloudy	24.4	16.7	12	0	1,355	0	No	No	Yes
8/26/2025	20:14	0:53	Mostly Clear	24.5	19.4	14	0	1,003	0	No	No	Yes

*Indicates that the headpond level was below dam crest elevation (39.4), but survey crew noted observable flow over the spillway structure. This represented minimal overtopping, leakage or small amounts of water being blown over the spillway from a mostly full headpond.

Table 4.6.1.2.2.1-2. Nighttime Visual Survey Eel Counts by Vantage Point (A, B, or C) and Size Class (0-6”, 6-12”, or >12”) at Brunswick During 2025

Date	Vantage Point A				Vantage Point B				Vantage Point C				Total Count
	0-6"	6-12"	>12"	Total	0-6"	6-12"	>12"	Total	0-6"	6-12"	>12"	Total	
6/11/2025	0	0	0	0	393	60	0	453	70	1	1	72	525
6/19/2025	0	0	0	0	210	0	1	211	500	0	0	500	711
6/26/2025	0	0	0	0	76	1	0	77	6,000	200	0	6,200	6,277
7/2/2025	0	0	0	0	0	0	0	0	9,800	500	0	10,300	10,300
7/10/2025	0	0	0	0	0	0	0	0	630	1	0	631	631
7/17/2025	0	0	0	0	14	0	0	14	1,250	0	0	1,250	1,264
7/23/2025	0	0	0	0	15	0	1	16	3,300	0	0	3,300	3,316
7/30/2025	0	0	0	0	131	0	1	132	6,700	0	0	6,700	6,832
8/6/2025	0	0	0	0	0	0	6	6	4,250	0	0	4,250	4,256
8/12/2025	0	0	0	0	0	1	1	2	1,550	25	1	1,576	1,578
8/19/2025	0	0	0	0	0	0	0	0	81	0	0	81	81
8/26/2025	0	0	0	0	0	0	1	1	13	1	1	15	16
Total	**0**	**0**	**0**	**0**	**839**	**62**	**11**	**912**	**34,144**	**728**	**3**	**34,875**	**35,787**

Table 4.6.1.2.2.1-3. Total Catch and Catch Per Unit of Effort (CPUE) for Juvenile American Eels by Sample Date, Size Class and Trap Location at Brunswick During 2025

Trap ID	Set Date Time	Pull Date Time	Hours Fished	Catch[7]				CPUE (fish/hour)			
1 or 2				0-6"	6-12"	>12"	Total	0-6"	6-12"	>12"	Total
1	6/11/2025	-	Temporary eel ramp not deployed due to flow conditions								
1	6/19/2025 14:20	6/20/2025 10:56	20.6	No catch-water supply issues							
1	6/26/2025 14:30	6/27/2025 11:25	20.9	289	0	0	289	14	0	0	14
1	7/2/2025 12:35	7/3/2025 8:55	20.3	174	2	0	176	9	0	0	9
1	7/10/2025 13:30	7/11/2025 10:18	20.8	19	0	0	19	1	0	0	1
1	7/17/2025 12:35	7/18/2025 10:02	21.5	39	0	0	39	2	0	0	2
1	7/23/2025 12:20	7/24/2025 9:48	21.5	356	0	0	356	17	0	0	17
1	7/30/2025 12:25	7/31/2025 9:22	21.0	105	0	0	105	5	0	0	5
1	8/6/2025 13:20	8/7/2025 9:45	20.4	283	0	0	283	14	0	0	14
1	8/12/2025 12:15	8/13/2025 10:00	21.8	43	0	0	43	2	0	0	2
1	8/19/2025 11:22	8/20/2025 9:41	22.3	6	0	0	6	0	0	0	0
1	8/26/2025 11:55	8/27/2025 10:25	22.5	0	0	0	0	0	0	0	0
2	6/11/2025	-	Temporary eel ramp not deployed due to flow conditions								
2	6/19/2025 14:43	6/20/2025 10:30	19.8	No catch- water supply issues							
2	6/26/2025 14:45	6/27/2025 12:35	21.8	3,400	300	0	3,700	156	14	0	169
2	7/2/2025 14:00	7/3/2025 9:22	19.4	5,300	100	0	5,400	274	5	0	279
2	7/10/2025 13:50	7/11/2025 11:00	21.2	3,150	0	0	3,150	149	0	0	149
2	7/17/2025 13:05	7/18/2025 10:30	21.4	1,350	0	0	1,350	63	0	0	63
2	7/23/2025 12:50	7/24/2025 10:34	21.7	2,475	0	0	2,475	114	0	0	114
2	7/30/2025 12:55	7/31/2025 10:15	21.3	3,150	0	0	3,150	148	0	0	148
2	8/6/2025 14:05	8/7/2025 10:15	20.2	1,125	0	0	1,125	56	0	0	56
2	8/12/2025 12:40	8/13/2025 10:35	21.9	675	0	0	675	31	0	0	31
2	8/19/2025 11:50	8/20/2025 9:51	22.0	62	2	0	64	3	0	0	3
2	8/26/2025 12:13	8/27/2025 10:35	22.4	80	0	0	80	4	0	0	4
Total catch over 12-week study period				22,081	404	0	22,485				

[7] Volumetric measurements were used to quantify eels in Trap 2 from June 27-28 through August 12-13.

Table 4.6.1.2.2.1-4. Minimum, Mean, and Maximum Total Catch and Catch Per Unit of Effort (CPUE) for Juvenile American Eels by Size Class and Trap Location at Brunswick During 2025

	Total Catch 0-6” eels			CPUE (no./hr) for 0-6 inch eels		
Trap ID	Minimum	Mean	Maximum	Minimum	Mean	Maximum
1	0	131	356	0	6	17
2	62	2,077	5,300	3	100	274

	Total Catch 6-12 inch eels			CPUE (no./hr) for 6-12 inch eels		
Trap ID	Minimum	Mean	Maximum	Minimum	Mean	Maximum
1	0	0	2	0	0	0
2	0	40	300	0	2	14

	Total Catch 12+ inch eels			CPUE (no./hr) for 12+ inch eels		
Trap ID	Minimum	Mean	Maximum	Minimum	Mean	Maximum
1	0	0	0	0	0	0
2	0	0	0	0	0	0

Figure 4.6.1.2.2.1-1. Visual Survey Locations (A-C) and Interim Trap Locations (1-3) at the Brunswick Project During the Upstream American Eel Movement Study.



Figure 4.6.1.2.2.1-2. Relative Locations of Areas with Highest Juvenile Eel Abundance as Observed from Vantage Point C Downstream of Brunswick.



Figure 4.6.1.2.2.1-3. Location of Temporary Eel Ramps 1 and 2 Downstream of the Brunswick Dam and Adjacent to the Tainter Gate Structure.

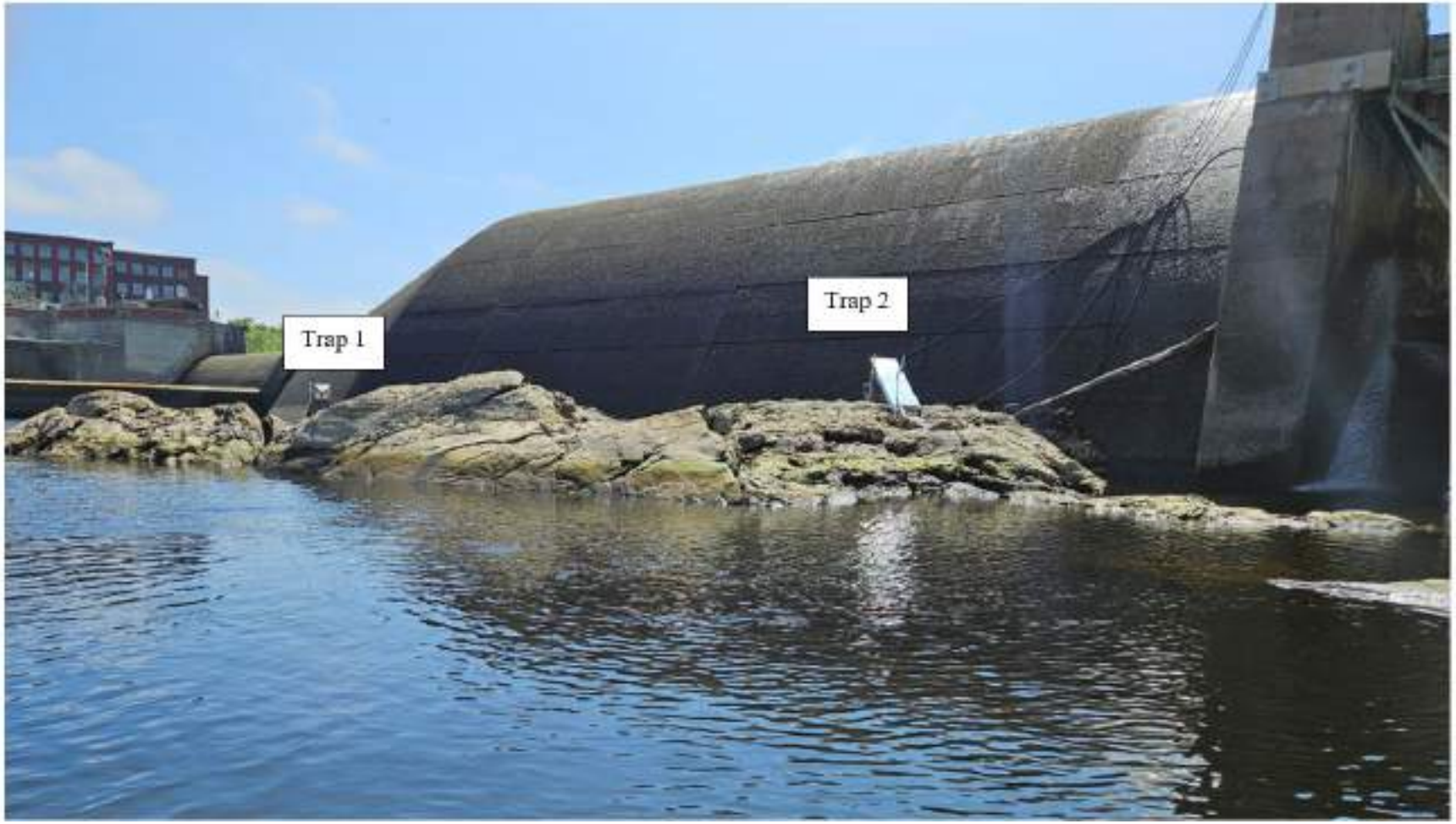
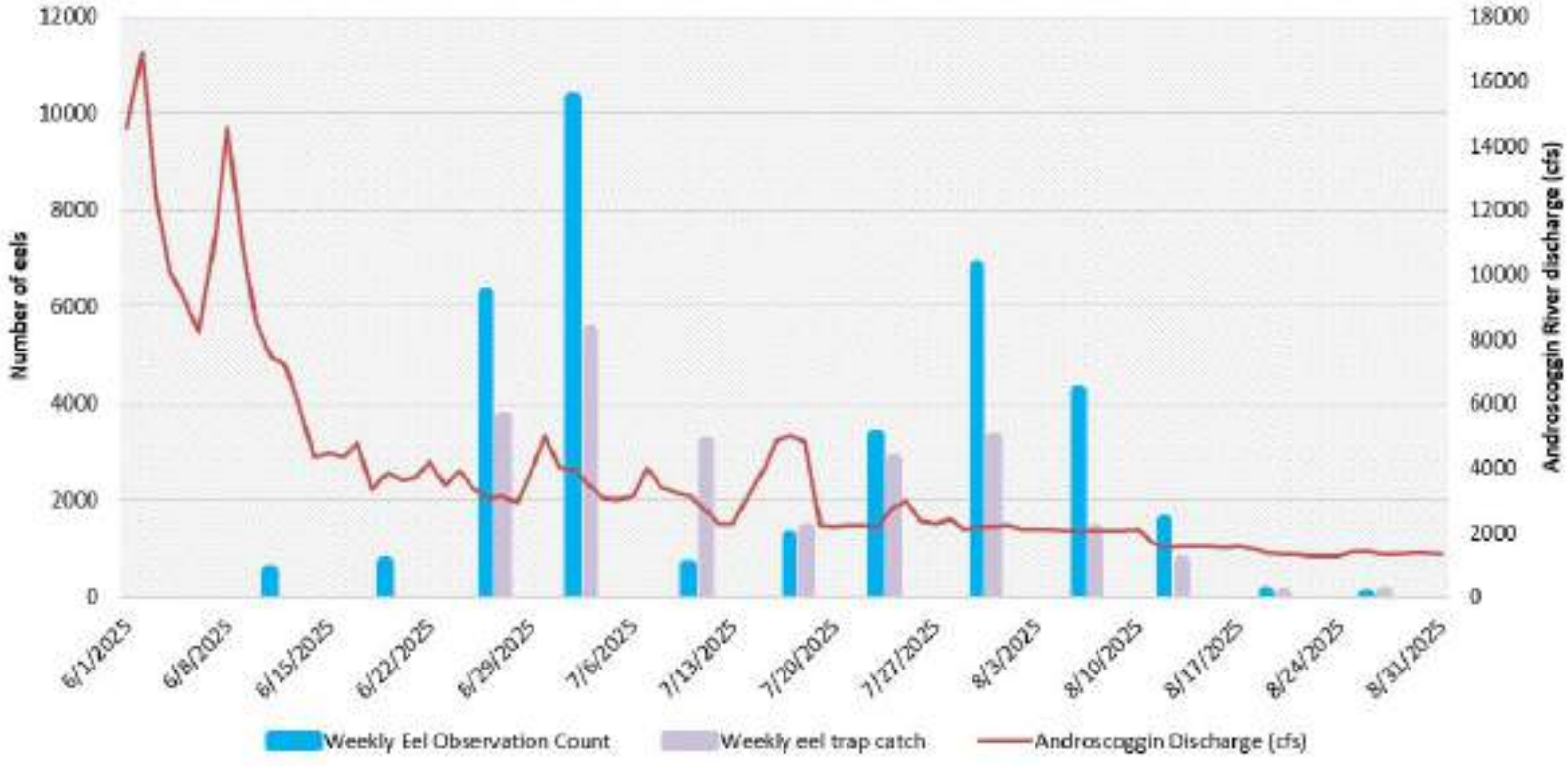


Figure 4.6.1.2.2.1-4. Twelve Week Brunswick Juvenile American Eel Sampling Period Showing Project Inflow and Estimated Numbers of Individuals Observed During Visual Nighttime Surveys and Associated Temporary Eel Ramp Collections During 2025.



2025 Evaluation of Stranding Risk/Bathymetry Study

BWPH conducted a stranding risk and bathymetry evaluation as part of the Project relicensing (BWPH 2026d). The study objective was to identify which areas and under which operational scenarios pose the greatest risk for the stranding of fish in the Project area. The study methods consisted of a desktop review of operational data, four field-based demonstration flow events and detailed topographic and bathymetric surveys of the study reach. Measurements of pool size, depth, outlet characteristics, and connectivity were used to assign relative stranding risk for small, medium, and large-bodied fish.

The desktop assessment focused the study on the river left channel because this area conveys most spill flow when generation capacity is exceeded and exhibits the greatest variability in hydraulic conditions under changing operations. As a result, it contains the highest concentration of geomorphic features, including shallow pools and bedrock depressions, that may become isolated during flow reductions.

The field-based flow demonstration events occurred on May 30th, 2025, between the hours of 8:00 am and 1:00 pm. During this time environmental conditions indicated that river herring and other anadromous species would likely be present in the vicinity of the Project. Representatives from BWPH, Gomez and Sullivan Engineers, D.P.C. (BWPH's licensing consultant), and MDMR made up the field study team. A total of four flow scenarios were observed in sequence. The series started with a moderate spilling flow and then decreased for the remaining flow scenarios. The details of the individual flows are as follows:

- moderate flow at 4,000 cfs;
- low flow at ~450-700 cfs;
- 100 cfs flow through Tainer gates and;
- no flow the left channel was cut off for ~2.5 hours with minor leakage ~ 10 cfs observed through the Tainter gates.

The field-based flow demonstrations showed that the river-left channel is dominated by a single large pool extending from the spillway and Taintor gates to the top of Shad Falls, covering approximately 3 acres with depths exceeding 10 ft and accounting for most of the channel's surface area, length, and volume. The main pool may become isolated under no-inflow conditions, but it remains a substantial habitat area. It provided sufficient passage at 100 cfs, with marginal passage for larger species (American Shad, Atlantic Salmon) and adequate passage for smaller fish under leakage-only conditions. In addition, the flow demonstrations identified 15 smaller, distinct potential stranding pools (Figure 4.6.1.2.2.1.5). These pools were grouped into three areas: Area 1 (Shad Falls), Area 2 (Shad Island), and Area 3 (spillway ledges).

The highest-risk pools occur in Area 1 below Shad Falls, where adequate depth and inflow may temporarily support fish but do not provide egress for large species (e.g., sturgeon, adult salmon, and shad) under no-flow conditions. While pools in Area 1 are readily accessible from the mainstem and likely to be frequented by migrating fish, available evidence indicates they would provide adequate egress under the 100 cfs scenario, though direct observation was limited by safety constraints. Pools in Area 2 (Shad Island) present only a mild risk due to their reduced connectivity to primary flow paths and lower likelihood of attracting concentrations of fish, while Area 3 (spillway ledges) exhibits similarly low risk due to limited pool size and accessibility. Table 4.6.1.2.2.1-5 provides a summary of the pools in each Area at low flow.

Observations also indicate that Shad Falls functions as a hydraulic barrier, effectively limiting upstream movement of non-anguillid species into the river-left channel under typical flow conditions. The field study team observed numerous migratory fish below the falls, but none were documented upstream. Structural modifications to the falls appear to reinforce this barrier. In the unlikely event fish ascend above Shad Falls, the 100 cfs voluntary minimum flow provides a continuous egress pathway from the main pool back to the tailrace and downstream channel.

Bathymetric results show that the river left channel is dominated by a large (~3.4-acre) main pool with depths up to approximately 20 ft, which remains connected and provides substantial refuge habitat under most flow conditions. Overall, the study determined that stranding risk at the Project is localized and largely limited to small peripheral pools under no-flow or rapidly declining flow conditions, with the highest potential concern for large-bodied fish in Area 1. However, the functional barrier at Shad Falls and the provision of a voluntary 100 cfs minimum flow appear to substantially reduce the likelihood of fish entering and becoming stranded in these areas.

Fish entering the river-left channel via spill or Tainter gates are unlikely to become stranded in the smaller, isolated pools upstream of the falls. Based on these findings, overall Project-related stranding risk is considered low to moderate.

Table 4.6.1.2.2.1-5. Description and Characteristics of Potential Stranding Areas as Observed under No River Left Channel Flow Conditions

Area 1 – Shad Falls									
Pool	**Pool Size**		**Outlet Channel Size (ft)**				**Stranding Potential***		
	Approx. Area (sq ft)	**Max Depth (ft)**	**Length**	**Width**	**Depth**	**Height Above Nearby Main Channel**	**Large Fish**	**Medium Fish**	**Small Fish**
1-1	250	0.8	No defined outlet channel			Est. 8 ft above tailrace	Low	Low	Low
1-2	1,200	4.0	12	10	1	5	High	High	High
1-3	240	2.6	5	6	1	1	High	Low	Low
1-4	4,200	5.5	10	5.5	0.8	1	High	Medium	Low
1-5	546	3.0	No defined outlet channel, wide shallow bedrock			2	Low	Low	Low
Area 2 – Shad Island									
Pool	**Pool Size**		**Outlet Channel Size (ft)**				**Stranding Potential***		
	Approx. Area (sq ft)	**Max Depth (ft)**	**Length**	**Width**	**Depth**	**Height Above Nearby Main Channel**	**Large Fish**	**Medium Fish**	**Small Fish**
2-1	252	1.0	4	3	1.2	0.6	Medium	Low	Low
2-2	1,320	1.5	3	3	1.1	2.3	Medium	Low	Low
2-3	800	1.2	14	6	0.7	2.8	High	High	Low
2-4	592	4.0	4	12	0.3	0.8	High	High	Low
2-5	546	3.6	6	12	0.8	1.5	High	High	Low
Area 3 – Spillway Ledges									
Pool	**Pool Size**		**Outlet Channel Size (ft)**				**Stranding Potential***		
	Approx. Area (sq ft)	**Max Depth (ft)**	**Length**	**Width**	**Depth**	**Height Above Nearby Main Channel**	**Large Fish**	**Medium Fish**	**Small Fish**
3-1	190	0.3	No defined outlet channel			2.0	Low	Low	Low
3-2	27	1.0	No defined outlet channel			0.5	Low	Low	Low
3-3	144	1.8	No defined outlet channel			2.0	Low	Low	Medium
3-4	72	1.0	No defined outlet channel			1.7	Low	Low	Low
3-5	23	0.5	No defined outlet channel			1.0	Low	Low	Low

*Note: The potential stranding hazard for each pool was evaluated based upon the physical characteristics of the pools and whether fish could enter the pool based on their presumed behaviors. Not all potential stranding pools are anticipated to be frequently accessed by migratory fish (e.g., Areas 2 and 3) as discussed in the text. Therefore, a "High" rating for stranding potential does not necessarily indicate that stranding occurs in these areas.



BRUNSWICK HYDROELECTRIC PROJECT
FERC NO 2284

Brookfield

N

0 60 120 240 Feet

Figure 4.6.1.2.2.1-5:
Locations of Potential Stranding Areas

Path: D:\Brookfield\02456\GIS\Maps\DLA\DLA.aprx

4.6.1.2.2.2 Downstream Fish Passage

Downstream passage was studied at the Project for juvenile Atlantic Salmon (smolts). An initial 3-years study was conducted during the years 2013 – 2015. These initial studies resulted in an average survival rate of 81.1%, which was below the proposed allowable take from BWPH's ISPP of 93% survival. As a result of consultation, an additional year of study was undertaken in 2018 which achieved the 93% survival threshold. The individual years of study are discussed below.

2013 Study

The goals of the 2013 downstream Atlantic Salmon smolt study were to evaluate the route of passage and survival of smolts at the Brunswick Project (Normandeau 2014). Specifically, the study evaluated the survival of smolts approaching and passing the Project structures, which included an area from 200 meters upstream of the Project to a location downstream of the Project beyond where dead fish could drift. Study objectives included determination of survival rates, route of passage, migration delay, and travel time.

Radio telemetry tracking techniques were utilized to monitor downstream passage and survival of Atlantic Salmon smolts at the Brunswick Project in early May 2013. The study used a paired release-recapture model, where hatchery-origin smolts were released upstream of the Project representing the treatment group, and others released downstream representing the control group. A total of 101 radio-tagged smolts represented the treatment group, while 60 smolts represented the control group. Primary results of the study included:

- Baseline whole station survival was 82.8%. Adjusted whole station survival (i.e., delay ≥24 hrs assumed as mortality) was 81.4%.
- Survival for spill was 100% and turbine passage survival ranged from 83.6% (Unit 1; vertical propeller) to 94.0% (Units 2 & 3; horizontal propeller).
- Of the treatment smolts, 94% moved downstream and approached the Project. Of those individuals, 61% passed via the turbines, 7% via the downstream fishway, 14% via the upstream fishway, 7% via spill, 4% passed via unknown routes, and 6% did not pass.
- Route choice did not differ significantly between releases on opposite riverbanks.
- Median approach time 3.2 hours, and median residence time was 0.5 hours.
- Flow conditions ranged between 3,600 – 30,500 cfs during the study period and were between 4,000 – 6,800 cfs on the dates of smolt releases. Modest amounts of spill were present during the study period with the flow exceeding the 10% exceedance flow briefly in late May.
- River temperatures ranged between 7.6 – 20.4°C for the duration of the study period and were between 13.2 – 16.62°C on the dates of smolt releases.

2014 Study

The 2014 smolt passage study was similar to the efforts in 2013 (Normandeau 2015). A total of 101 radio-tagged smolts (treatment group) were released above the dam split between both riverbanks, while 60 smolts (control group) were released below the Project. Primary results of the study included:

- Baseline whole station survival was 94.9%. Adjusted whole station survival (i.e., delay ≥24 hrs assumed as mortality) was 92.7%.
- Survival for spill was 100% and turbine passage survival ranged from 70.9% (Unit 1; vertical propeller) to 90.9% (Units 2 & 3; horizontal propeller).
- Of the treatment smolts, 99% moved downstream and approached the Project. Of those individuals, 26% passed via the turbines, 3% via the downstream fishway, 1% via the upstream fishway, 55% via spill, 14% passed via unknown routes, and 1% did not pass.
- Route choice did not differ significantly between releases on opposite riverbanks.
- Median approach time 1.3 hours, and median residence time was 0.2 hours.
- Flow conditions ranged between 6,600 – 26,900 cfs during the study period and were between 8,600 – 16,200 cfs on the dates of smolt releases. Significant amounts of spill were present for most of the study period with the flow exceeding the 10% exceedance flow on two occasions.
- River temperatures ranged between 7.2 – 16.3°C for the duration of the study period and were between 8.1 – 14.7°C on the dates of smolt releases.

2015 Study

The 2015 smolt passage study was similar to the efforts in 2013 and 2014 (Normandeau 2016). A total of 102 radio-tagged smolts (treatment group) were released above the dam split between both riverbanks, while 59 smolts (control group) were released below the Project. Primary results of the study included:

- Baseline whole station survival was 83.8%. Adjusted whole station survival (i.e., delay ≥24 hrs assumed as mortality) was 78.2%.
- Survival for spill was 100% and turbine passage survival ranged from 71.8% (Unit 1; vertical propeller) to 80.4% (Units 2 & 3; horizontal propeller).
- Of the treatment smolts, 88% moved downstream and approached the Project. Of those individuals, 67% passed via the turbines, 0% via the downstream fishway, 24% via spill, 8% passed via unknown routes, and 1% did not pass.
- Route choice did not differ significantly between releases on opposite riverbanks.

- Median approach time 2.5 hours, and median residence time was 0.3 hours.

- Flow conditions ranged between 1,600 – 12,900 cfs during the study period and were between 2,800 – 7,600 cfs on the dates of smolt releases. Modest amounts of spill were present during the study period with the flow exceeding the 10% exceedance flow briefly in late May.

- River temperatures ranged between 8.8 – 20.4°C for the duration of the study period and were between 12.5 – 16.5°C on the dates of smolt releases.

2018 Study

The 2018 smolt passage study was broadly similar to the prior years' efforts but with a different statistical approach (Normandeau 2019). It incorporated a Cormack-Jolly-Seber framework approach to correct for background mortality as opposed to the paired release-recapture model that was used previously. Additionally, generation and spill were intentionally manipulated. A total of 173 radio-tagged smolts had the opportunity to approach the Project (some were released above Pejepscot Dam). Primary results of the study included:

- Unit operations were governed by inflow. Units 1 and 2 were operated during the day and nighttime hours at the onset of the study and following a decrease in inflow to 18,275 cfs. Unit 1 was offline at night and Unit 2 was in operation day and night. The nighttime unit shutdowns were done to provide intentional spill for smolt passage.

- Baseline whole station survival was 96.3%. Adjusted whole station survival (delay <24 hrs) was 94.8%.

- Survival for spill was 100% and turbine passage survival was 88.1%.

- Of the 173 treatment smolts with an opportunity to approach Brunswick following downstream passage at Pejepscot, 95% did so. Of the total number of treatment smolts approaching Brunswick, 30% passed via the turbines, 2% via the downstream fishway, 1% via the upstream fishway, 66% via spill, 1% passed via unknown routes, and 0% did not pass.

- Median approach time was 6.6 hours, and median residence time was 0.3 hours.

- Flow conditions ranged between 3,000 – 25,000 cfs during the study period and were above the station capacity of 7,800 cfs for 5 of 6 fish releases. Large amounts of spill were present through the first half of the study then were maintained through nighttime shutdowns as flow subsided.

- River temperatures ranged between 7 – 22°C for the duration of the study period and were between 9 – 14°C on the dates of smolt releases.

Atlantic Salmon Adult Downstream Passage Studies

The ISPP for the Project included provisions for downstream passage study of post-spawn adult Atlantic Salmon. This study requires a sample of size of 40 Androscoggin River-origin adult salmon. Due to the low numbers of adult salmon returns to the river, an adequate supply of fish for the study has not been available since the initial ESA listing of Atlantic Salmon, and the study has been suspended indefinitely until an adequate source of study fish is available (FERC 2020).

Downstream Passage Alternatives Study

BWPH is currently conducting the Downstream Passage Alternatives Study to determine conceptual options and expected performance for improved downstream passage that will reduce delay and increase passage efficiency for upstream migrating fish, including river herring, American Shad, and Sea Lamprey. The study is being conducted in consultation with NMFS, USFWS, and MDMR. BWPH anticipates filing the results of the study with the USR.

Computational Fluid Dynamics Modeling – Downstream Passage

BWPH is currently conducting CFD modeling to evaluate the effect of flow pattern and velocity conditions on downstream passage at the Project. BWPH anticipates providing the results of the CFD modeling with the USR.

4.6.1.3 Aquatic Habitat

4.6.1.3.1 Aquatic Habitat Surveys

In 2019, as part of the studies conducted to support the FERC relicensing of the upstream Pejepscot Hydroelectric Project, aquatic habitat and substrate was characterized in the upper portion of the Brunswick Project impoundment (i.e., the reach from Pejepscot Dam downstream to a point approximately 0.7 miles along the Brunswick impoundment). Pool (38.1%), backwater (28.6%), and run (20.1%) were the most common mesohabitats in the reach. Of the 35 total mesohabitat units mapped, five were unable to have substrate identified (14.3%) due to depth of the mesohabitat unit not allowing for visual observation or probing. Of the remaining 30 mesohabitat units, primary substrates were identified: eight were gravel medium (22.9%), seven were cobble (20.0%), six were sand (17.1%), three were complex bedrock (8.6%), three were boulder small (8.6%), two were rubble (5.7%), and one was boulder large (2.9%). Evidence of potential sea lamprey spawning activity was recorded at three locations during the study. Depressions and mounds of mixed substrates typically cobble large gravel, small gravel and fine gravel were observed at the three locations (Topsham Hydro 2020).

Habitat in the mainstem river was evaluated by Yoder et al. (2006) during the fish assemblage survey in 2003. Each of the sites sampled was assessed using a Qualitative Habitat Evaluation Index (QHEI), whereby the habitat was visually evaluated and assessed based on "good" and "modified" characteristics of lotic habitat. QHEI results from Yoder et al. (2006) for the five sites in the vicinity of the Project area are shown in Table 4.6.1.3.1-1.

QHEI evaluations were performed at two sites within the Project impoundment and three sites downstream of the Project dam in tidal waters (Yoder et al., 2006). The two sites within the Project impoundment were characterized as high and low-gradient riverine, with no modified attributes and 6-8 good attributes. As such, these were considered free-flowing locations with good riverine habitat qualities based on the QHEI evaluation. The low-gradient riverine site had a lack of current and substrate diversity compared to the high-gradient site. The three sites downstream of the Project dam were characterized as freshwater tidal riverine. The two sites closest to the Project dam had two modified attributes, including sparse to no cover and no riffle/run habitat, and 6-7 good attributes. These two sites exhibited good habitat qualities based on the QHEI evaluation. The site farthest downstream (5.1 miles) had the same two modified attributes, in addition to high/moderate silt cover, fair to poor development, slow or no flow, and high to moderate overall embeddedness of the substrate. This site only had three good attributes, leading to a lower QHEI score.

Table 4.6.1.3.1-1. QHEI Results for Good and Modified Habitat Attributes at Sites Evaluated on the Androscoggin River in the Project Area

Site Description	Location	Project Impoundment		Downstream of Project		
	Distance from Project Dam	4.3 RM	1.5 RM	0.2 RM	2.6 RM	5.1 RM
	Habitat Type	High-gradient riverine	Low-gradient riverine	Freshwater tidal riverine	Freshwater tidal riverine	Freshwater tidal riverine
Good Habitat Attributes	No Channelization/Recovered	X	X	X	X	X
	Boulder, Cobble, Gravel Substrates	-	-	-	-	-
	Silt Free Substrates	-	-	X	-	-
	Good/Excellent Development	X	X	X	X	-
	Five or More Substrate Types	X	-	X	X	X
	Extensive-Moderate Cover	X	X	X	X	-
	Fast Current/Eddies	X	-	-	-	-
	Low-Normal Overall Embeddedness	X	X	X	X	-
	Max Depth > 1m	X	X	X	X	X
	Low-Normal Riffle/Run Embeddedness	X	X	-	-	-
Modified Habitat Attributes	Impounded	-	-	-	-	-
	Channelized or No Recovery	-	-	-	-	-
	Silt/Muck Substrates	-	-	-	-	-
	Sparse or No Cover	-	-	X	X	X
	Max Depth < 70 cm	-	-	-	-	-
	Recovering Channel	-	-	-	-	-
	High/Moderate Silt Cover	-	-	-	-	X
	Fair-Poor Development	-	-	-	-	X
	Only 1-2 Cover Types	-	-	-	-	-
	Slow or No Flow	-	-	-	-	X
	High-Mod Overall Embeddedness	-	-	-	-	X
	High-Mod Riffle-Run Embeddedness	-	-	-	-	-
	No Riffle/Run	-	-	X	X	X
	QHEI Score	75	69	62	37	55

Site Description	Location	Project Impoundment		Downstream of Project		
	Distance from Project Dam	**4.3 RM**	**1.5 RM**	**0.2 RM**	**2.6 RM**	**5.1 RM**
	Habitat Type	**High-gradient riverine**	**Low-gradient riverine**	**Freshwater tidal riverine**	**Freshwater tidal riverine**	**Freshwater tidal riverine**
	Ratio of Modified: Good Attributes	0.00	0.00	0.29	0.33	2.00

4.6.1.3.2 Special Fish Habitats

Critical habitat is designated by the NMFS or the USFWS for the survival and recovery of species listed as threatened or endangered under the ESA, including Atlantic Salmon, Shortnose Sturgeon, and Atlantic Sturgeon. Critical habitat includes areas occupied by ESA-listed species and those areas that may require special management considerations or protection or that have been determined to be essential for the conservation of the species. EFH is identified for species managed in Fishery Management Plans under the Magnuson-Stevens Fishery Conservation and Management Act and is defined as the habitat necessary for managed fish to complete their life cycle such that the fishery can be harvested sustainably. Habitat Areas of Particular Concern are designated EFH judged to be particularly important to the long-term productivity of populations of one or more managed species, or to be particularly vulnerable to degradation (NEFMC 1998).

Atlantic Salmon

Atlantic Salmon in the Androscoggin are part of the Merrymeeting Bay SHRU and portions of the Androscoggin River are classified as critical habitat (i.e., critical to the recovery of the species).

The Project lies entirely within designated critical habitat for the GOM DPS of Atlantic Salmon, with EFH for eggs and larvae, juvenile and adults designated for the Androscoggin River (NMFS 2012). The Lower Androscoggin River in the Project area is generally designated as low-quality spawning habitat, though the mainstem is considered an important migration corridor (NMFS 2012; NASCO 2009). No high-quality spawning or rearing habitat is expected to occur in the Project impoundment or tailwater areas (NMFS 2012; NASCO 2009).

EFH for Atlantic Salmon is designated for all waters currently or historically accessible to Atlantic Salmon within the streams, rivers, lakes, ponds, wetlands and other water bodies of Maine, New Hampshire, Vermont, Rhode Island, and Connecticut and is described for each Atlantic Salmon life stage (NEFMC 1998) as follows:

- Eggs: Bottom habitats with a gravel or cobble riffle (redd) above or below a pool of rivers. Generally, the following conditions exist in the egg pits (redds): water temperatures below 10°C, and clean, well-oxygenated fresh water. Atlantic Salmon eggs are most frequently observed between October and April.

- Larvae: Bottom habitats with a gravel or cobble riffle (redd) above or below a pool of rivers. Generally, the following conditions exist where Atlantic salmon larvae, or alevins/fry, are found: water temperatures below 10°C, and clean, well-oxygenated fresh water. Atlantic Salmon alevins/fry are most frequently observed between March and June.

- Juveniles: Bottom habitats of shallow gravel / cobble riffles interspersed with deeper riffles and pools in rivers and estuaries. Generally, the following conditions exist where Atlantic Salmon parr are found: clean, well-oxygenated fresh water, water temperatures below 25°C, water depths between 10 cm and 61 cm, and water velocities between 30 and 92 cm

per second. As they grow, parr transform into smolts. Atlantic Salmon smolts require access downstream to make their way to the ocean. Upon entering the sea, "postsmolts" become pelagic and range from Long Island Sound north to the Labrador Sea.

- Adults: For adult Atlantic salmon returning to spawn, habitats with resting and holding pools in rivers and estuaries. Returning Atlantic Salmon require access to their natal streams and access to the spawning grounds. Generally, the following conditions exist where returning Atlantic Salmon adults are found migrating to the spawning grounds: water temperatures below 22.8°C, and dissolved oxygen above 5 ppm. Oceanic adult Atlantic Salmon are primarily pelagic and range from the waters of the continental shelf off southern New England north throughout the Gulf of Maine.

- Spawning Adults: Bottom habitats with a gravel or cobble riffle (redd) above or below a pool of rivers. Generally, the following conditions exist where spawning Atlantic Salmon adults are found: water temperatures below 10°C, water depths between 30 cm and 61 cm, water velocities around 61 cm per second, and clean, well-oxygenated fresh water. Spawning Atlantic Salmon adults are most frequently observed during October and November. Atlantic Salmon EFH includes all aquatic habitats in the watersheds of the identified rivers, including all tributaries, to the extent that they are currently or were historically accessible for salmon migration. Atlantic Salmon EFH excludes areas upstream of longstanding naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years).

Sturgeon

The river downstream of the Project dam provides rearing and spawning habitat for both Atlantic Sturgeon and Shortnose Sturgeon. However, critical habitat has not been officially designated for the northeast region population of endangered Shortnose Sturgeon. Critical habitat for the threatened GOM DPS of Atlantic Sturgeon is designated within the Androscoggin River, including the Project tailwater area. Reproduction and recruitment are essential for species conservation, and studies indicate this occurs in a limited number of rivers. Physical features that have been identified as essential for the GOM DPS of Atlantic Sturgeon (NMFS 2017a) include:

- Hard bottom substrate (e.g., rock, cobble, gravel, boulder, etc.) in low salinity waters (0.0 -0.5 ppt range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;

- Aquatic habitat with a gradual downstream salinity gradient of 0.5 up to as high as 30 ppt and soft substrate (e.g., sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development;

- Water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support:

    - Unimpeded movement of adults to and from spawning sites

  - Seasonal and physiologically dependent movement of juveniles to appropriate salinity zones within the river estuary; and
  - Staging, resting, or holding of subadults or spawning condition adults;

- Water depths in main river channels deep enough (e.g., at least 1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river; and
- Water (particularly in the bottom meter of the water column), between the river mouth and spawning sites, with the temperature, salinity, and oxygen values that combined, support:
  - Spawning;
  - Annual and interannual adult, subadult, larval, and juvenile survival; and
  - Larval, juvenile, and subadult growth, development, and recruitment (e.g., 13 C to 26 C for spawning habitat and no more than 30 C for juvenile rearing habitat and 6 mg/L DO or greater for juvenile rearing habitat).

4.6.1.4 Freshwater Mussels

In 2025, as part of the relicensing of the Project, BWPH conducted a survey of freshwater mussels as no systematic bivalve surveys had been conducted in the Project area (BWPH 2026e). The goal of this study was to provide information regarding the distribution, size, and assemblage of freshwater mussels using aquatic habitats in the Project area. The objective of the study was to document mussel populations and potential host fish species that may be affected by Project operations.

The survey was conducted July 28-30th, 2025 between 9am and 6:30 pm. The weather conditions were partly cloudy and 75-85°F. Water clarity was good and all sites had noticeable current, helping keep cells clear of resuspended material. Discharge was around 2,000 cfs near Auburn, Maine (USGS-01059000) during the survey. The impoundment elevation, as recorded at the dam, ranged from approximately 38.5 to 39.3 ft during the survey.

Within the Project impoundment, 40 sites were sampled using a semi-quantitative cell survey, implementing a visual and tactile search to deplete cells. Sites were placed in shallow littoral habitat (<8 ft) as these areas are most likely to be impacted by fluctuations in water levels. For each cell physical characteristics were recorded, including GPS coordinates, substrate composition percentage (Wentworth Scale), percent coverage of macrophytes and woody debris, cell dimensions, cell search time, depth at center of the cell, and water clarity. Each live mussel found was identified to species and measured, and counts of relic shells found in the cells were recorded. For each species, representative photos were taken of lateral and dorsal view, and representative relic shells were retained.

The survey covered 312.75 square meters (m^2) of habitat with a total search effort of 1,059 minutes, and an average effort of 3.39 minutes/m^2. Cell area and effort was variable across sites, as some sites contained very dense mussel communities which required a smaller area to accurately deplete. In total, 4,644 live freshwater mussels from four species were found during the survey, Eastern Elliptio (*Elliptio complanata*), Alewife Floater (*Utterbackiana implicata*), Triangle Floater (*Alasmidonta undulata*), and Eastern Lampmussel (*Lampsilis radiata*), giving a CPUE of 4.39 individuals/minute. A single Eastern Floater (*Pyganodon cataracta*) shell was also found in a shell midden, though no live individuals were found during the survey. No invasive bivalves were found during the survey.

Only two out of the 40 sites had no live freshwater mussels, with the average density of freshwater mussels across sites being 14.8 individuals/m^2, and a high of 131.0 individuals/m^2. Of the 4,644 live individuals 99.3% (4,644 individuals) were Eastern Elliptio, 0.43% (20 individuals) Alewife Floater, 0.15% (seven individuals) Triangle Floater, and 0.15% (7 individuals) Eastern Lampmussel. To reduce stress on individuals only the first 25 Eastern Elliptio individuals were measured for length at each site.

Sediment within the cells was dominated by silt (44.4% of survey area), with cobble (23.0%), gravel (12.5%) and sand (13.2%) also commonly present. Macrophytes covered 11.8% of the surveyed area and was present at 22 sites. The cells with the highest density (60-131 individuals/m^2) were dominated by silt (80-100%), and most also had macrophytes. Eastern elliptio densities were greater in the surrounding silt than within the macrophyte patches, being present at most sites between the shoreline and near-shore weed beds in high density, often in 20-40 cm of water. The cells with 3-4 species present contained a mix of cobble, gravel, and sand, with only one diverse cell containing silt. Cells with two species present contained a variety of substrate conditions from 100% silt to an even mix of cobble, gravel, and sand. The five most dense sites (≥60 individuals/m^2) had 100% silt sediment composition, often with patches of macrophytes, though not all high silt sites had high density.

All the species found with live individuals had multiple year classes present, and the Eastern Elliptio population showed recent recruitment with individuals ranged from 15-109 mm (Table 4.6.1.4-1). All species have multiple known fish hosts present in the study area, with pumpkinseed serving as a potential resident host for all mussel species present (Table 4.6.1.4-2).

Table 4.6.1.4-1: Summary of the Mussel Lengths

Species	Min of Length (mm)	Max of Length (mm)	Average of Length (mm)	Individuals Measured
Alewife Floater	41	100	71	20
Eastern Elliptio	15	109	66	878
Eastern Lampmussel	28	84	65	7
Triangle Floater	20	34	27	7

Table 4.6.1.4-2: Freshwater Mussel Species Present in the Impoundment, Species Conservation Status, and Known Fish Host Present

Species	Maine Status	Global Status	Host Fish Species Present	Citation
Eastern Elliptio	S5-Secure	S5-Secure	Yellow Perch, Banded Killifish, Pumpkinseed, American Eel	Young 1911, Watters et al. 2005, Lellis et al. 2013, Nedeau et al. 2000, NatureServe 2025
Alewife Floater	S4- Apparently Secure	S5-Secure	White Sucker, Pumpkinseed, Alewife	Johnson 1946, Davenport and Warmuth 1965, Nedeau et al. 2000, NatureServe 2025
Triangle Floater	S4- Apparently Secure	S4- Apparently Secure	Pumpkinseed, Fallfish, White Sucker	Watters et al. 1998, Nedeau et al. 2000, NatureServe 2025
Eastern Lampmussel	S5-Secure	S5-Secure	Yellow Perch, Smallmouth Bass, Pumpkinseed Sunfish	Nedeau et al. 2000, NatureServe 2025
Eastern Floater	S5-Secure	S5-Secure	White Sucker, Pumpkinseed Sunfish	Nedeau et al. 2000, NatureServe 2025

4.6.1.5 Benthic Macroinvertebrates

Benthic macroinvertebrates are discussed in Sections 4.5.1.2.4 and 4.5.1.2.5.

4.6.1.6 Amphibian and Aquatic Reptile Resources, Habitats, and Temporal/Life History

There is limited specific information available on amphibians and aquatic reptile species in the Project area. Information is available on a state and county scale. Examination of species distribution maps available through the Maine Amphibian and Reptile Atlas Project (MDIFW 2026), updated May 2023, have determined that there are approximately 18 amphibian species and approximately 15 reptile species recorded in Androscoggin, Cumberland, and Sagadahoc Counties that may be present in the Project area(Table 4.6.1.6-1). Based on their life history requirements, salamander, frog/toad, and most turtle species have the potential to utilize the aquatic habitat within the Project area. Snake species, while not primarily aquatic, may utilize riparian areas for feeding and shelter (MDIFW 2026). Some listed species, while recorded within one or more of the above counties, had observations that were not along the mainstem Androscoggin River.

Salamanders

Nine species of salamander could potentially use aquatic or terrestrial habitats in the Project area (Table 4.6.1.6-1). Of these, the Blue-Spotted Salamander and the Northern Spring Salamander are listed as Species of Special Concern in Maine (MDIFW 2026). Photographic and observed records of Blue-Spotted Salamander have been recorded in Androscoggin County along the Androscoggin River corridor. Records of the Northern Spring Salamander are listed in western

Cumberland County, but not along the mainstem Androscoggin River (MDIFW 2026). The other six species are: Eastern Newt (also known as the Red-Spotted Newt), Eastern Red-Backed Salamander, Four-Toed Salamander, Northern Dusky Salamander, Northern Two-Lined Salamander, and Yellow Spotted Salamander. In addition, the non-native Mudpuppy has recently been observed in Cumberland County (MDIFW 2026).

The Northern Spring Salamander, Northern Dusky Salamander, and Northern Two-Lined Salamander share similar habitat, reproduction, and diet requirements. All three species inhabit terrestrial and aquatic habitats including: clear upland streams, caves, shaded seepages, rocky brooks, springs, seepages, and associated riparian areas. Occasionally they are also found in swamps and lake margins or forested wet areas. They are often found under rocks, logs, leaves, or moss in or around water. Reproduction occurs at various times of the spring, summer, or fall depending on environmental conditions (NatureServe Explorer 2016).

The Eastern Red-Backed Salamander, the Four-Toed Salamander, the Yellow Spotted Salamander, and the Blue-Spotted Salamander share similar habitat, reproduction, and diet requirements. These species can inhabit lakes, ponds, swamps, and quiet stream pools, forested wetland, scrub-shrub wetland, riparian zones, and multiple forest types containing damp microhabitats under leaf litter, surface objects, or inside logs. Breeding migration timing varies depending on local conditions and may occur in both spring and fall, with egg laying typically occurring in late winter to mid-summer (NatureServe Explorer 2016).

The Eastern Newt, also known as the Red-spotted Newt, requires both terrestrial and aquatic habitat throughout its life cycle. With the exception of the red eft stage (juvenile), it is primarily aquatic. Aquatic habitats include lakes, ponds, swamps, pools, shallow water, and wetlands. In the red eft stage, the Eastern Newt is terrestrial. Terrestrial habitats include riparian areas wetlands, forests, and grasslands or herbaceous areas. The red eft stage burrows in soil, under fallen logs, leaf litter, and other forest debris (NatureServe Explorer 2016).

The Mudpuppy, though still uncommon in Maine, has been recorded in both Androscoggin and Cumberland Counties. This species is fully aquatic and can live in lakes, marshes, streams, and drainage ditches. Records in Maine indicate it has only been found in lakes and large ponds. Mudpuppies were accidentally introduced into the Belgrade Lakes in the 1940s, with potential recurrent introductions through use as fishing bait. This species is active year-round, and lays its eggs in the spring on the underside of rocks and logs (MDIFW 2026).

Frogs and Toads

There are eight species of frog and toad that may utilize habitats within the Project area (Table 4.6.1.6-1). The American Toad, Spring Peeper, Wood Frog, Pickerel Frog, Gray Tree-Frog, Green Frog, and American Bullfrog are common species throughout Maine. The Northern Leopard Frog is listed as Species of Concern in the State of Maine (MDIFW 2026).

The Green Frog and American Bullfrog are highly aquatic species that venture onto land if conditions are suitable. They can inhabit ponds, swamps, lakes, reservoirs, marshes, stream margins and are found mainly in waterbodies with abundant floating, emergent, or submerged vegetation along shorelines. During winter, hibernation typically takes place under land objects, underground, or under flowing water. Breeding for all species occurs between May and August. Metamorphosis varies between species, with the American Bullfrog developing into the adult stage one to two years after the eggs hatch (NatureServe Explorer 2016).

The Northern Leopard Frog, Pickerel Frog, Spring Peeper, Wood Frog, and Gray Tree Frog share similar habitat, reproduction, and diet requirements. All of these species utilize both terrestrial and aquatic habitats at various life stages. They can inhabit springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, lakes, multiple wetland types, and riparian zones. They are usually found near permanent water with rooted aquatic vegetation. During winter, hibernation may take place either underwater or underground. Breeding occurs in the spring (NatureServe Explorer 2016).

With the exception of the breeding season, the American Toad occupies primarily terrestrial areas. They prefer areas with sufficient moisture, food, and a suitable breeding location nearby. Common habitats include, but are not limited to, forests of multiple compositions, forested wetlands, herbaceous wetlands, scrub-shrub wetlands, cropland/hedgerows, and riparian zones. Breeding occurs in the spring when they migrate to temporary or permanent pools, or in shallow areas of slow moving waterbodies. Eggs hatch approximately a week after breeding and metamorphosis occurs within two months of hatching (usually June or July) (NatureServe Explorer 2016).

Snakes

There are eight species of snakes that may utilize habitats within the Project area, including the Northern Water Snake, Northern Brown Snake, Eastern Milk Snake, Garter Snake, Eastern Ribbon Snake, Redbelly Snake, Ring-Neck Snake and Smooth Green Snake (Table 4.6.1.6-1). The Northern Water Snake requires aquatic habitat while the other snake species may make limited use of aquatic environments, primarily riparian zones and immediate shorelines. Two species, the Northern Brown Snake and Eastern Ribbon Snake, are listed as a Species of Special Concern in Maine. Records indicate that Northern Brown Snake (or DeKay's Brownsnake) specimens and photographs have been recorded in the general vicinity of the Project area (MDIFW 2026). The Eastern Ribbon Snake has also been recorded in all Androscoggin, Cumberland, and Sagadahoc counties, with some records along the mainstem of the Androscoggin River (MDIFW 2026).

The Northern Water Snake inhabits creeks, rivers, lakes, oxbows, canals, reservoirs, ponds, marshes, bogs, swamps, forested wetlands, herbaceous wetlands, scrub-shrub wetlands, and riparian zones. Basking areas include flood debris piles, logs, or rocks at the water's edge. Hibernation occurs in burrows, rocks or deep crevices either at the water's edge or in upland

areas near water. The breeding season typically occurs from late April to early June (NatureServe Explorer 2016).

The Northern Brown Snake, Eastern Ribbon Snake, Garter Snake, and Redbelly Snake inhabit terrestrial and wetland habitats. They hibernate underground or beneath buildings and other structures. These snakes give "live" birth, and therefore do not require habitat for egg protection and development. Their diet includes earthworms, slugs, snails, insects, and small amphibians. (NatureServe Explorer 2016).

The Eastern Milk Snake, Ring-Neck Snake, and Smooth Green Snake share similar habitat, reproduction, and diet requirements. These snakes inhabit a wide variety of areas including open country, road cuts, powerline right-of-ways, rocky hillsides, grasslands, riparian zones, wetland borders, deciduous forests, and human dwellings. They may be found under objects such as rocks, logs, boards, tin, or building debris. Eggs require a well-drained, protected area with external heat to hatch (MDIWF 2023, NatureServe Explorer 2016).

Turtles

There are seven species of turtle that may utilize habitats within the Project area (Table 4.6.1.6-1). The Snapping Turtle, Eastern Painted Turtle, and Musk Turtle are considered common turtle species in Maine. The Wood Turtle and the Spotted Turtle are listed as Species of Special Concern in the State of Maine. The Spotted Turtle has records in Cumberland, Androscoggin, and Sagadahoc counties, though observations are not recorded along the mainstem of the Androscoggin River (MDIFW 2026). The Blanding's Turtle is listed as State Endangered. Photographic records of the Blanding's Turtle are listed in both Cumberland and Androscoggin counties, with the latter record potentially along the mainstem Androscoggin River upstream of the Project area (MDIFW 2026).

Wood Turtles can be found in a variety of habitats including creeks, rivers, forested and herbaceous wetlands, and forests. During summer months, they may roam overland in terrestrial habitats alongside streams, such as woodland bogs and marshy fields. Overwintering occurs in bottoms or banks of streams where water flows all winter, even under ice. This species has a wide diet, and could be considered carnivorous, frugivorous, and insectivorous (NatureServe Explorer 2016).

The Spotted Turtle is a semi-aquatic turtle species that inhabit woodland streams, wet meadows, creeks, and rivers. They move seasonally between different wetland types and spend time on land. Hibernation occurs in muddy bottoms of waterways or bogs. Breeding occurs between March and May and egg hatching occurs late August to September (NatureServe Explorer 2016).

The Snapping Turtle, Eastern Painted Turtle, and Musk Turtle are aquatic turtles that can inhabit a wide range of waterbody types including: shallow bodies of water with soft bottom and aquatic vegetation, lake margins, vernal pools, swamps, woodland streams, fens, bogs, small marshes and marshy pastures. During winter, hibernation occurs in bottom mud, debris, or bank holes.

During breeding season, overland travel may occur (Fuller 2016; Warner Nature Center 2016; NatureServe Explorer 2016).

The Blanding's Turtle is primarily aquatic and prefers marshes, swamps, streams, ponds, and vernal pools with dense emergent vegetation and logs for basking. This species hibernates at the bottom of ponds, swamps, and vernal pools, and also spends parts of the summer inactive under leaf litter in areas near wetlands. This species can travel longer distances between wetlands to feed on breeding amphibians, though its diet is generally omnivorous (MDIFW 2026).

Table 4.6.1.6-1. Amphibian and Aquatic Reptile Species Documented in Androscoggin, Cumberland, and Sagadahoc Counties, Maine

Type	Common Name	Scientific Name	Aquatic Habitat Use	Riparian Habitat Use	Status in Maine
Salamanders	Eastern Red-Backed Salamander	*Plethodon cinereus*	Breeding/Larvae	Juvenile/Adult	Not Listed
	Yellow Spotted Salamander	*Ambystoma maculatum*	Breeding/Larvae	Juvenile/Adult	Not Listed
	Northern Dusky Salamander	*Desmognathus fuscus*	Breeding/Larvae Juvenile/Adult	Juvenile/Adult	Not Listed
	Northern Two-Lined Salamander	*Eurycea bislineata*	Breeding/Larvae Juvenile/Adult	Juvenile/Adult	Not Listed
	Northern Spring Salamander	*Gyrinophilus porphyriticus*	Breeding/Larvae Juvenile/Adult	Juvenile/Adult	Special Concern
	Four-Toed Salamander	*Hemidactylium scutatum*	Breeding/Larvae	Juvenile/Adult	Not Listed
	Eastern Newt (Red-spotted Newt)	*Notophthalmus viridescens*	Breeding/Larvae/ Adult	Juvenile	Not Listed
	Blue-Spotted Salamander	*Ambystoma laterale*	Breeding/Larvae	Juvenile/Adult	Special Concern
	Mudpuppy	*Necturus maculosus maculosus*	All Stages	Fully aquatic	Non-native
Frogs and Toads	American Toad	*Anaxyrus americanus*	Breeding/Larvae	Juvenile/Adult	Not Listed
	American Bullfrog	*Lithobates catesbeianus*	All Stages	Adult (breeding movements)	Not Listed
	Gray Tree-Frog	*Hyla versicolor*	Breeding/Larvae	Juvenile/Adult	Not Listed
	Green Frog	*Lithobates clamitans melanota*	All Stages	Adult (wintering)	Not Listed

Type	Common Name	Scientific Name	Aquatic Habitat Use	Riparian Habitat Use	Status in Maine
	Northern Leopard Frog	*Lithobates pipiens*	All Stages	Juvenile/Adult	Special Concern
	Pickerel Frog	*Lithobates palustris*	Breeding/Larvae Wintering Adult	Juvenile/Adult (summer)	Not Listed
	Spring Peeper	*Pseudacris crucifer*	Breeding/Larvae	Juvenile/Adult	Not Listed
	Wood Frog	*Lithobates sylvaticus*	Breeding/Larvae	Juvenile/Adult	Not Listed
Snake	Eastern Milk Snake	*Lampropeltis triangulum triangulum*	NA	All Stages	Not Listed
	Northern Brown Snake (DeKay's Brownsnake)	*Storeria dekayi*	NA	All stages	Special Concern
	Northern Water Snake	*Nerodia sipedon*	Adult (feeding)	Juvenile/Adult	Not Listed
	Garter Snake	*Thamnophis sirtalis*	NA	Juvenile/Adult	Not Listed
	Eastern Ribbon Snake	*Thamnophis sauritus*	NA	Juvenile/Adult	Special Concern
	Redbelly Snake	*Storeria occipitomaculata*	NA	Juvenile/Adult	Not Listed
	Ring-Neck Snake	*Diadophis punctatus*	NA	Juvenile/Adult	Not Listed
	Smooth Green Snake	*Opheodrys vernalis*	NA	Juvenile/Adult	Not Listed
Turtles	Blanding's Turtle	*Emydoidea blandingii*	Juvenile/Adult	Breeding/Nesting	Endangered
	Eastern Painted Turtle	*Chrysemys picta*	Juvenile/Adult	Breeding/Nesting Juvenile/Adult (sunning)	Not Listed
	Snapping Turtle	*Chelydra serpentina*	Juvenile/Adult	Breeding/Nesting	Not Listed
	Spotted Turtle	*Clemmys guttata*	Juvenile/Adult	Breeding/Nesting	Special Concern
	Musk Turtle	*Sternotherus odoratus*	Juvenile/Adult	Juvenile/Adult	Not Listed

Type	Common Name	Scientific Name	Aquatic Habitat Use	Riparian Habitat Use	Status in Maine
				(hibernation)	
	Wood Turtle	*Glyptemys insculpta*	Juvenile/Adult	Juvenile/Adult (summer)	Special Concern

4.6.2 Environmental Analysis

FERC's SD2 identified three potential resource issues relating to aquatic resources, which are discussed in greater detail below.

Effects of continued Project operation on water quality from the project headwaters downstream to where the Androscoggin River flows into Merrymeeting Bay

As indicated in Section E.4.5.1.2, water quality in the Project impoundment and downstream areas meets Maine's standards and is supportive of aquatic habitat.

Effects of continued Project operation on aquatic habitat in the Project area for migratory and resident fish species.

BWPH operates the Project in a run-of-river mode, resulting in minimal man-made fluctuation in the Project impoundment, and the operation of the Project has no effect on overall river flow in the lower Androscoggin River. The Project waters are composed of a variety of aquatic habitats that provide nursery, spawning, and rearing opportunities for resident and migratory fish species, including Smallmouth and Largemouth Bass, Yellow Perch, American Eel, river herring, American Shad, suckers, and other important minnow and forage species. The Project waters are also designated as critical habitat for Atlantic Salmon. In addition, several species of amphibians, reptiles, and macroinvertebrates inhabit the Project waters during their life cycles.

Existing information for the Project, along with the results of the studies completed by BWPH, demonstrate that the current operation of the Project is maintaining and supporting habitat for aquatic species in the Androscoggin River both upstream and downstream of the Project dam.

BWPH is proposing to continue to operate the Project in a run-of-river mode, which will maintain existing aquatic habitat and angling opportunities in the Project area. Continued operation of the Project is not expected to adversely affect aquatic habitat, including EFH for Atlantic Salmon.

Effects of continued Project operation on passage of migratory and resident fish species in the Androscoggin River.

As described in Section E.4.6.1.2.2, several studies have been conducted to determine the effectiveness of existing upstream and downstream passage facilities at the Project. In general, it has been determined that the upstream and downstream passage facilities are not consistent with the 2019 design guidelines specified by USFWS.

Improvements to downstream passage facilities will be informed by the *Downstream Passage Alternatives Study* and *Computational Fluid Dynamics Modeling – Downstream Passage Study* in consultation with the resource agencies. These processes are ongoing, and additional information will become available as part of the USR process, and included in the FLA.

Based on radio telemetry studies performed to date, the upstream passage facility allows for some passage of adult river herring and limited passage for adult American Shad. Insufficient numbers of Atlantic Salmon have been returning to the Androscoggin River to trigger an upstream passage study in accordance with the Project's final SPP. Further studies on the upstream passage facility are being conducted in the form of the *Upstream Passage Alternatives Study; Diadromous Fish Behavior, Movement, and Project Interaction Study;* and *Computational Fluid Dynamics Modeling – Upstream Passage Study.* It is anticipated that improvements will be developed following the completion of these studies and consultation with the resource agencies. Additional information will become available as part of the USR process, and included in the FLA.

Study results indicate that on the spillway side of the river there are large concentrations of juvenile American Eel interacting with areas of permanent leakage flow from the Tainter gates. Deployment of the temporary eel traps demonstrated the ability to attract juvenile eels through the introduction of artificial "leakage" flows onto ledge habitat downstream of the overflow spillway with the highest trap catches observed in closer proximity to spillway pool habitat below the Tainter gates.

4.6.3 Proposed Environmental Measures

Currently, BWPH is proposing the following PME measures to protect aquatic resources.

- Continue to operate the Project in a run-of-river mode by maintaining the impoundment within 2 ft of the spillway crest, such that inflow approximates outflow.
- Develop and implement an Operations Compliance Monitoring Plan.
- Continue consultation with the applicable resource agencies regarding upstream and downstream fish passage improvements for Atlantic Salmon, American Shad, river herring, and Sea Lamprey as the remaining outstanding relicensing studies are completed. Once the remaining relicensing studies have been completed, BWPH will identify additional PME measures for the Project related to upstream and downstream fish passage for inclusion in the FLA. In the interim BWPH proposes to:
    - Continue to provide upstream passage for Atlantic Salmon, American Shad, river herring, and other diadromous fish species via the Project's vertical slot fishway.
    - Continue to provide downstream passage for diadromous fish via the Project's downstream fish passage facility consisting of a surface sluice and tailrace discharge pipe.
    - Continue to implement measures in the Final SPP to protect Atlantic Salmon, Shortnose Sturgeon, and Atlantic Sturgeon.
- Installation and operation of a temporary portable American Eel ramp for two passage seasons (June 1 through September 15) to further identify a suitable location for a permanent upstream American Eel ramp. The temporary portable eel ramp will be installed during the first full passage season after the effective date of the new license.
- Installation and operation of a permanent upstream American Eel ramp based on the results of the temporary portable ramp evaluation. The permanent ramp will be installed during the third full passage season after the effective date of the new license.

- Develop and implement a Fishway Operations and Maintenance Plan.

4.6.4 Cumulative Effects

In SD2, aquatic habitat and passage of migratory fish species are identified as resources that could be cumulatively affected by the proposed continued operation and maintenance of the Project. The geographic scope for these resources was identified as the entire Androscoggin River basin.

BWPH's proposal to continue to operate the Project in a run-of-river mode with no storage or flood control capacity would continue to have a beneficial cumulative effect on streamflow, aquatic habitat and fisheries in the Lower Androscoggin River by eliminating any impoundment and flow fluctuations associated with the Project. Other hydropower projects in the Androscoggin River watershed that have peaking operations would continue to influence streamflow, aquatic habitat and fishery resources.

Activities within Androscoggin River basin that may cumulatively affect migratory fish species include the construction and operation of dams within the river basin, which have resulted in migratory barriers and loss of spawning habitat. The resource agencies and Licensees of hydropower projects within the Androscoggin River basin have been addressing upstream and downstream fish passage in the lower Androscoggin River basin within various regulatory proceedings (i.e., ESA consultation, development of SPPs, and FERC licensing proceedings) over the recent years.

The current upstream and downstream fish passage facilities at the Project provide varying levels of passage effectiveness for Atlantic Salmon, river herring, Sea Lamprey and American Shad. BWPH is in the process of completing further study to determine appropriate alternatives to improve fish passage for upstream and downstream migrating Atlantic Salmon, river herring, Sea Lamprey, American Eel (downstream) and American Shad. For upstream migrating American Eel, BWPH is proposing enhancements in the form of an upstream eel ramp, which will reduce any cumulative effects to this species in the Androscoggin River basin resulting from operation of the Project.

4.6.5 Unavoidable Adverse Effects

After the implementation of PME measures and modifications are complete, operation of the Project may continue to result in minor adverse effects to migrating fish, such as upstream passage delay or entrainment of downstream migrating individual fish. Such impacts are expected to be significantly mitigated.

4.6.6 References

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4.7 Wildlife and Botanical Resources

4.7.1 Affected Environment

4.7.1.1 Regional Setting

The Project is in the Warm Continental Division in a Laurentian Mixed Forest Province, as described by the United States Forest Service. This ecoregion lies between the boreal forest and broadleaf deciduous forest zone and is considered transitional (USFS/USDA, 2023). These forests can contain pure stands of coniferous or deciduous trees, or a mixed stand with few coniferous or deciduous trees.

Within the Ecoregion, the Project lies within the Central Main Coastal and Interior section, which is also described as a transitional zone. Starting from the west moving east, the forest transitions from mixed hardwoods typical of southern New England, including Appalachian oak, and pine, to the northern coastal spruce fir, and spruce fir northern hardwood communities to the west. Moving from the south to the north, the coastal community transitions from montane spruce-fir to northern hardwood communities (USFS/USDA, 2023).

The Project is located between the downtown areas of Brunswick and Topsham, ME on the Androscoggin River.

The Project boundary follows the contour level of 42.0 ft around most of the impoundment, except along the northerly shore of the impoundment between the Project dam and the Black Bridge railroad crossing where it follows the contour level of 46.0 ft. The Project boundary also encloses the principal Project works including the dam, intake, powerhouse, tailrace, and fishway. The Project boundary extends approximately 4.5 miles upstream to the Pejepscot Dam and encompasses a total of approximately 348 acres. Given that the Project boundary lies close to the impoundment, there is limited upland habitat for botanical resources or terrestrial wildlife within the Project boundary. However, due to the transitional nature of the Central Maine Coastal and Interior Section, the area surrounding the Project likely contains a wide range of terrestrial wildlife resources which utilize the habitat found in the Project area outside of the Project boundary.

4.7.1.2 Botanical Resources

As discussed in Section 4.3.4, there are fourteen different cover types within 1,000 ft of the Project boundary. The land-use is dominated by open water (19.4%) (i.e., the Project impoundment), and various forest classifications (i.e., mixed (16.4%), evergreen (10%), or deciduous (10%)), barren land composed of rock, sand, or clay (11%), and land with various degrees of development (13%). Table 4.3.4-2 provides a breakdown of the land-use classifications found within 1,000 ft of the Project boundary, and Figure 4.3.4-2 shows the location of the various land-use classifications in this same area.

Upland habitats adjacent to the Project impoundment were determined based on the Conservancy Gateway/The Nature Conservancy NatureServe Terrestrial Northeast Habitat Map (CG/TNC, 2026), which is a continuous GIS coverage that maps terrestrial habitats/ecological systems for the Northeast. The ecological systems represented in this data coverage are mosaics of plant community types that tend to co-occur within landscapes with similar ecological processes, substrates, and/or environmental gradients.

The dominant terrestrial habitat adjacent to the Project impoundment is the Laurentian-Acadian Pine-Hemlock-Hardwood Forest. This habitat is described as a coniferous or mixed forest widespread in the glaciated northeast. White pine (*Pinus strobus*), hemlock (*Tsuga canadensis*), and red oak (*Quercus rubra*) are typical canopy dominants. Red maple (*Acer rubrum*) is common, and other hardwoods like sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), and birch (*Betula spp.*) also occur. In Maine, the natural community is referred to as a Hemlock Forest. Associated plant species include barren strawberry (*Geum fragarioides*), mountain laurel (*Kalmia latifolia*), giant pinedrops (*Pterospora andromedea*), green adder's-mouth (*Malaxis unifolia*), loesel's twayblade (*Liparis loeselii*), sand violet (*Viola adunca*), scarlet oak (*Quercus coccinea*), slender mountain-ricegrass (*Piptatheropsis pungens*), spotted wintergreen (*Chimaphila maculata*), and spreading-pod rockcress (*Boechera grahamii*) (TNC, 2026).

Other habitat types found in the vicinity of the Project include Developed; Shrubland/Grassland mostly regenerating clearcuts, Agriculture; Laurentian-Acadian Large River Floodplain; and Laurentian-Acadian Alkaline Conifer-Hardwood Swamp. Habitat and vegetation associated with wetlands are discussed in Section 4.7.1.4

4.7.1.2.1 Invasive Plant Species and Noxious Weeds

In July 2025, BWPH conducted an invasive plant study to document the presence and distribution of invasive terrestrial plant species within a 363-acre study area encompassing the Project boundary and adjacent shoreline (BWPH 2026). The target invasive plant species for this survey included the species on Maine Department of Agricultural, Conservation and Forestry's (MDACF) 2019 Maine Natural Areas Program list. Fifteen terrestrial invasive species from the MDACF invasive list were observed within the study area (Table 4.7.2.1-1). No aquatic invasive species were found within the study area. The most frequently occurring invasive species were oriental bittersweet (*Celastrus orbiculatus*), Morrow's honeysuckle (*Lonicera morrowii*), and purple loosestrife (*Lythrum salicaria*). Overall, the density of invasive plants observed in the study area was low (1% - 33% cover). Invasive plant species were more commonly found on the north side of the river (river left), while native aquatic weed beds were more abundant on the south side (river right). All the invasive plant species identified within the study area are known to be widespread throughout the state of Maine.

Table 4.7.2.1-1. Observed Target Invasive Plant Species from 2025 Survey

Common Name	Scientific Name	Invasive Ranking	Status in Maine
Autumn olive	*Elaeagnus umbellata*	Very invasive	Widespread
Bittersweet nightshade	*Solanum dulcamara*	Potential invasive	Widespread
Black locust	*Robinia pseudoacacia*	Severely invasive	Widespread
Common barberry	*Berberis vulgaris*	Very invasive	Widespread
Common buckthorn	*Rhamnus sp.*	Severely invasive	Widespread
Garlic mustard	*Alliaria petiolata*	Severely invasive	Widespread
Japanese barberry	*Berberis thunbergii*	Severely invasive	Widespread
Japanese knotweed	*Reynoutria japonica*	Severely invasive	Widespread
Morrow's honeysuckle	*Lonicera morrowii*	Severely invasive	Widespread
Multiflora rose	*Rosa multiflora*	Very invasive	Widespread
Norway maple	*Acer platanoides*	Very invasive	Widespread
Oriental bittersweet	*Celastrus orbiculatus*	Severely invasive	Widespread
Purple loosestrife	*Lythrum salicaria*	Very invasive	Widespread
Tartarian honeysuckle	*Lonicera tatarica*	Severely invasive	Widespread
Yellow iris	*Iris pseudacorus*	Severely invasive	Widespread

Source: Brookfield, 2026

4.7.1.3 Terrestrial Wildlife Resources

The Project boundary essentially follows the impoundment shoreline and therefore encompasses limited terrestrial habitat. Along the Brunswick impoundment, the habitat is mostly forested with a mix of conifer and hardwood species. Because of the limited habitat, animals are likely transient individuals that may derive from resident populations in lands surrounding the Project.

Mammals that may utilize forested habitat include Short-tailed Shrew (*Blarina brevicauda*), Star-nosed Mole (*Condylura cristata*), New England Cottontail (*Sylvilagus transitionalis*), Snowshoe Hare (*Lepus americanus*), Southern Flying Squirrel (*Glaucomys volans*), Woodland Vole (*Microtus pinetorum*), Striped Skunk (*Mephitis mephitis*), Northern Raccoon (*Procyon lotor*), North American Porcupine (*Erethizon dorsatum*), Coyote (*Canis latrans*), Red Squirrel (*Tamiasciurus hudsonicus*), and Gray Squirrel (*Sciurus carolinensis*).

Habitats bordering or close to the Project boundary include developed or agricultural areas. Many mammals that utilize forested habitats may also utilize these developed or agricultural spaces. Some examples of mammals that may utilize the developed or agricultural areas include Gray Fox (*Urocyon cinereoargenteus*), Red Fox (*Vulpes vulpes*), Virginia Opossum (*Didelphis virginiana*), Eastern Cottontail (*Sylvilagus floridanus*), Meadow Vole (*Microtus pennsylvanicus*),

Woodchuck (*Marmota monax*), and White-footed Deermouse (*Peromyscus leucopus*). (MDIFW, 2026b).

There are several bat species that may utilize lands around the Project area, including Big Brown Bat (*Eptesicus fuscus*), Little Brown Bat (*Myotis lucifugus*), Northern Long-eared Bat (*Myotis septentrionalis*), and Silver-haired Bat (*Lasionycteris noctivagans*) (MDIFW, 2026b). Furbearers that may utilize the Brunswick impoundment and the various terrestrial habitats include American Mink (*Neogale vison*), American Marten (*Martes americana*), Fisher (*Pekania pennanti*), North American Beaver (*Castor canadensis*), Common Muskrat (*Ondatra zibethicus*), and Northern River Otter (*Lontra canadensis*). Larger mammals may also utilize the Project area, including White-tailed Deer (*Odocoileus virginianus*), Moose (*Alces alces*), and American Black Bear (*Ursus americanus*). Due to varying forms of development present in this area, as well as other habitat considerations, large mammals such as Moose and Black Bear may occur within the Project area, but it is unlikely that they would be permanent residents and are likely instead limited to transient individuals (MDIFW, 2026b). However, it is likely that White-tailed Deer have established permanent populations in or around the Project area. MDIFW has identified deer wintering areas within two miles of the Project location (MDIFW, 2026b).

Multiple avian species may utilize the Project area seasonally or year-round. Associated bird species common to the Laurentian-Acadian Pine-Hemlock-Hardwood Forest include Black-and-white Warbler (*Mniotilta varia*), Blackburnian Warbler (*Setophaga fusca*), Black-throated Blue Warbler (*Setophaga caerulescens*), Eastern Wood-Pewee (*Contopus virens*), Hermit Thrush (*Catharus guttatus*), Northern Saw-whet Owl (Aegolius acadicus), Northern Waterthrush (*Parkesia noveboracensis*), Ovenbird (*Seiurus aurocapilla*), Pine Warbler (*Setophaga pinus*), Ruffed Grouse (*Bonasa umbellus*), Scarlet Tanager (*Piranga olivacea*), Veery (*Catharus fuscescens*), Wood Thrush (*Hylocichla mustelina*), and Yellow-bellied Sapsucker (*Sphyrapicus varius*) (CG/TNC, 2026). In addition, the Project impoundment and surrounding areas provide habitat for migrating bird species (USFWS, 2026). A list of bird species which may occur in the Project area is provided in Table 4.7.1.3-1.

4.7.1.3.1 Invasive Wildlife Species

Several non-native wildlife species are known to occur in Maine. These include bird species such as Rock Pigeon (*Columba livia*), European Starling (*Sturnus vulgaris*), and House Sparrow (Passer domesticus), as well as mammal species such as House Mouse (*Mus musculus*) and Norway Rat (*Rattus norvegicus*) (Maine Legislature, 2026; DACF, 2021a, 2021b, 2021c). According to the University of Georgia's Early Detection and Distribution Mapping System, the following invasive insect species have been reported in both Cumberland and Sagadahoc counties in the vicinity of the Androscoggin River; Bark beetle; Browntail moth; Elongate hemlock scale; European pine shoot moth; Hemlock woolly adelgid; Large aspen tortrix; Spongy moth (formerly gypsy moth); Spotted-wing drosophila; Spruce beetle; Spruce budworm; Winter moth (UGCIS&H, 2026).

Table 4.7.1.3-1. Representative Birds in the Project Area

Common Name	Scientific Name
Alder Flycatcher	*Empidonax alnorum*
American Bittern	*Botaurus lentiginosus*
American Black Duck	*Anas rubripes*
American Crow	*Corvus brachyrhynchos*
American Goldfinch	*Spinus tristis*
American Oystercatcher	*Haematopus palliatus*
American Redstart	*Setophaga ruticilla*
American Robin	*Turdus migratorius*
American Three-toed Woodpecker	*Picoides dorsalis*
American Woodcock	*Scolopax minor*
Bald Eagle	*Haliaeetus leucocephalus*
Baltimore Oriole	*Icterus galbula*
Barn Swallow	*Hirundo rustica*
Barred Owl	*Strix varia*
Bay-breasted Warbler	*Setophaga castanea*
Belted Kingfisher	*Megaceryle alcyon*
Black Capped Chickadee	*Poecile atricapillus*
Black throated blue Warbler	*Setophaga caerulescens*
Black-and-white Warbler	*Mniotilta varia*
Black-backed Woodpecker	*Picoides arcticus*
Black-billed Cuckoo	*Coccyzus erythropthalmus*
Blackburnian Warbler	*Setophaga fusca*
Black-capped Chickadee	*Poecile atricapillus*
Black-throated Green Warbler	*Setophaga virens*
Blue jay	*Cyanocitta cristata*
Blue-headed Vireo	*Vireo solitarius*
Blue-winged Teal	*Spatula discors*
Bobolink	*Dolichonyx oryzivorus*
Broad-winged Hawk	*Buteo platypterus*
Brown Creeper	*Certhia americana*
Brown Thrasher	*Toxostoma rufum*

Common Name	Scientific Name
Brown-headed Cowbird	*Molothrus ater*
Canada Goose	*Branta canadensis*
Canada Warbler	*Cardellina canadensis*
Cape May Warbler	*Setophaga tigrina*
Carolina Wren	*Thryothorus ludovicianus*
Catharus sp.	*Catharus sp.*
Cedar Waxwing	*Bombycilla cedrorum*
Chestnut-sided Warbler	*Setophaga pensylvanica*
Chimney Swift	*Chaetura pelagica*
Chipping Sparrow	*Spizella passerina*
Common Goldeneye	*Bucephala*
Common Grackle	*Quiscalus quiscula*
Common Merganser	*Mergus merganser*
Common Nighthawk	*Chordeiles minor*
Common Raven	*Corvus corax*
Common Yellowthroat	*Geothlypis trichas*
Cooper's Hawk	*Accipiter cooperii*
Dark-eyed Junco	*Junco hyemalis*
Double-crested Cormorant	*Phalacrocorax auritus*
Downy Woodpecker	*Picoides pubescens*
Eastern Bluebird	*Sialia sialis*
Eastern Kingbird	*Tyrannus tyrannus*
Eastern Phoebe	*Sayornis phoebe*
Eastern Towhee	*Pipilo erythrophthalmus*
Eastern Whip-poor-will	*Antrostomus vociferus*
Eastern Wood-Pewee	*Contopus virens*
European Starling	*Sturnus vulgaris*
Evening Grosbeak	*Coccothraustes vespertinus*
Field Sparrow	*Spizella pusilla*
Fish Crow	*Corvus ossifragus*
Fox Sparrow	*Passerella iliaca*
Golden-crowned kinglet	*Regulus satrapa*

Common Name	Scientific Name
Gray Catbird	*Dumetella carolinensis*
Gray Jay	*Perisoreus canadensis*
Gray-cheeked/Bicknell's Thrush	*Catharus minimus*
Great Black-backed Gull	*Larus marinus*
Great Blue Heron	*Ardea herodias*
Great Cormorant	*Phalacrocorax carbo*
Great Crested Flycatcher	*Myiarchus crinitus*
Great Horned Owl	*Bubo virginianus*
Green Heron	*Butorides virescens*
Green-winged Teal	*Anas carolinensis*
gull sp.	*Larinae sp*
Hairy Woodpecker	*Leuconotopicus villosus*
Hermit Thrush	*Catharus guttatus*
Herring Gull	*Larus argentatus*
Hooded Merganser	*Lophodytes cucullatus*
House Finch	*Haemorhous mexicanus*
House Sparrow	*Passer domesticus*
House Wren	*Troglodytes aedon*
Hudsonian Godwit	*Limosa haemastica*
Indigo Bunting	*Passerina cyanea*
Least Bittern	*Ixobrychus exilis*
Least Flycatcher	*Empidonax minimus*
Least Sandpiper	*Calidris minutilla*
Least Tern	*Sternula antillarum*
Lesser Yellowlegs	*Tringa flavipes*
Long-eared Owl	*Asio otus*
Louisiana Waterthrush	*Parkesia motacilla*
Magnolia Warbler	*Setophaga magnolia*
Mallard	*Anas platyrhynchos*
Merlin	*Falco columbarius*
Mourning Dove	*Zenaida macroura*
Nashville Warbler	*Leiothlypis ruficapilla*

Common Name	Scientific Name
Northern Cardinal	*Cardinalis cardinalis*
Northern Flicker	*Colaptes auratus*
Northern Harrier	*Circus cyaneus*
Northern Mockingbird	*Mimus polyglottos*
Northern Parula	*Setophaga americana*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Northern Saw-Whet Owl	*Aegolius acadicus*
Northern Waterthrush	*Parkesia noveboracensis*
Olive-sided Flycatcher	*Contopus cooperi*
Orchard Oriole	*Icterus spurius*
Osprey	*Pandion sp.*
Ovenbird	*Seiurus aurocapilla*
Palm Warbler	*Setophaga palmarum*
Passerine sp.	*Passeriformes sp.*
Peregrine Falcon	*Falco peregrinus*
Pied-billed Grebe	*Podilymbus podiceps*
Pileated Woodpecker	*Dryocopus pileatus*
Pine Grosbeak	*Pinicola enucleator*
Pine Warbler	*Setophaga pinus*
Prairie Warbler	*Setophaga discolor*
Purple Finch	*Haemorhous purpureus*
Purple Sandpiper	*Calidris maritima*
Red-bellied Woodpecker	*Melanerpes carolinus*
Red-breasted Nuthatch	*Sitta canadensis*
Red-eyed Vireo	*Vireo olivaceus*
Red-shoulder Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Red-winged Blackbird	*Agelaius phoeniceus*
Ring-billed Gull	*Larus delawarensis*
Ring-necked Duck	*Aythya collaris*
Rock Pigeon	*Columba livia*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*

Common Name	Scientific Name
Ruby-crowned Kinglet	*Regulus calendula*
Ruby-throated Hummingbird	*Archilochus colubris*
Ruffed Grouse	*Bonasa umbellus*
Saltmarsh Sparrow	*Ammodramus caudacutus*
Scarlet Tanager	*Piranga olivacea*
Sharp-shinned Hawk	*Accipiter striatus*
Short-eared Owl	*Asio flammeus*
Snowy Egret	*Egretta thula*
Song Sparrow	*Melospiza melodia*
Spotted Sandpiper	*Actitis macularius*
Swainson's Thrush	*Catharus ustulatus*
Swamp Sparrow	*Melospiza georgiana*
Tennessee Warbler	*Leiothlypis peregrina*
Tree Swallow	*Tachycineta bicolor*
Tufted Titmouse	*Baeolophus bicolor*
Turkey Vulture	*Cathartes aura*
Upland Sandpiper	*Bartramia longicauda*
Veery	*Catharus fuscescens*
Warbling Vireo	*Vireo gilvus*
White-breasted Nuthatch	*Sitta carolinensis*
White-crowned Sparrow	*Zonotrichia leucophrys*
White-throated Sparow	*Zonotrichia albicollis*
Wild Turkey	*Meleagris gallopavo*
Willet	*Tringa semipalmata*
Willow Flycatcher	*Empidonax traillii*
Wilson's Warbler	*Cardellina pusilla*
Winter Wren	*Troglodytes hiemalis*
Wood Duck	*Aix sponsa*
Wood Thrush	*Hylocichla mustelina*
Yellow Warbler	*Setophaga petechia*
Yellow-bellied Flycatcher	*Empidonax flaviventris*
Yellow-bellied sapsucker	*Sphyrapicus varius*

Common Name	Scientific Name
Yellow-rumped Warbler	*Setophaga coronata*
Yellow-throated Warbler	*Setophaga dominica*

Sources: CG/TNC, 2026, IPaC 2023, Maine BBA 2018-2022, MDIFW, 2026a

4.7.1.4 Wetlands, Riparian, and Littoral Habitat

4.7.1.4.1 Wetland Habitat and Vegetation

Wetlands are defined by the USFWS as "lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water." For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of the year" (USFWS, 2016).

Review of the USFWS National Wetland Inventory (NWI) coverage found that, within 1,000 ft of the Project boundary, there are approximately 451 acres categorized as wetlands (Figure 4.7.1.4.1-1). Of these, 399 acres are considered open water and are split between riverine, lake, and freshwater pond. The remaining 52 acres are considered either freshwater emergent (2 acres) or freshwater forested/shrub wetlands (50 acres), which are further defined below.

Freshwater emergent wetlands are herbaceous marsh, fen, swale, and wet meadows, and in Maine, may be characterized by tussock sedge, other sedges, bluejoint, reed canary grass, soft rush, green bulrush, wool grass, and various flowering herbs (MDEP, 2019).

Freshwater forested/shrub wetlands are forested swamp, or wetland, shrub, or bog. In Maine, they may be characterized as deciduous or evergreen, and include red maple, larch, black ash, yellow birch, gray birch, green ash, American elm, white pine, black willow, northern white cedar, hemlock, balsam fir, and black spruce. Associated shrubs include highbush blueberry, sheep laurel, maleberry, black chokeberry, mountain holly, common elderberry, common winterberry, and silky dogwood. Herbs include skunk cabbage, Jack-in-the-pulpit, Canada mayflower, royal fern, cinnamon fern, sensitive fern, and marsh fern (MDEP, 2019).

4.7.1.4.2 Riparian Habitat and Vegetation

Riparian habitat is the specialized zone of vegetation that serves as the interface between the upland vegetation community and the riverine environment. This zone provides numerous valuable functions such as maintaining streambank stability, sediment filtration, and floodplain processes. At the Project dam, there is little to no riparian zone. This area borders the Towns of Brunswick and Topsham and is highly developed lands with residential, commercial, and industrial uses. Starting near I-295 and northward, the riparian zone habitat and vegetation

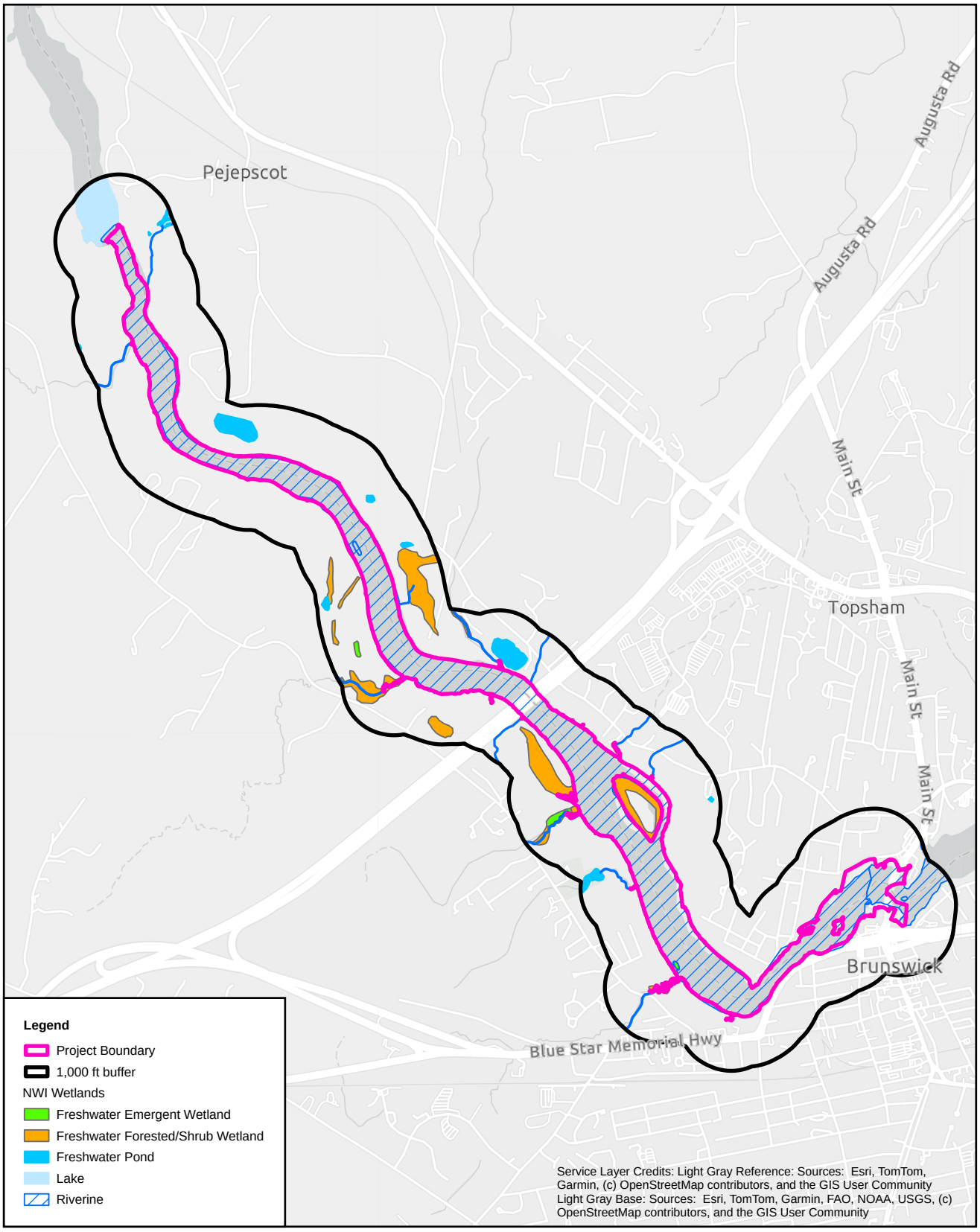
adjacent to the Project impoundment is, in general, comprised of forested areas of varying width. In some developed locations, the riparian zone is limited by the presence of roads, railroads, barren areas, and/or industrial and residential areas. In addition, there are relatively small, localized wetlands scattered throughout the Project area. Habitat and vegetation found in the forested or wetland riparian areas are consistent with those discussed in the previous sections.

4.7.1.4.3 Littoral Habitat and Vegetation

The littoral zone is the transitional area between deepwater, aquatic habitat and the terrestrial wetlands or uplands. It is often comprised of permanently flooded wetlands such as marshes and other shallow water areas that are permanently water covered. The Project impoundment upstream of the Brunswick Dam includes approximately 4.5 miles of the Androscoggin River. The impoundment has a surface area of 175 acres, and gross storage of 125 acre-ft at a pond elevation of 39.4 ft. Google images taken over time did not provide visual information of grass beds or other littoral zone habitat elements. The NWI indicates freshwater emergent and freshwater woody wetlands that may make up littoral habitat in small areas of the Project, but little information is present on the specific littoral zone habitat. BWPH's run of river operations at the Project protect littoral and shoreline habitat in the impoundment by maintaining stable head pond elevations that keep aquatic habitats wetted.

4.7.1.4.4 Wetland, Littoral, and Riparian Wildlife

Wetland and riparian areas serve as transition zones between aquatic and terrestrial systems, and, as such, support many mammal, bird, reptile, and amphibious species that depend on both habitat types to survive. Sections 4.7.1.3 provides additional information on wildlife that may exist in the Project area.



BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Brookfield

N

0 0.25 0.5 1 Miles

Figure 4.7.1.4.1-1:
Wetlands within 1,000 feet
of the Project boundary

Path: D:\Brookfield\02456\GIS\Maps\DLA\DLA.aprx

4.7.2 Environmental Analysis

FERC's SD2 identified two potential resource issues relating to wildlife and botanical resources, which is discussed in greater detail below.

Effects of Project maintenance (e.g., vegetation management) on special status species including bats and migratory birds.

Most of the upland area within the Project boundary is located around the Project dam, forebay, access road and powerhouse areas, as the Project boundary follows the shoreline elevation for most of the impoundment. These upland areas are predominantly developed/industrial land use.

Northern long-eared and tricolored bats may occur within the Project area foraging in forested habitats adjacent to Project waters, roosting in upland areas (e.g., live or snag trees, caves, etc.), and spending winter months in hibernacula; however, the continued operation of the Project is not expected to adversely affect any bats present in the Project area.

Project operation and maintenance is not proposed to involve tree-cutting. Additionally, over the terms of the new license BWPH has proposed to avoid tree clearing (i.e., removal of all trees greater than three inches in diameter at breast height) on Project lands from April 15 through October 31, unless a tree poses an immediate threat to human life or property, to minimize potential impacts to northern long-eared and tricolored bats. Therefore, continued Project operation and maintenance is not expected to result in impacts on special status species including bats and migratory birds.

Effects of the Project on the spread and control of invasive species.

Invasive plant introduction and establishment are generally more likely in areas with frequent or intermittent vegetation or soil disturbance, as well as in areas near existing invasive plant populations. Because the Project area has a long history of human disturbance and developed land uses, invasive plant species are already present. However, continued Project operation does not include additional land disturbance, and Project operations appear to have limited influence on the introduction or persistence of invasive plant species within the Project boundary.

Changes in invasive species presence are likely driven by factors unrelated to Project operation. Other vectors may spread invasive plants, including aquatic recreation (e.g., fishing and boating), land clearing or planting, agricultural activities, wildlife movement, and upstream flows that can transport invasive species into the Project area. BWPH has limited ability to control these vectors, and they are not related to Project operations or maintenance.

4.7.3 Proposed Environmental Measures

BWPH is proposing to avoid tree clearing (i.e., removal of all trees greater than three inches in diameter at breast height) on Project lands from April 15 through October 31, unless a tree poses

an immediate threat to human life or property, to minimize potential impacts to northern long-eared bat and tricolored bat.

4.7.4 Unavoidable Adverse Effects

No unavoidable adverse impacts are expected to wildlife and botanical resources.

4.7.5 References

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4.8 Threatened and Endangered Species

4.8.1 Affected Environment

State and federally listed threatened and endangered (TE) species have the potential to occur within aquatic and terrestrial habitats in and around the Project area. The State of Maine also identifies Species of Special Concern, which are species that do not meet the criteria for state or federal listing but are considered vulnerable and may warrant conservation attention.

Several information sources were reviewed to identify TE species and sensitive habitats that may occur within the Project area, including the USFWS Information for Planning and Consultation (IPaC) system, MDIFW Essential Habitat and Significant Wildlife Habitat datasets, Maine Natural Areas Program resources, and NMFS information for federally listed diadromous fish species. In addition, a preliminary Environmental Review request was also submitted to MDIFW to identify important fisheries, wildlife, and critical habitat resources at the Project. On December 12, 2023, MDIFW issued their response to the review request with information on known locations of TE and special concern species, designated Essential and Significant Wildlife Habitats; and inland fisheries habitats within the vicinity of the Project (MDIFW, 2023a). The species and habitats discussed below were identified based on database reviews, agency correspondence, known species distributions, and the potential for occurrence within the Project area.

4.8.1.1 Critical and Special Status Habitats

Review of the USFWS IPaC database indicates that the Project area overlaps designated critical habitat for the federally endangered GOM DPS for Atlantic salmon (USFWS, 2026). The Atlantic salmon critical habitat designation was finalized in June 2009 and includes riverine, estuarine, and lake habitats throughout the species' occupied range in Maine (NMFS, 2009).

The Recovery Plan for the GOM DPS of Atlantic Salmon, finalized jointly by USFWS and NMFS in 2018, identifies the Androscoggin River as part of the Merrymeeting Bay SHRU. The recovery plan emphasizes the importance of habitat connectivity and access to spawning, rearing, and migratory habitat and identifies dams and other impediments to fish passage as significant factors affecting Atlantic salmon recovery (USFWS and NMFS 2018).

In addition to Atlantic salmon, NMFS information indicates that the Project tailwater area occurs within the known range of the federally endangered Shortnose Sturgeon and overlaps designated critical habitat for the GOM DPS of Atlantic sturgeon . Shortnose Sturgeon were originally listed as endangered in 1967 and remain listed as endangered under the Endangered Species Act; however, critical habitat has not been designated for the species. Atlantic sturgeon were listed by NMFS in 2012, with the GOM DPS classified as threatened (NMFS, 2012). In 2017, NMFS designated critical habitat for the GOM DPS of Atlantic sturgeon (NMFS, 2017). Review of the NMFS Atlantic Sturgeon Critical Habitat GIS dataset indicates that the upstream

extent of designated critical habitat extends into the downstream portion of the Project boundary, resulting in approximately 0.1 mile of overlap (NMFS, 2022).

Atlantic and Shortnose Sturgeon habitat use, and critical habitat are discussed further in Section 4.6.1.2.1.

MDIFW has not identified any state-designated Essential Habitat within the Project area (MDIFW, 2023a & MDIFW n.d.). Under Maine's Endangered Species Act, Essential Habitat consists of areas currently or historically providing physical or biological features necessary for the conservation of state-listed threatened or endangered species and that may require special management considerations. Currently, Essential Habitat designations in Maine are limited primarily to nesting and breeding habitats for piping plover (*Charadrius melodus*), least tern (*Sternula antillarum*), and roseate tern (*Sterna dougallii*) (MDIFW, n.d)

Tidal Waterfowl and Wading Bird Habitat, a Significant Wildlife Habitat designation under Maine's Natural Resources Protection Act, occurs downstream of the Project. These habitats provide important breeding, feeding, migration, staging, and wintering habitat for a variety of waterfowl and wading bird species (MDIFW, n.d)

4.8.1.2 Threatened and Endangered Fish and Freshwater Aquatic Species

Atlantic salmon and Shortnose Sturgeon are federally endangered, and Atlantic sturgeon is federally threatened. Atlantic Salmon would typically be found migrating through the Project area, primarily when pre-spawn adults pass upstream in the spring through the fall, when post-spawn kelts pass downstream in the late fall or early spring, and when juveniles (smolts) pass downstream through the area in the spring.

Available data suggests that Atlantic Sturgeon spawning may occur in the Androscoggin River near RM 4.8. However, additional evidence, such as capture of a spawning female, sturgeon eggs or larvae, have not yet been recovered in the Androscoggin River (Wippelhauser et al. 2017). The Androscoggin River mainstem from the Project dam downstream to where the mainstem river discharges into Merrymeeting Bay has been designated as critical habitat for the GOM DPS of Atlantic Sturgeon (NMFS 2017).

Shortnose Sturgeon spawning occurs from late April through early June (MDMR and MDIFW 2017) and has been documented in the 1-km reach downstream of the Project dam and outside of the Project boundary (Squiers et al. 1982). Historically, it is thought that Shortnose Sturgeon likely swam as far upstream as they could to spawn, with the extent dependent on the characteristics of the river system. This would allow downstream drift of larvae to occur wholly within freshwater, as larvae and smaller juveniles cannot tolerate high salinities (NMFS 2010). Critical habitat has not been designated for Shortnose Sturgeon.

In their environmental review request response, MDIFW stated that the Tidewater Mucket, a state-threatened species of freshwater mussel, has been documented downstream of the Project. Limited surveys have been conducted upstream of the Project, and the species was not detected.

MDIFW determined that this species may potentially be present upstream of the Project, including within the impoundment (MDIFW, 2023a). Mussel surveys conducted by BWPH in 2025 did not find this species present in the impoundment (see Section 4.6.1.4)

Additionally, based on location, habitats present, and life history requirements, MDIFW determined that the state-endangered Blanding's Turtle, state-threatened Spotted Turtle, and species of special concern Wood Turtle may be resident or transient in the Project area (MDIFW, 2023a).

Table 4.5.1.2.4-3 provides additional information pertaining to the odonate species of special concern, while Table 4.8.1.2-1 provides a summary of the non-odonate fish and freshwater aquatic species of special concern that may be present in the Project area. Information on these species can be found in Sections 4.5.1.2.4, 4.5.1.2.5 and 4.6.1.6.

Table 4.8.1.2-1. TE and Special Concern Fish and Aquatic Species that May Occur Near the Project

Common Name	Scientific Name	Status
Atlantic Salmon	*Salmo salar*	Federally Endangered
Shortnose Sturgeon	*Acipenser brevirostrum*	Federally Endangered
Atlantic Sturgeon	*Acipenser oxyrinchus oxyrinchus*	Federally Threatened
Blanding's Turtle	*Emydoidea blandingii*	State Endangered
Spotted Turtle	*Clemmys guttata*	State Threatened
Wood Turtle	*Glyptemys insculpta*	State Special Concern
Tidewater Mucket	*Leptodea ochracea*	State Threatened

4.8.1.3 Threatened and Endangered Wildlife Species

Several terrestrial wildlife species identified by USFWS and MDIFW as threatened, endangered, or Species of Special Concern have the potential to occur within the Project area. The USFWS IPaC review identified the federally endangered northern long-eared bat (*Myotis septentrionalis*), the proposed endangered tricolored bat (*Perimyotis subflavus*), and the proposed threatened monarch butterfly (*Danaus plexippus*) as species that may occur within the Project area (USFWS, 2026). In addition, MDIFW identified several mammal, bird, reptile, and insect species designated as threatened, endangered, or Species of Special Concern that may utilize habitats in the vicinity of the Project.

MDIFW identified nine mammal species with state threatened, endangered, or Special Concern status (Table 4.8.1.3-1). Most are bat species, including the big brown bat, little brown bat, northern long-eared bat, and silver-haired bat. Bat populations in Maine have experienced declines associated with White-nose Syndrome, a fungal disease affecting hibernating bats. The big brown bat, little brown bat, and northern long-eared bat hibernate within Maine, whereas the silver-haired bat typically migrates to warmer regions during winter months (MDIFW, 2017). Forested and riparian habitats within and adjacent to the Project area may provide seasonal habitat for these species.

MDIFW also identified 32 bird species with state threatened, endangered, or Special Concern status that may occur within the vicinity of the Project (Table 4.8.1.3-2). In addition, the USFWS IPaC review identified 18 migratory bird species designated as Birds of Conservation Concern (BCC), consisting of 12 BCC Rangewide species and six BCC species designated within applicable Bird Conservation Regions. Several of these species are also designated as state-listed species or Species of Special Concern by MDIFW. The IPaC review further identified the bald eagle (*Haliaeetus leucocephalus*), which is protected under the Bald and Golden Eagle Protection Act (USFWS, 2026).

Wildlife species identified by USFWS and MDIFW include both resident species that may be present year-round and migratory species that occur seasonally. Habitats present within and adjacent to the Project area include forested habitats, riparian corridors, wetlands, and developed areas that may be utilized by these species.

Table 4.8.1.3-1. Mammals Identified as State TE or Special Concern that May Occur Near the Project

Common Name	Scientific Name	State Status
Big Brown Bat	*Eptesicus fuscus*	Special Concern
Eastern Red Bat	*Lasiurus borealis*	Special Concern
Eastern Small-Footed Bat	*Myotis leibii*	Threatened
Hoary Bat	*Lasiurus cinereus*	Special Concern
Little Brown Bat	*Myotis lucifugus*	Endangered
Northern Long-Eared Myotis	*Myotis septentrionalis*	Endangered (Federally Endangered)
Silver-Haired Bat	*Lasionycteris noctivagans*	Special Concern
Tri-Colored Bat	*Perimyotis subflavus*	Endangered

Source: MDIFW,2023a; MDIFW, 2023b

Table 4.8.1.3-2. Birds Identified as State TE or Special Concern that May Occur Near the Project

Common Name	Scientific Name	Special Concern
American Coot (breeding population only)	*Fulica americana*	Special Concern
American Kestrel	*Falco sparverius*	Special Concern
American Oystercatcher	*Haematopus palliates*	Special Concern
American Pipit (breeding population only)	*Anthus rubescens*	Endangered
American Three-toed Woodpecker	*Picoides dorsalis*	Special Concern
Arctic Tern	*Sterna paradisaea*	Threatened
Atlantic Puffin	*Fratercula arctica*	Threatened
Bank Swallow	*Riparia riparia*	Special Concern
Barn Swallow	*Hirundo rustica*	Special Concern
Barrow's Goldeneye	*Bucephala islandica*	Threatened
Bay-breasted Warbler	*Setophaga castanea*	Special Concern
Bicknell's Thrush	*Catharus bicknelli*	Threatened
Black-Crowned Night-Heron	*Nycticorax nycticorax*	Endangered
Blackpoll Warbler	*Setophaga striata*	Endangered
Black Tern	*Chlidonias niger*	Endangered

Common Name	Scientific Name	Special Concern
Bobolink	*Dolichonyx oryzivorus*	Threatened
Bonaparte's Gull	*Chroicocephalus philadelphia*	Special Concern
Brown Thrasher	*Toxostoma rufum*	Special Concern
Canada Warbler	*Cardellina canadensis*	Special Concern
Cape May Warbler	*Setophaga tigrina*	Special Concern
Chimney Swift	*Chaetura pelagica*	Special Concern
Cliff Swallow	*Petrochelidon pyrrhonota*	Endangered
Common Gallinule	*Gallinula galeata*	Threatened
Common Murre	*Uria aalge*	Special Concern
Common Nighthawk	*Chordeiles minor*	Special Concern
Eastern Kingbird	*Tyrannus tyrannus*	Special Concern
Eastern Meadowlark	*Sturnella magna*	Threatened
Eastern Towhee	*Pipilo erythrophthalmus*	Special Concern
Eastern Whip-poor-will	*Antrostomus vociferus*	Special Concern
Eastern Wood-Pewee	*Contopus virens*	Special Concern
Evening Grosbeak (breeding population only)	*Coccothraustes vespertinus*	Special Concern
Field Sparrow	*Spizella pusilla*	Special Concern
Fox Sparrow (breeding population only)	*Passerella iliaca*	Special Concern
Grasshopper Sparrow	*Ammodramus savannarum*	Endangered
Great Blue Heron	*Ardea herodias*	Special Concern
Great Cormorant (breeding population only)	*Phalacrocorax carbo*	Threatened
Greater Scaup	*Aythya marila*	Special Concern
Harlequin Duck	*Histrionicus histrionicus*	Threatened
Horned Lark (breeding population only)	*Eremophila alpestris*	Special Concern
Laughing Gull	*Larus atricilla*	Special Concern
Leach's Storm-petrel	*Hydrobates leucorhoa*	Special Concern
Least Bittern	*Ixobrychus exilis*	Endangered
Lesser Yellowlegs	*Tringa flavipes*	Special Concern
Loggerhead Shrike	*Lanius ludovicianus*	Special Concern
Nelson's Sparrow	*Ammospiza nelsoni*	Special Concern

Common Name	Scientific Name	Special Concern
Northern Harrier	*Circus cyaneus*	Special Concern
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Special Concern
Olive-sided Flycatcher	*Contopus cooperi*	Special Concern
Peregrine Falcon (breeding population only)	*Falco peregrinus*	Endangered
Piping plover	*Charadrius melodus*	Endangered (Federally Endangered)
Purple Martin	*Progne subis*	Special Concern
Purple Sandpiper	*Calidris maritima*	Special Concern
Razorbill	*Alca torda*	Threatened
Rufa Red Knot	*Calidris canutus rufa*	Special Concern
Red-necked Phalarope	*Phalaropus lobatus*	Special Concern
Rusty Blackbird	*Euphagus carolinus*	Special Concern
Saltmarsh Sparrow	*Ammospiza caudacuta*	Endangered
Sedge Wren	*Cistothorus platensis*	Endangered
Semipalmated Sandpiper	*Calidris pusilla*	Special Concern
Short-eared Owl (breeding population only)	*Asio flammeus*	Threatened
Tennessee Warbler	*Leiothlypis peregrina*	Special Concern
Tree Swallow	*Tachycineta bicolor*	Special Concern
Upland Sandpiper	*Bartramia longicauda*	Threatened
Vesper Sparrow	*Pooecetes gramineus*	Special Concern
Whimbrel	*Numenius phaeopus*	Special Concern

Source: MDIFW, 2023b & MDIFW, 2024

4.8.1.4 Threatened and Endangered Botanical Resources

The Maine Natural Areas Program provides county level TE or species of special concern information for Botanical Resources and Habitats. Table 4.8.1.4-1 provides the county level botanical resources that may be in the Project area.

Table 4.8.1.4-1. Botanical Resources Identified as TE or Special Concern Potentially Occurring in the Project Area

Common Name	Species Name	State Status	County
Broad Beech Fern	*Phegopteris hexagonoptera*	Special Concern	Cumberland
Comb-leaved Mermaid-weed	*Proserpinaca pectinata*	Endangered	Cumberland
Dry Land Sedge	*Carex siccata*	Special Concern	Cumberland
Eaton's Burr-marigold	*Bidens eatonii*	Special Concern	Sagadahoc
Estuary Bur-marigold	*Bidens hyperborea*	Special Concern	Sagadahoc
Hollow Joe-pye Weed	*Eutrochium fistulosum*	Special Concern	Cumberland
Mountain-laurel	*Kalmia latifolia*	Special Concern	Cumberland/Sagadahoc
Narrow-leaf Arrowhead	*Sagittaria filiformis*	Special Concern	Cumberland
Parker's Pipewort	*Eriocaulon parkeri*	Special Concern	Sagadahoc
Showy Lady's-slipper	*Cypripedium reginae*	Special Concern	Cumberland
Smooth Winterberry Holly	*Ilex laevigata*	Special Concern	Cumberland
Spicebush	*Lindera benzoin*	Special Concern	Cumberland
Spongy-leaved Arrowhead	*Sagittaria montevidensis ssp. spongiosa*	Special Concern	Sagadahoc
Spotted Pondweed	*Potamogeton pulcher*	Threatened	Cumberland
Sweet Pepper-bush	*Clethra alnifolia*	Special Concern	Sagadahoc
Tidal spikerush	*Eleocharis aestuum*	Special Concern	Sagadahoc

Source MDIFW, 2021.

4.8.2 Environmental Analysis

FERC's SD2 identified one potential resource issue relating to threatened and endangered resources, which is discussed in greater detail below.

Effects of Project operation and maintenance on Atlantic salmon (*Salmo salar*) and its designated critical habitat; Gulf of Maine Distinct Population Segment (DPS) Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and its designated critical habitat; Shortnose Sturgeon (*Acipenser brevirostrum*); northern long-eared bat (*Myotis septentrionalis*), which is federally listed as endangered; tricolored bat (*Perimyotis subflavus*), which is proposed for federal listing as endangered; and monarch butterfly (*Danaus plexippus*), which is proposed for federal listing as threatened.

Northern long-eared and Tricolored bat

Northern long-eared and tricolored bats may occur within the Project area foraging in forested habitats adjacent to Project waters, roosting in upland areas (e.g., live or snag trees, caves, etc.), and spending winter months in hibernacula; however, the continued operation of the Project is not expected to adversely affect any bats present in the Project area.

Project operation and maintenance is not proposed to involve tree-cutting. Additionally, over the terms of the new license BWPH has proposed to avoid tree clearing (i.e., removal of all trees greater than three inches in diameter at breast height) on Project lands from April 15 through October 31, unless a tree poses an immediate threat to human life or property, to minimize potential impacts to northern long-eared and tricolored bats. Therefore, continued Project operation and maintenance is not expected to result in impacts to special status species including bats and migratory birds.

Monarch butterfly

The monarch butterfly may occur within the Project area; however, continued operation and maintenance of the Project is not expected to have any adverse effects on the monarch butterfly. Monarch butterfly habitat preferences include open fields, roadside areas, gardens, and wetlands, and other areas vegetated with flowering plants and milkweed plants. BWPH's vegetation management includes routine cutting of grass and vegetation near the Project works during the growing season. Because this activity is existing, milkweed has not become established, nor would it be expected to become established. Therefore, continued operation of the Project is not likely to impact the monarch butterfly.

Atlantic Salmon, Atlantic Sturgeon, Shortnose Sturgeon

Potential effects of the proposed action on Atlantic Salmon, Atlantic Sturgeon, Shortnose Sturgeon and associated critical habitat are discussed in Section 4.6.

4.8.3 Proposed Environmental Measures

Regarding proposed PME measures related to Atlantic Salmon, various studies related to upstream and downstream fish passage are still ongoing as is consultation with the applicable resource agencies. Additional PME measures related to upstream and downstream fish passage will be included in the FLA and/or following the completion of all studies.

BWPH will continue implementing the measures in the Final SPP to protect Atlantic sturgeon and Shortnose Sturgeon. These measures include procedures for safely handling any Atlantic or Shortnose Sturgeon encountered by Project personnel during fish lift operations, periodic dewatering of turbine draft tubes for maintenance, or stranding events in pools below the spillway. Routine inspections and maintenance requiring unit dewatering will be scheduled outside the sturgeon spawning season (typically May through July), when sturgeons are less likely to be attracted to the turbine draft tubes.

BWPH is proposing to avoid tree clearing (i.e., removal of all trees greater than three inches in diameter at breast height) on Project lands from April 15 through October 31, unless a tree poses an immediate threat to public safety or property, to minimize potential impacts to northern long-eared bat and tricolored bat.

4.8.4 Unavoidable Adverse Effects

Continued operation of the Project, as proposed, will have no significant unavoidable adverse impacts on TE species.

4.8.5 References

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4.9 Recreation and Land Use

4.9.1 Affected Environment

The Project is located on the Androscoggin River, approximately nine river miles upstream of Merrymeeting Bay, in the urban centers of Brunswick and Topsham. Land use surrounding the Project dam is generally residential, commercial, and industrial. Both banks of the river are relatively populated downstream from the Project dam and for about a mile upstream. Further upstream, the riversides become rural and sparsely populated for the length of the Project boundary. The river immediately downstream from the dam is contained within steep banks. There are several islands located in the channel in the first three to four miles downstream from the dam, including Shad Island, which is directly downstream of the Project spillway. Goat Island is located a few hundred ft upstream of the dam. The Project dam is located just upstream of the Frank J. Wood Bridge[8], which spans the Androscoggin River to connect the Brunswick and Topsham Main Streets. The north side of the dam can be accessed from Summer Street and the south side of the dam can be accessed directly off Main Street. Locked doors and gated fences limit public access to the powerhouse, dam, tailrace, and other Project facilities. Recreational access is provided upstream and downstream from the Project dam, offering varied opportunities including boating, fishing, wildlife viewing, picnicking, and trail activities. The following sections further describe recreation and land use resources in the Project area.

4.9.1.1 Regional Recreation

The Project is located within the Mid-Coast Maine tourism region, known for its picturesque coastal communities and rugged coastline. Brunswick is a designated Main Street Community with a rich history and bustling downtown (Maine Office of Tourism, 2023a). Topsham's Lower Village area features historical residences and mill buildings along the Androscoggin River (Town of Topsham, n.d.-a). Both communities provide outdoor recreational opportunities, including parks and trails along the Androscoggin River and a swinging pedestrian suspension bridge (the Androscoggin Swinging Bridge) connecting the two communities just upstream from the Project dam. The Androscoggin Riverwalk trail loops across the pedestrian bridge and follows the shorelines of both communities between the pedestrian bridge and the Frank J. Wood Bridge, providing views of the Androscoggin River and the Project. Just downstream from the Project in Topsham, Brunswick-Topsham Land Trust (BTLT) provides a short (0.3 mile) hiking trail (called Town Landing Trail) along the undeveloped shoreline of the 3.2-acre Smart Property (BTLT, 2023a). The 2.6-mile Androscoggin River Bicycle Path provides a paved Americans with Disabilities Act accessible multi-use path along the Androscoggin River from Water Street down to Cook's Corner in Brunswick and crosses into Topsham via the Route 196 Bridge.

[8] Maine Department of Transportation (MaineDOT) is in the process of replacing the Frank J. Wood Bridge. The new bridge span opened to traffic in December 2025. Recreational enhancements being constructed as part of the bridge replacement include improvements to the ME Route 201 right-of-way adjacent to 250th Anniversary Park, development of a new park in Topsham near the bridge abutment, and sidewalks on both sides of the bridge with viewing bump-outs, dedicated bike lanes, and lighting. Construction and demobilization activities are expected to continue into late 2026 (MaineDOT, n.d.).

Additional public access is provided in Brunswick, including Pinette's Landing and the Merrymeeting Dog Park downstream from the Project. Town parks and recreation sites within and adjacent to the Project boundary are discussed in detail in the following section.

The Merrymeeting Bay area just downstream from the Project provides recreation opportunities on and off the water, including at John L. Baxter State Forest, Center Point and Thorne Head Preserves, Green Point and Bowdoinham Wildlife Management Area, and the Steve Powell Wildlife Management Area on Swan Island. These parks and preserves provide hiking, biking, wildlife viewing, fishing, and paddling opportunities. Further opportunities are provided along the coastline, including Wolfe's Neck State Park, Hamilton Audubon Sanctuary, Doughty Point Preserve, Skolfield Shores Preserve, Kate Furbish Preserve East, Woodward Point Preserve, and several other public access locations. The stretch of the Androscoggin River from Lewiston/Auburn to Merrymeeting Bay, known as the Lower Androscoggin, is characterized by slow, wide stretches with moderate rapids and is more often frequented by shoreline anglers and boaters as opposed to fly fishing (Maine Office of Tourism, 2023b). Angler access is available along various rivers in the region, including at boat launches and riverside parks along the Lower Androscoggin.

Boating access to Androscoggin River in the Project vicinity is provided upstream from the Project at the Pejepscot Boat Ramp in Topsham and at the portage facility associated with the Pejepscot dam. The Project impoundment is too shallow for large trailered boats (FERC, 2004). Just upstream from the Project, hand-carry boat access is provided at the Mill Street Canoe Portage in Brunswick, which serves as the portage take-out for boat access around the Project dam. The portage route follows Mill Street for approximately ¾ mile to 250th Anniversary Park, which serves as the portage put-in. Access for both hand-carry and trailered boats is provided by the Town of Brunswick at the Water Street Boat Landings downstream from the Project boundary. A boat barrier is located approximately 1/2 mile upstream of the dam and is seasonally installed from June 15 to October 31, as conditions allow. A second boat barrier is located downstream of the powerhouse from the southern shore to the tip of Shad Island and is in place year-round as conditions allow. Recreation facilities adjacent to the Project within the two Towns are discussed in greater detail in the following section.

4.9.1.2 Project Area Recreation

The Project impoundment and areas downstream of the Project support many recreational activities, including boating, fishing, wildlife viewing, picnicking, and trail activities. Recreational access to the Project area is provided by local municipalities and organizations as well as by BWPH.

The Exhibit R approved as part of the existing license designated two potential areas for recreational development at the Project. One site is in Brunswick, just across Main Street from the Project powerhouse. The site has since been developed by BWPH and the Town of Brunswick as 250th Anniversary Park. The second site is in Topsham adjacent to Summer Street, just upstream of the left dam abutment. This area has since been developed by the Town of Topsham as the Summer Street Overlook, which is part of the Androscoggin Riverwalk. The approved Exhibit R also included a viewing area at the fishway, which has since been developed as the Fishway Viewing Area. Section 4.9.1.2.1 describes these three recreation sites required by the FERC license (i.e., the Project recreation sites).

Recreation sites providing public access within and adjacent to the Project boundary that are not required as part of the Project license (i.e., non-Project recreation sites) include the Pejepscot Dam Recreation Area, Coffin Pond Recreation Area, Mill Street Canoe Portage, Androscoggin Swinging Bridge, Androscoggin Riverwalk, and Bridge to Bridge Trail. Section 4.9.1.2.2 describes the non-Project recreation sites.

Project and non-Project recreation sites within and adjacent to the Project boundary are depicted in Figure 4.9.1.2-1. The following subsections briefly describe each site. As discussed in Section 4.9.1.3, BWPH conducted a recreation study in 2025; the resulting *2026 Recreation Study Initial Study Report* describes the sites in detail and includes photographic documentation of each site (BWPH, 2026).

4.9.1.2.1 Project Recreation Sites

4.9.1.2.1.1 250th Anniversary Park

250th Anniversary Park is a 1.5-acre park located downstream from the Project on the south shore of the Androscoggin River, just east of the Frank J. Wood Bridge. The Park is on lands owned by the State of Maine, the Town of Brunswick, and BWPH. A quarter-acre section of the park was donated to the Town of Brunswick, with an easement retained, by BTLT (BTLT, 2023b). The parcel owned by BWPH was leased to the Town in 1984 for the duration of the existing FERC license (Central Maine Power Company and Town of Brunswick, 1994). Per the lease agreement, BWPH is responsible for signage required by the FERC license, and Brunswick is responsible for all other operations and maintenance.

The site provides scenic views of the Androscoggin River, informal shoreline access for bank fishing, and a natural shoreline put-in area for hand carry boats as part of the portage route beginning at Mill Street Canoe Portage. Park amenities include benches, an interpretive plaque,

and a trail to the shoreline with two staircases for improved footing. Parking is available in the lot serving the Fishway Viewing Area, discussed below, and in a municipal lot on Cabot Street. Fishing is permitted only downstream from the Frank J. Wood Bridge; MDMR has restricted fishing upstream of the bridge due to the Project upstream fishway facilities (FERC, 2004). The site is located within the Project boundary. An aerial overview of the site is provided as Figure 4.9.1.2.1.1-1.

4.9.1.2.1.2 Fishway Viewing Area

The Fishway Viewing Area is located on the south shore of the Androscoggin River, adjacent to the Project's fishway, and is open to the public Wednesdays through Sundays from May 1st through June 30th from 1:00 pm to 5:00 pm. Figure 4.9.1.2.1.2-1 provides an aerial overview of the site. The site is owned and operated by BWPH and is within the Project boundary. The site is accessible off Maine Street/Route 201, where a sign marks the site entrance and parking lot. Additional site identification signage is posted on the fence at the gated entrance to the viewing area. The viewing area itself consists of an outdoor concrete platform and an indoor viewing room. The concrete platform provides views of the fishway from above. Concrete stairs lead from the platform down to the viewing/counting room, which provides backlit informational signs, a whiteboard with information on fish species and passage numbers, and two windows with underwater views into the fishway. Dedicated parking for the Fishway Viewing Area is provided just off Maine Street and has capacity for 8 standard vehicles, including one designated accessible space.

4.9.1.2.1.3 Summer Street Overlook

On July 27, 2012, BWPH granted the Town of Topsham the right to construct a trail on a BWPH-owned parcel of land abutting Summer Street and the left dam abutment (FPL Energy Maine Hydro LLC and Town of Topsham, 2012). The Town subsequently developed the site as part of the Androscoggin Riverwalk, described in the following section. Per the 2012 agreement, the Town of Topsham is responsible for recreation facilities operations and maintenance at the site. The site is set on a small hill overlooking the river, providing scenic views of the river, Shad and Goat Islands, the Project dam, the Frank J. Wood Bridge, and historic buildings in Brunswick. Site amenities include a gravel pullout off Summer Street with parking capacity for approximately 8 vehicles, an approximately 8-foot-wide paved multi-use trail, trash receptacles, dog waste stations, a bench, and interpretive signage. The site is located within the Project boundary. An aerial overview of the site is provided as Figure 4.9.1.2.1.3-1.

4.9.1.2.2 Non-Project Recreation Sites

4.9.1.2.2.1 Pejepscot Dam Recreation Area

Pejepscot Dam Recreation Area, also known as the Pejepscot Fishing Park, is located off River Road in Brunswick, outside of the Project boundary. The site provides recreational access to the river above and below Pejepscot Dam, views of the dam and appurtenant facilities, boat take-out and put-in opportunities above and below the dam, and a trail for portaging around the dam. The site is accessed via a long gravel access road and consists of a small parking area with capacity

for approximately three vehicles, angler access above and below the dam, and a portage facility. The site is owned and operated by Topsham Hydro Partners Limited Partnership (Topsham Hydro), a Brookfield company, as part of the Pejepscot Hydroelectric Project (FERC No. 4784) and was studied extensively as part of the relicensing of that project. FERC issued a new license for the Pejepscot project on September 21, 2023.

4.9.1.2.2.2 Coffin Pond Recreation Area

Coffin Pond Recreation area is located on the south shore of the Androscoggin River and is owned and operated by the Town of Brunswick. The site is not within the Project boundary. The site is accessed from River Road and consists of a gravel parking area, picnic areas, playgrounds, restrooms, concessions, hiking trails, youth fishing access, and a small pond for swimming and ice skating. The parking area provides capacity for approximately 45 standard vehicles, including two designated accessible spaces. The playground is separated from the parking area by a row of boulders, and the pond area is separated from the remaining facilities by a chain link fence. A fee is required for access to the pond, restroom, and concessions areas, but the remaining facilities do not require a fee. The fee at the time of the site visit ranged from $5 to $9 depending on town residence and age. The site is open from 10 am to 5 pm daily.

4.9.1.2.2.3 Mill Street Canoe Portage

Mill Street Canoe Portage is located on the south side of the Androscoggin River off Route 1 (Mill Street), outside of the Project boundary. The site provides hand-carry boat access just upstream of the Project boat barrier and functions as the Project's portage take-out. The site is owned by MaineDOT and is operated by the Town of Brunswick. BWPH assisted the Town in development of the site.

The site provides a precast concrete plank boat ramp with asphalt approach, a gravel parking area, benches, a trash receptacle, a dog waste station, and informal shoreline access. The boat ramp provides access for hand-carry boats. A locked bollard at the top of the ramp prevents trailered boat access. Signage near the boat ramp marks the beginning of the portage route, discussed in Section 4.9.1.2.3. The parking area provides capacity for 16 standard vehicles, including one designated accessible space.

The site is closed to the public by locking the gate at the entrance when the Project boat barrier is not in place (typically from October 31 through June 15).

4.9.1.2.2.4 Androscoggin Swinging Bridge

The Androscoggin Swinging Bridge is a historic pedestrian suspension bridge spanning the Androscoggin River between Brunswick and Topsham approximately 1,600 ft upstream from the Project dam. The bridge is part of the Androscoggin Riverwalk, discussed below. A small park at the southern bridge abutment, owned by the State of Maine and operated by the Town of Brunswick, provides access to the bridge, parking, signage, and benches. The park is outside the Project boundary. Another park at the northern bridge abutment, owned and operated by the Town of Topsham, also provides access to the bridge, parking, benches, trash receptacles, and

interpretive signage. Informal footpaths lead to the shoreline from both parks. Signage at both parks prohibits swimming.

Parking on the Brunswick side of the bridge is provided in a paved lot with 5 lined spaces, including one designated accessible space. On the Topsham side, parking is provided in a paved lot with 7 lined spaces, including one designated accessible space.

4.9.1.2.2.5 Androscoggin Riverwalk

The Androscoggin Riverwalk (also known as the Androscoggin Brunswick-Topsham Riverwalk) is a 1.25-mile paved multi-use trail connecting Topsham and Brunswick via the Androscoggin Swinging Bridge and the Frank J. Wood Bridge. Amenities are provided at the parks along the trail (i.e., Summer Street Overlook and Androscoggin Swinging Bridge) and include trash receptacles, dog waste stations, benches, and interpretive signage.

Parking for the Riverwalk is provided at Androscoggin Swinging Bridge (on both the Topsham and Brunswick sides), Summer Street Overlook, a lot across Cabot Street near the Frank J. Wood Bridge, and a public lot in Topsham near the intersection of Maine and Summer Streets.

4.9.1.2.2.6 Bridge to Bridge Trail

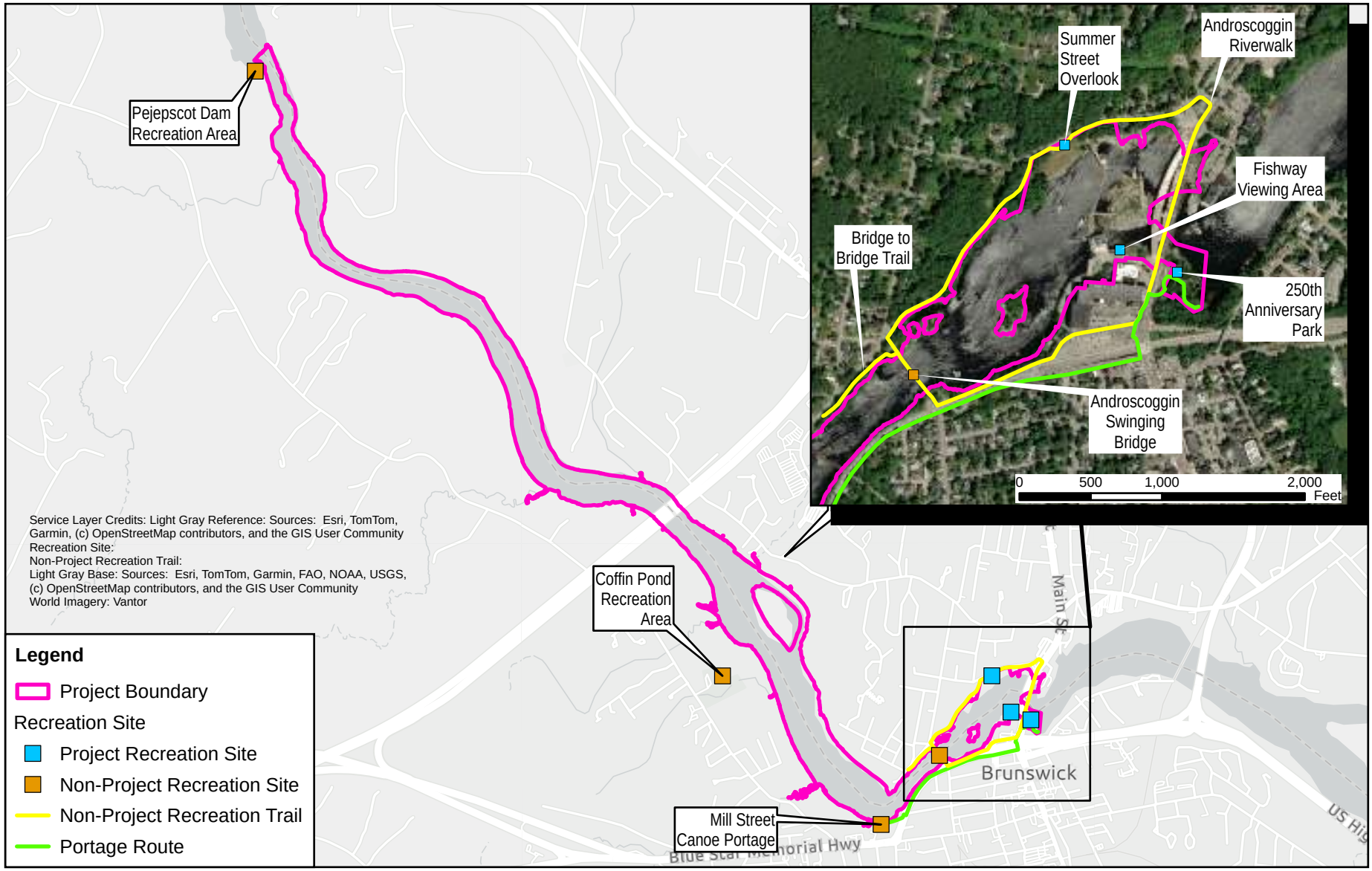
The Bridge-to-Bridge Trail is a short (less than a quarter mile) paved multi-use trail along the Topsham bank of the Androscoggin River, just upstream from the Androscoggin Riverwalk. The trail extends from Front Street near a railroad bridge known as the Black Bridge to the Androscoggin Swinging Bridge downstream. Parking for the trail is available at the Androscoggin Swinging Bridge, discussed below.

4.9.1.2.3 Portage Route

Boat access around the Project dam is provided via a designated portage route, depicted in Figure 4.9.1.2-1. The portage take-out is located at Mill Street Canoe Portage, described above. From the take-out, the portage route crosses a grassy area between the Mill Street Canoe Portage driveway and the Androscoggin River to Mill Street. At Mill Street, users turn north and follow the sidewalk for approximately 70 ft, cross Mill Street to Cumberland Street, and follow north along the south side of Mill Street to Maine Street. At Maine Street, users turn north and follow the west side of Maine Street across U.S. Highway 1 to the Fort Andross Mill Complex, then cross Maine Street at the secondary entrance to 250th Anniversary Park, described above. Users then follow the trail through 250th Anniversary Park to the put-in. The total distance of the route is approximately 0.9 miles.

A sign at Mill Street Canoe Portage directs boaters from the boat ramp to Mill Street, where additional signage directs users along existing sidewalks to Maine Street and north towards 250th Anniversary Park. Sidewalks and crosswalks serve the entire route from Mill Street Canoe Portage to 250th Anniversary Park. Photos of the route and associated signage are provided in the *2026 Recreation Study Initial Study Report*.

As part of the recreation use and condition assessment conducted during relicensing, BWPH evaluated locations within the Project boundary for the potential to shorten the portage route and determined that there is no location within the Project boundary downstream from the Mill Street Portage that would provide safe access for boaters. The only publicly accessible locations downstream of the existing portage take-out are the Androscoggin Swinging Bridge abutment areas. The abutment area on the Brunswick side of the river is exceedingly steep and descends into an area of swift current just upstream from the Project dam. The site is therefore unsuitable for boating access. The abutment area on the Topsham side of the river descends more gradually to calmer water; however, the site is downstream of the boat barrier, would increase rather than decrease the length of the portage route, and would similarly follow existing sidewalks and crosswalks to the put-in location. The site would therefore not constitute a significant improvement over the existing portage route.



BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Brookfield

N

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Figure 4.9.1.2-1:
Recreation Sites in the Vicinity of the Brunswick Project

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Brookfield

BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

N

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Feet

Figure 4.9.1.2.1.1-1:
250th Anniversary Park

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GOMEZ AND SULLIVAN ENGINEERS

BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

N

0 25 50 100 Feet

Figure 4.9.1.2.1.2-1:
Fishway Viewing Area

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BRUNSWICK HYDROELECTRIC PROJECT
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Brookfield

N

0 25 50 100 Feet

Figure 4.9.1.2.1.3-1:
Summer Street Overlook

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4.9.1.3 2025 Recreation Study

BWPH conducted a recreation study during the 2025 field season to assess existing recreational access and opportunity within and adjacent to the Project and evaluate whether there is a need for additional and/or enhanced recreational access and opportunity. Primary data collection methods for the study included a field inventory and condition assessment, recreational user surveys, and an impoundment boat access evaluation. The methodology provided updated information on recreation sites and amenities in the study area, including the sites' operation, current condition, parking capacity, activities supported, accessibility, and general use patterns, as well as user perceptions of various site attributes.

As discussed in Section 4.9.1.2, several existing recreation sites provide public access within and abutting the Project boundary. Three Project recreation sites (250th Anniversary Park, Summer Street Overlook, and the Fishway Viewing Area) provide access and views adjacent to and immediately downstream of the Project dam. These facilities provide sightseeing, picnicking, wildlife viewing, fishing, paddling, and trail-based opportunities. Non-Project recreation sites providing access along the Project impoundment include Pejepscot Dam Recreation Area, Coffin Pond Recreation Area, Mill Street Canoe Portage, Androscoggin Swinging Bridge, Androscoggin Riverwalk, and Bridge to Bridge Trail. These sites provide additional sightseeing, picnicking, wildlife viewing, fishing, paddling, and trail-based opportunities, as well as playgrounds and a small pond for swimming and ice skating. A designated portage route connects Mill Street Canoe Portage and 250th Anniversary Park, allowing for hand-carry boat access upstream and downstream of the Project dam. Additional information on Project area recreation sites is shown in Table 4.9.1.3-1.

During the field inventory all Project recreation sites were found to be in good or fair condition. Minor maintenance and repair issues were identified at 250th Anniversary Park, including trail erosion, graffiti, littering, and vegetation encroachment. At the Fishway Viewing Area, construction activities related to the replacement of the Frank J. Wood Bridge had closed the parking area and obscured the entrance signage. Some minor maintenance issues were also identified in the viewing room. Summer Street Overlook was found to be in good condition. Non-Project recreation sites were generally found to be in good overall condition. The portage route was found to be generally well marked except for the upstream extent within Mill Street Canoe Portage and the downstream extent from the intersection of Mill and Maine Streets to the put-in within 250th Anniversary Park.

Recreational user survey responses characterized use of the Project and non-Project sites in the study area. Responses indicate that most Project area recreation site users are local residents who visit the sites several times per year and engage primarily in sightseeing, nature watching, and trail-based activities. Most sites are primarily accessed on foot, although access by personal vehicle was still relatively common. Users generally found Project area recreation sites to be lightly to moderately utilized but not crowded. Most respondents indicated that the Project area recreation sites met their recreational needs. The exception was the Fishway Viewing Area, which respondents found to be difficult to locate and often closed. This may in part be due to

construction of the Frank J. Wood Bridge, which impacted the site entrance and parking area during the study season.

The Project impoundment is currently accessible by hand-carry boat and is one of the few locations in the Project vicinity inaccessible to large trailered boats. Access for hand-carry boats is provided at the upstream and downstream extents of the Project impoundment. Access for trailered boats is available at 20 public boat launches within 10 miles of the Project, including three public boat launches providing access to comparable stretches of river upstream of the Project impoundment and the Water Street Boat Landing less than a mile from the Project dam. Previous studies indicate that at least two of the three upstream launches see relatively low usage for trailered boat launching and have ample capacity for existing and likely future demand. Only 3 of the 328 visitor survey respondents identified a need for motorized boat access to the Project impoundment. Although most structured interview respondents and MDIFW have indicated a need for trailered boat access to the Project impoundment, the relatively low usage of the nearby upstream launches and the extensive opportunity provided in the Project area indicate that ample access for trailered boats is provided in the Project vicinity and additional access would likely be underutilized.

Overall, the results of the recreation study confirm that there are ample recreational opportunities and access sites in the Project area, and the sites are suitable for the pattern of seasonal use and activities supported. The study did not identify any significant needs at the FERC-approved Project recreation sites. No new Project recreation sites or modifications to the existing Project recreation sites are proposed at this time.

Table 4.9.1.3-1: Project Area Recreation Sites

Site Name	Facilities/Amenities	Estimated Parking Capacity	Activities Supported
Project Recreation Sites			
250th Anniversary Park	• Trail • Benches • Overlook area • Interpretive plaque • Portage route put-in	Available at Fishway Viewing Area and public lots nearby.	• Sightseeing/nature watching • Hiking/walking/running • Fishing • Hand-carry boat access
Fishway Viewing Area	• Concrete platform and indoor viewing room • Site identification and informational signage • Interpretive displays	8 vehicles, including one designated accessible space	• Sightseeing/nature watching
Summer Street Overlook	• Trash receptacle • Dog waste station • Rock bench • Interpretive signage	8 vehicles	• Sightseeing/nature watching • Hiking/walking/running • Biking
Non-Project Recreation Sites			
Pejepscot Dam Recreation Area	• Portage take-out • Portage trail around Pejepscot Dam • Portage put-in	3 vehicles	• Sightseeing/nature watching • Hiking/walking/running • Fishing • Hand-carry boat access
Coffin Pond Recreation Area	• Picnic areas • Playgrounds • Restrooms (fee access) • Concessions	45 vehicles, including two designated accessible spaces	• Picnicking • Playground activities • Hiking/walking/running • Fishing

Site Name	Facilities/Amenities	Estimated Parking Capacity	Activities Supported
	• Hiking trails • Youth fishing access • Swimming/ice skating pond (fee access)		• Swimming • Ice skating
Mill Street Canoe Portage	• Concrete plank boat ramp • Signage for portage route • Interpretive signage • Benches • Trash receptacle • Dog waste station	16 vehicles, including one designated accessible space	• Sightseeing/nature watching • Fishing • Hand-carry boat access
Androscoggin Swinging Bridge	• Pedestrian bridge • Benches • Trash receptacles • Interpretive signage	12 vehicles, including two designated accessible spaces	• Sightseeing/nature watching • Hiking/walking/running • Biking
Androscoggin Riverwalk	• Paved multi-use trail • Trash receptacles • Dog waste stations • Benches • Interpretive signage	Available at multiple locations along trail.	• Sightseeing/nature watching • Hiking/walking/running • Biking
Bridge to Bridge Trail	• Multi-use trail • Benches	Available at Androscoggin Swinging Bridge.	• Sightseeing/nature watching • Hiking/walking/running • Biking

4.9.1.4 Project Vicinity Recreation Needs Identified in Management Plan

Two statewide plans serve as management plans for recreational needs in the Project vicinity: the Maine Statewide Comprehensive Outdoor Recreation Plan (SCORP) and the Strategic Plan for Providing Public Access to Maine Waters for Boating and Fishing. The Midcoast Council of Governments (MCOG), a regional planning and economic development district serving communities in the Midcoast region, including Brunswick and Topsham, has published a Five-year Strategic Plan to guide planning decisions and coordinate regional activities of member communities. In addition, the Towns of Topsham and Brunswick have comprehensive plans for the lands within their jurisdiction. A discussion of recreation needs and goals identified in each of these plans follows.

4.9.1.4.1 Maine Statewide Comprehensive Outdoor Recreation Plan

The Maine Bureau of Parks and Lands (MBPL) reviews statewide recreational needs at five-year intervals. The most recent review is reported in the 2020-2024 SCORP. Within the SCORP, MBPL examines the supply and demand for outdoor recreational opportunities; identifies opportunities, constraints, and trends; and devises strategies for implementing statewide recreation priorities. Priority areas for the current SCORP are to support active, engaged communities, address workforce attraction and retention through outdoor recreation, sustain and grow tourism, promote ecological and environmental resilience, and invest in maintenance and stewardship. According to the SCORP, the U.S. Forest Service forecasts that the activities in the northern United States that will see the largest number of new participants are visiting interpretive sites, nature viewing, visiting developed sites, swimming, and motorized water activities. The SCORP did not identify any strategies specific to the Project or in the vicinity of the Project (MBPL, 2019).

4.9.1.4.2 Boating Facilities Strategic Plan

The Maine Department of Agriculture, Conservation and Forestry, in cooperation with MDIFW, produced the Strategic Plan for Providing Public Access to Maine Waters for Boating and Fishing in 1995 (updated in 2000). This plan guides the two agencies in directing their water access programs. The plan does not identify the Androscoggin River in the Project area as needing guaranteed public access or additional access (MBPL, 2013).

4.9.1.4.3 Midcoast Council of Governments Strategic Plan

The MCOG Strategic Plan was developed to guide the organization's activities and efforts to coordinate the regional planning activities of its member communities. Development of the plan included regional forums and planning sessions, and focused on housing, infrastructure funding, and regional economic development. The seven goals of the plan include Midcoast sense of place, Hub of Excellence (regional economic development), bringing more federal and state funding to the region, housing, sustainability and resiliency, communication, and diversity, equity, and integration (MCOG, 2022). The plan does not identify any strategies specific to the Project or in the vicinity of the Project.

4.9.1.4.4 Town Comprehensive Plans

The Comprehensive Planning and Land Use Act, adopted by the State of Maine in 1988, requires that towns in Maine have a comprehensive plan consistent with the state Growth Management Act to impose certain ordinances or qualify for certain grant and loan programs.

The Town of Topsham updated its Comprehensive Plan in 2019 after a process of extensive public engagement and input. The resulting plan evaluates the town's history and present status, identifies and characterizes the distinct neighborhoods within the town, describes the existing land use, and provides a decision-making framework that reflects residents' shared vision for the town's future. Themes of the plan include pedestrian access and mobility, access to open spaces, and sustainability. Specific strategies aim to preserve and enhance trail connectivity and access to natural resources, including access to the Androscoggin River. The 2011 Lower Village Waterfront Access Study was developed to evaluate the opportunities and constraints of creating waterfront access to the Androscoggin River within the Lower Village neighborhood (Town of Topsham, 2019).

Adopted by the Town Council on December 15, 2025, Brunswick's updated comprehensive plan—titled "One Brunswick, Beautifully Balanced"—serves as a guide for municipal zoning and land use decisions over the next decade. The Plan's themes emphasize deliberate and measured growth by shrinking the Town's designated growth areas and steering new developments into regions where critical infrastructure is already equipped to handle them. Key policy goals target the prevention of overdevelopment, protecting essential environmental and marine resources while preserving the historic, coastal, and rural character of the community. Additionally, the plan establishes an integrated roadmap for future town investments, addressing long-term needs across housing, transportation, economic sustainability, and public services. (Town of Brunswick, 2025).

4.9.1.5 Land Use and Management within the Project Vicinity

Land use in the Androscoggin River watershed is discussed in Section 4.3.4. As previously noted, lands along the upstream extent of the Project boundary are primarily undeveloped and are generally forested. Development is concentrated in the downstream extent of the Project area, which consists of a mixture of low, medium, and high intensity developed lands with pockets of developed open space. Land use adjacent to the Project dam is industrial and commercial. Commercial land uses generally dominate the Main Street corridors of both towns extending north and south from the Frank J. Wood Bridge, and residential uses dominate the remaining areas. BWPH owns the lands adjacent to the Project dam as well as Shad and Goat Islands. The State of Maine owns several narrow parcels of land along Mill Street in Brunswick, which follows along the Project impoundment from just upstream from the Project dam to just upstream from the Black Bridge (Town of Brunswick, n.d.). Central Maine Power generally owns the lands abutting the Project impoundment on the Topsham side, from just upstream from the Project dam upstream to the Black Bridge (Town of Topsham, n.d.-b).

Management of lands outside of the Project boundary falls under the jurisdiction of the municipality in which they are located. The State of Maine's Mandatory Shoreland Zoning Act requires that lands within 250 ft of ponds and non-forested freshwater wetlands; rivers; coastal wetlands and tidal waters; and all land areas within 75 ft of certain streams, be subject to local ordinances that regulate land use activities. MDEP is required to set, and update as needed, minimum guidelines for these municipal zoning and land use controls. The Towns of Brunswick and Topsham have adopted Zoning Ordinances with shoreline buffer zones meeting MDEP minimum requirements, including setbacks for new construction and vegetation removal (MDEP, 2019).

4.9.1.6 Land Use and Management of Project Lands

BWPH possesses the necessary title, right or interest to operate the Project on the lands within the Project boundary. These lands are managed in accordance with federal, state, and local regulations. In general, Project operations and maintenance, along with recreation, are the primary activities that occur on Project lands.

4.9.2 Environmental Analysis

FERC's SD2 identified one potential resource issue relating to recreation and land use which is discussed in greater detail below.

Effects of continued Project operation and maintenance on recreational use and experience in the Project area, including the adequacy of existing recreation access, education and interpretive opportunities, and facilities in meeting current and anticipated recreation needs.

BWPH operates the Project in a run-of-river mode, resulting in minimal man-made fluctuation in the Project impoundment, and the operation of the Project has no effect on overall river flow in the lower Androscoggin River. For these reasons, recreational and land use resources within the Project area are not known or expected to be adversely impacted by continued Project operations.

Results of the recreation study completed for this relicensing effort indicate that the exiting Project area recreation sites, including both Project and non-Project sites, offer a diverse range of recreational opportunities and have ample capacity to handle current and future demand. The FERC-approved Project recreation sites are in good to fair condition with minor maintenance issues, and users are generally satisfied with the Project area recreation sites and feel the sites are meeting their needs.

4.9.3 Proposed Environmental Measures

BWPH is proposing to continue to operate and maintain the Project recreation sites. In addition, in response to the Recreation Study findings, BWPH proposes the following enhancements to Project area recreational resources:

- Fishway Viewing Area
  - Post signage complying with 18 C.F.R. § 8.2 ("Part 8 Sign") at site.
  - Address bridge construction impacts to parking area as needed to return the lot to pre-construction condition.
  - Clear vegetation as needed to ensure site signage is visible.
- 250th Anniversary Park
  - Post a Part 8 Sign at the site.
  - Renew existing lease agreement with the Town of Brunswick for site operation and maintenance over the term of the new license.
  - Repair the eroded trail segment.
  - Remove graffiti from site amenities.
  - Repair or replace existing benches as needed.
  - Perform a site cleanup to remove litter.
  - Clear vegetation encroaching on path and stairs.
- Summer Street Overlook
  - Post a Part 8 Sign at the site.
  - Renew existing lease agreement with the Town of Topsham for site operation and maintenance over the term of the new license.
- Portage Route
  - Coordinate with the Town of Brunswick to replace weathered signage at Mill Street Canoe Portage and to add directional signage as needed to delineate the existing portage route from the take-out at Mill Street Canoe Portage to the put-in at 250th Anniversary Park.

4.9.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts to recreation and land use are anticipated due to continued Project operation.

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4.10 Aesthetic Resources

4.10.1 Affected Environment

The Project vicinity is a mix of urban, rural, and forested land, including areas of industrial, residential, and agricultural development. The land along the Project's impoundment is primarily forested with higher density development near the Project's facilities in the towns of Brunswick and Topsham, ME. As discussed in greater detail below, the Project's impoundment, facilities, and the portion of the Androscoggin River downstream of the dam are visible from various roads, bridges, and recreational areas and trails within the vicinity of the Project. Section 4.3.4 examines land use types and coverage in the Project vicinity and greater Androscoggin River watershed.

4.10.1.1 Visual Character of Project Lands and Water

The Androscoggin River in the Project vicinity has a history of industrial use, which has shaped the visual character in the area. A railroad track runs along portions of the left descending bank of the Project impoundment and crosses the river over a bridge, known as Black Bridge, approximately 0.5 river miles upstream of the Project's dam. Approximately 850 ft downstream of Black Bridge is the Androscoggin Swinging Bridge, a suspension pedestrian bridge that crosses the river, which was originally built in the 1890s to provide a means for mill workers who lived in Topsham to reach the Fort Andross Mill Complex (formerly known as the Cabot Mill; NRHP 2026), a large mill located in Brunswick next to the Project's dam and powerhouse. As noted in Section 4.9, the Frank J. Wood Bridge, which spans the river just downstream of the dam, was recently replaced. The new bridge includes sidewalks and wide shoulders for pedestrians, including pedestrian viewing areas, a new park on the Topsham side, and improvements to the existing 250th Anniversary Park on the Brunswick side of the crossing (MaineDOT 2026). Another large mill, the Bowdoin Mill Complex, is located on the left descending bank immediately downstream of the bridge.

The river within the Project vicinity is relatively wide and calm, with interspersed islands, and riverbanks generally include a mix of coniferous and deciduous trees and shrubs. As described above, the shorelines are more developed near the Project dam and powerhouse and include mill, commercial, residential, and other buildings, as well as roads and parking lots. The Project's 830-foot-long, 40-foot-high concrete gravity dam and integral powerhouse span the river. The dam consists of two ogee spillway sections that are separated by a pier and barrier wall. The Project's dam, powerhouse, and other facilities (Section 3.2.1) are depicted in Figure 3.2.1-1. Just downstream of the dam, portions of the exposed riverbed and shoreline consist of broad ledges.

Views of the impoundment are available at the Mill Street Canoe Portage and the Androscoggin Swinging Bridge, as well as area roads, including Mill Street in Brunswick and Bridge and Summer Streets in Topsham. The dam and portions of the river downstream of the dam are visible from the new bridge and Summer Street in Topsham. Views of the river downstream of

the dam are also available at the Town of Brunswick's 250th Anniversary Park and Water Street in Brunswick. Additionally, there are also two trails, the Androscoggin Riverwalk and the Androscoggin River Bicycle Path, which offer views of the river within the vicinity of the Project.

Figures 4.10.1.1-1 through 4.10.1.1-4 provide photos of the area in the vicinity of the Project.

4.10.1.2 Scenic Attractions

The Androscoggin Swinging Bridge, 250th Anniversary Park, Summer Street Overlook, and the Androscoggin Riverwalk offer scenic views of the area. There are no State or Federal Scenic Byways in the Project vicinity (Federal Highway Administration 2026, Maine Office of Tourism 2026). See Section 4.9 for a discussion of recreational opportunities offering scenic views in the Project vicinity.



Figure 4.10.1.1-1. View of impoundment from the Mill Street Canoe Portage faced downstream



Figure 4.10.1.1-2. View of impoundment from the Summer Street Overlook



Figure 4.10.1.1-3. View of river from Project's fishway faced downstream



Figure 4.10.1.1-4. View of river from 250th Anniversary Park faced downstream

4.10.2 Environmental Analysis

FERC's SD2 did not identify any potential resource issues related to aesthetic resources.

Continued operation of the Project is not expected to adversely affect aesthetic resources in the Project vicinity. The existing Project operations and facilities are part of the current aesthetic context of the Project vicinity and are in keeping with the industrial nature of the immediate surroundings. No material changes to existing Project operations or facilities are proposed, and as such, BWPH does not expect any adverse effects of the Project on aesthetic resources.

4.10.3 Proposed Environmental Measures

BWPH is not proposing any PME measures related to aesthetic resources.

4.10.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts are expected to aesthetic resources at the Project.

4.10.5 References

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4.11 Cultural Resources

4.11.1 Affected Environment

The Androscoggin River, on which the Project is located, has a long history of Precontact period human activity, as well as Euroamerican history. The river was a major source of transportation, settlement, and food resources for Native Tribes throughout much of the Precontact period and continued to be a vital resource for both them and Euroamerican settlers after contact. In the Post-Contact period, the river continued to serve as a means of travel and trade and soon became a source of industrial focus.

4.11.1.1 Archaeological Resources

4.11.1.1.1 Precontact Period History and Euroamerican Period History

The archaeological record of Maine dates back more than 11,000 years. Evidence of human activity on the Androscoggin River extends at least 9,000 years into the past. Archaeologists have divided this record into three major periods known as the Paleoindian, Archaic, and Ceramic cultural periods and these have been further subdivided into various study units Table 4.11.1.1.1-1, (Spiess, 1990). Archaeological sites from these periods have been discovered within the Androscoggin River watershed.

Paleoindian Period (ca. 11,500-9,500 years ago)

The earliest inhabitants in the region, and throughout North America, are referred to as Paleoindian people. Paleoindian people are believed to be the first people to migrate into North America and, in their pursuit of large game, rapidly colonized the continent (Martin 1973). The hallmark of Paleoindian people is the fluted spear point, which presumably was used to hunt large game species (Spiess, Wilson, and Bradley 1998). In Maine, the Paleoindian period dates from approximately 11,500 to 9,500 years ago when much of the landscape was still vegetated in tundra and/or woodlands. Several well-known Paleoindian sites are associated with the Androscoggin drainage, which was a major corridor for Maine's earliest inhabitants. These include fluted-point Paleoindian sites, such as the Vail and Adkins sites (Gramly 1982, 1988), the Michaud site (Spiess and Wilson 1987); the Janet Cormier site (Will and Moore 2002); the Varney Farm Late Paleoindian Site (Petersen et al. 2000), and the Nicholas site (Wilson et al. 1995).

The end of the Paleoindian period and subsequent transition into the Early Archaic period, is poorly understood. Archaeological evidence indicates that during the later Paleoindian period, fluted spear points were replaced by smaller, unfluted points and other point styles also emerge in the region (Will and Moore 2002). These cultural changes coincide with the transformation of the environment from more open woodlands to closed forests. By the Early Archaic period, the archaeological record contains dramatically different material than that recovered from sites dating to the preceding Paleoindian period.

Archaic Period (ca. 9,500-3,000 years ago)

The Archaic period represents the longest cultural period in the region, spanning around 6,500 years. Although Early and Middle Archaic people probably continued a nomadic hunter and gatherer lifestyle, their subsistence and settlement patterns were different from those of the Paleoindian period. This is evidenced by the location of most Early and Middle Archaic sites along present-day water bodies, and the presence of food remains of aquatic species. The archaeological record also shows a shift from the use of high quality lithic raw material for making tools to lower quality but locally available lithic raw material. During this time, we also see the emergence of a new suite of lithic tools classified as the Gulf of Maine Archaic Tradition (Robinson et al. 1992, Clark and Will 2006). By the Middle Archaic period, the first cemetery sites occur. These cemetery sites reveal mortuary practices that included the sprinkling of graves with red ocher, and the offering of grave goods (Willoughby 1898, Moorehead 1922, Robinson 1992).

The close of the Late Archaic period is characterized by another archaeological tradition known as the Susquehanna Tradition (Sanger 1979, Bourque 1995). This tradition is widespread in Maine and New England. The people of the Susquehanna Tradition appear to have been more focused on a terrestrial economy than a marine economy. They largely abandoned the use of red ocher in their graves and often used cremation to care for their dead rather than burying them intact. Diagnostic tool forms include large, broad-bladed chipped stone spear points (Borstel 1982).

Ceramic Period (ca. 3,000-450 years ago)

The introduction of pottery manufacture and use in Maine defines the onset of what Maine archaeologists call the Ceramic period (Sanger 1979). In other parts of the Northeast, this cultural period is referred to as the Woodland period. Ceramics first appeared in the archaeological record of Maine around 3,000 years ago and they persisted until contact with Europeans when clay pots were replaced in favor of iron and copper kettles that were traded for beaver pelts and other animal furs. Ceramic period sites are abundant in Maine, along both the coast and in the Maine interior (Sanger 1979). The Ceramic period ends with European contact around 450 years ago. At this time, most of the artifacts attributable to Precontact period inhabitants of Maine disappear from the archaeological record.

Integration with Euroamerican Life (AD 1760-AD 1940)

Relations with the Indigenous population and the European inhabitants alternated between civil partnership and open hostility. By the late 17th century, open hostilities between the predominantly English settlers of the New England region and the remaining Indigenous groups took a toll on both populations, resulting in the English near abandonment of the region of Maine. Hostilities continued off and on until the conclusion of the Seven Years War in 1763. Many of the Indigenous groups in Maine were allied with the French, so with their defeat they were forced to sign treaties with the English settlers that were unfavorable to them. In the 18th and 19th centuries Indigenous groups in Maine that had suffered great loss from disease as well

as warfare became increasingly marginalized by the European settlers and were either forced onto reservations or to emigrate out of the region. The groups that remained in the Maine region persisted, gaining more political recognition in the latter 20th century (Bourque 2001). Federally recognized tribes within the State of Maine include the Aroostook Band of Micmac, the Houlton Band of Maliseets, the Passamaquoddy Tribes (Pleasant Point and Princeton), and the Penobscot Indian Nation.

The Pejepscot Company was formed in 1714 with the goal of encouraging immigration to the area now known as Brunswick and Topsham. They bought a large tract of land in 1716 and by May 3, 1717, Brunswick was constituted as a township by the General Court of Massachusetts. Topsham was originally part of the township of Brunswick, separated and began its own town in 1764 (Wheeler and Wheeler 1878). Euroamerican population in the Brunswick and Topsham area increased throughout the 18th and 19th centuries as industries such as sawmills, grist mills, woolen mills and paper mills prospered. In addition to the mills there were many small manufacturers that made goods such as bricks, marble works, matches, pitchforks, pottery, and shingles. Shipbuilding is another industry that prospered in the area during the 1800s. Site ME 64.06 or Humphreys Shipyard is located approximately 3.8 km downstream of the Project on the south side of the Androscoggin River in Brunswick. It is shown on J. Chance Jr.'s 1857 Map of Cumberland County Maine, as Shipyard and Steam Mills. The site was located and reported to MHPC in 2002 and was visited by Dr. Leith Smith of the MHPC in 2011. The shipyard and steam mills were built by General John Campbell Humphrey in 1848, and he ran these operations with his sons John H. and Charles C., manufacturing lumber and building ships (Wheeler and Wheeler 1878).

Table 4.11.1.1.1-1. Comprehensive Planning Archaeological Study

Time Period	Study Unit
11,500 - 10,000 RCYBP	Fluted Point Paleoindian Tradition
10,200 - 9,500 RCYBP	Late Paleoindian Tradition
10,000- 6,000 RCYBP	Early and Middle Archaic Traditions
6,000 - 4,200 RCYBP	Late Archaic: Laurentian Tradition
6,000 - 4,000 RCYBP	Late Archaic: Small-stemmed Point Tradition
4,500 - 3,700 RCYBP	Late Archaic: Moorehead Phase
3,900 - 3,000 RCYBP	Late Archaic: Susquehanna Tradition
3,000 RCYBP – AD 1500	Ceramic Period
AD 1500 – AD 1675	Early Contact
AD 1675 – AD 1760	Late Contact
AD 1760 – AD 1940	Integration with Euroamerican Life

Note: RCYBC equals radiocarbon years before present; AD equals calendar years. All dates are estimates.
Sources: Spiess (1990:104) and Spiess (pers. comm. 1999).

4.11.1.1.2 Identified of Precontact Period and Euroamerican Archaeological in the Vicinity of the Project

Precontact Period Sites

Archaeological survey work along this portion of the Androscoggin River drainage has resulted from both professional archaeological surveys associated with cultural resource management and surveys conducted by professional and advocational archaeologists for research purposes.

Two archaeological sites are located along the banks of the Androscoggin River potentially within the Project area. The Sweat Site (Site 14.138) is located on the northeast side of the river in the central area of the Project approximately 3.2 km downstream of the Pejepscot dam in the Town of Topsham. It was identified during the Town of Topsham Archaeological Project archaeological survey conducted along the north side of the river and Merrill Island by Deborah B. Wilson, Steven L. Cox, and Bruce J. Bourque in 1988-1989 (Wilson, Cox and Bourque 1990). This small site was in a single test hole that was expanded into a 1 meter by 0.5-meter test unit that contained Late Ceramic period to Contact period (Ceramic Period 7) pottery sherds and a piece of graphite. Additional testing around the positive test unit at 5 meter intervals did not produce any additional archaeological materials.

Site 15.64 is located on the south side of the river just downstream of the Riverside Cemetery in the Town of Brunswick. This site was reported by Richard Doyle in 1984. It contains evidence of a Middle Archaic occupation represented by an axe, scraper, and possible Neville type biface.

A third Precontact period site is located outside of the Project to the north in the Town of Topsham near the intersection of Winter Street and the Maine Central Railroad Tracks. Site 15.365 is located at the margin of an outwash plain that was truncated by the proto-Androscoggin River as it formed its bed by downcutting through the extensive sand deposits in the site vicinity. The site is about 300 meter distance from the present course of the Androscoggin River, and the stream that borders the site's west side outlets into the river adjacent to Merrill Island (Wilson and Spiess 1997:4-5). Wilson and Spiess suggested the site may be a kill where a deer or moose was taken and butchered by a small hunting party. The site covered a 34.25 m^2 area and was fully excavated by Wilson and Spiess. A biface fragment recovered suggests the site may date to the Susquehanna period.

Numerous Ceramic period and Archaic period sites are documented downstream of the Project.

Euroamerican sites

No Euroamerican sites are documented within the Project area. However, one Euroamerican period site, Pejepscot Settlement Site (ME 064-001) is located at the falls that mark the downstream terminus of the Project. As mentioned above, this site dates from 1628 to 1731 and it is associated with early settlement and fortification of the area including Fort Andros and the later Fort Pejepscot. Robert J. Hale visited the fort in 1731 and his observations are recorded in his "Journal of a Voyage to Nova Scotia" and published in Historical Collections of the Essex

Institute Vol. XLII, No. 3, pp. 217-244, July 1906. On August 29th, 1731, Hale described the site.

"Then wee Travalil'd over Land to Brunswick & gott to the Fort in about an hour. It Stands on the W. Side of Pejypscott Falls upon Ammariscoggin River, which empties itself into Kennebc the fupposed Eastern Boundary of the Province of Maine. The Fort is built of Lime & Stone, incloses about a quarter acre of Land, only one Double houfe in it, no Guns have 2 or 3 in each Bastion, the Walls about 12 feet high, is Commanded by Capt. Benj. Larraby, who has 15 soldiers under him. Midway between this & Maquait is a large Meeting Houfe newly rais'd, tho' the whole Number of Families at Brunswick exceeds not 20 (Hale 1906:240)."

In the 19th century the location of these fortifications began the site of a series of cotton mills used sequentially by the following companies, Brunswick Cotton Manufacturing Company, Maine Cotton and Woolen Factory Company, The Brunswick Company and finally the Cabot Manufacturing Company. Currently portions of the cotton mill buildings have been modified into office and retail space.

4.11.1.1.3 Prior Cultural Resource Investigations within the Project Area

Three previously completed cultural resource management studies overlap portions of the Project area. Deborah B. Wilson, Steven L. Cox and Bruce J. Bourque completed an archaeological survey of the Topsham side of the Androscoggin River including approximately 7.5 km of shoreline from just north of the crossing of I-95 south to just above the Brunswick-Topsham Dam. The survey was completed from 1988 to 1989 and included portions of the banks of the Androscoggin that landowners allow archaeologists to access as survey conducted by canoe to look for evidence of eroding archaeological sites. Wilson, Cox, and Bourque identified The Sweat Site (Site 14.138) at the northmost extent of their survey on the eastern side of the river. This small site is associated with the Late Ceramic to Contact period. Portions of Merrill Island were also included in their survey however, no other archaeological sites were identified along the Androscoggin River or on the island. Wilson, Cox, and Bourque (1990) concluded the relatively high banks along this portion of the river were not well suited for Precontact period settlement and this portion of the river may have been utilized more as a travel corridor between resource and settlement locations.

In 2019, Dr. J. N. Leith Smith of the MHPC completed Phase I and Phase II archaeological investigation of the south approach for the proposed Frank J. Wood Bridge Replacement Project in Brunswick, Maine (Smith 2019). Review of the proposed project by the MHPC identified two areas of potential archaeological sensitivity on the west side of the south approach in Brunswick. The first area consisted of an elevated parking lot immediately north of the east wing of the Cabot Mill building, and the second was the upper riverbank immediately west of the existing bridge. Mechanical assisted excavation of the area of potential effect in the parking lot revealed approximately 5 ft of fill that was probably deposited at the time of the Cabot Mill expansion in 1892. Features identified in the area consisted of a section of early 19th-century stone foundation wall and a deposit of fractured foundation stone that probably derived from mill construction. Neither feature nor the associated archaeological deposits were archaeologically significant.

Investigation of the upper riverbank identified sand and gravel fill that was probably deposited around 1980 when the current Brunswick Project was constructed. MHPC concluded that due to filling and significant disturbance to the upper riverbank, no archaeological properties would be impacted by the proposed project. (Smith 2019).

In 2023, Backwoods Archaeological Resource Consulting, LLC completed a Phase I archeological survey of the placement of a new waterline (approximately 1.18 km in length) across the Androscoggin River for the Brunswick-Topsham Water District (Pelletier 2023). The route of the waterline ran from the Topsham Water Facility on the eastern side of the river south to the river's edge and then approximately 0.4 km south along the eastern bank of the river to the point of the river crossing. A directional drill was used to cross the river and then the line ran from the western bank of the river south and west to the Brunswick Water Facility. Eight test holes were excavated along the eastern side of the river and two test holes were excavated along the western side. No cultural material was found, and no historic properties were impacted by the proposed project.

4.11.1.1.4 Historic and Precontact Archaeological Resource Surveys Conducted for Relicensing

BWPH is in the process of completing a Precontact and Historic Archaeological Survey, to support FERC's compliance with Section 106 of the National Historic Preservation Act by determining whether historic properties are present within the Project's defined APE. The APE, developed in consultation with the MHPC, includes the area between the riverbank and a 50-foot inland buffer, or the FERC Project boundary. In 2025, BWPH completed the Phase IA Archaeological Assessment including a sensitivity review of background information, field reconnaissance to verify areas of archaeological potential, and preparation of Phase IA reports (BWPH 2026a and BWPH 2026b). The study is ongoing, the next step to complete Phase IB subsurface investigations. Phase 1B survey for precontact and historic sensitive areas identified during Phase 1A is planned for summer 2026 with the results being provided with the USR. All methods follow applicable federal and state guidelines and are completed in coordination with MHPC.

4.11.1.2 Historic Structures

Three Historic Districts are located within the vicinity of the Project. The Topsham Historic District, the Lincoln Street Historic District, and the Federal Street Historic District, all of these historic districts are listed on the National Register of Historic Places (NRHP).

The Topsham Historic District consists of a grouping of early 19th and 20th century architecture located north of the Project area in Topsham. There are 58 homes within the historic district, of which 30 are Federal, eight are Transitional Federal-Greek Revival, 13 are Greek Revival, one is Italianate, two are Queen Anne, one is Eclectic, one is Colonial Revival and two are contemporary. The buildings in this district have similar scale, proportion, materials, color, and design quality to each other.

The Lincoln Street Historic District consists of 14 buildings of mid-19th century architecture and one relocated home of late 18th century architecture located south of the Project area in Brunswick. Most of the buildings are in Greek Revival style, the other styles represented include Transitional Greek Revival-Italianate, Italianate and Colonial-Colonial Revival. Most of the buildings have been well maintained and 14 of them are still used for their original residential purpose and one is used as a local historical society's museum.

The Federal Street Historic District consists of a grouping of late 18th, 19th, and 20th century architecture located south of the Project area in Brunswick. There are 138 homes and buildings within the historic district, the majority of which are Federal, Greek Revival and Colonial Revival. Many of these buildings can be considered vernacular examples of their style and buildings located on Bowdoin College campus are some of the major works by architects of state and national importance. Most of the buildings within the historic district are currently in good to excellent condition (information taken from NRHP Inventory-Nomination Forms).

4.11.1.2.1 Identification of Historic Districts and Properties within the Project

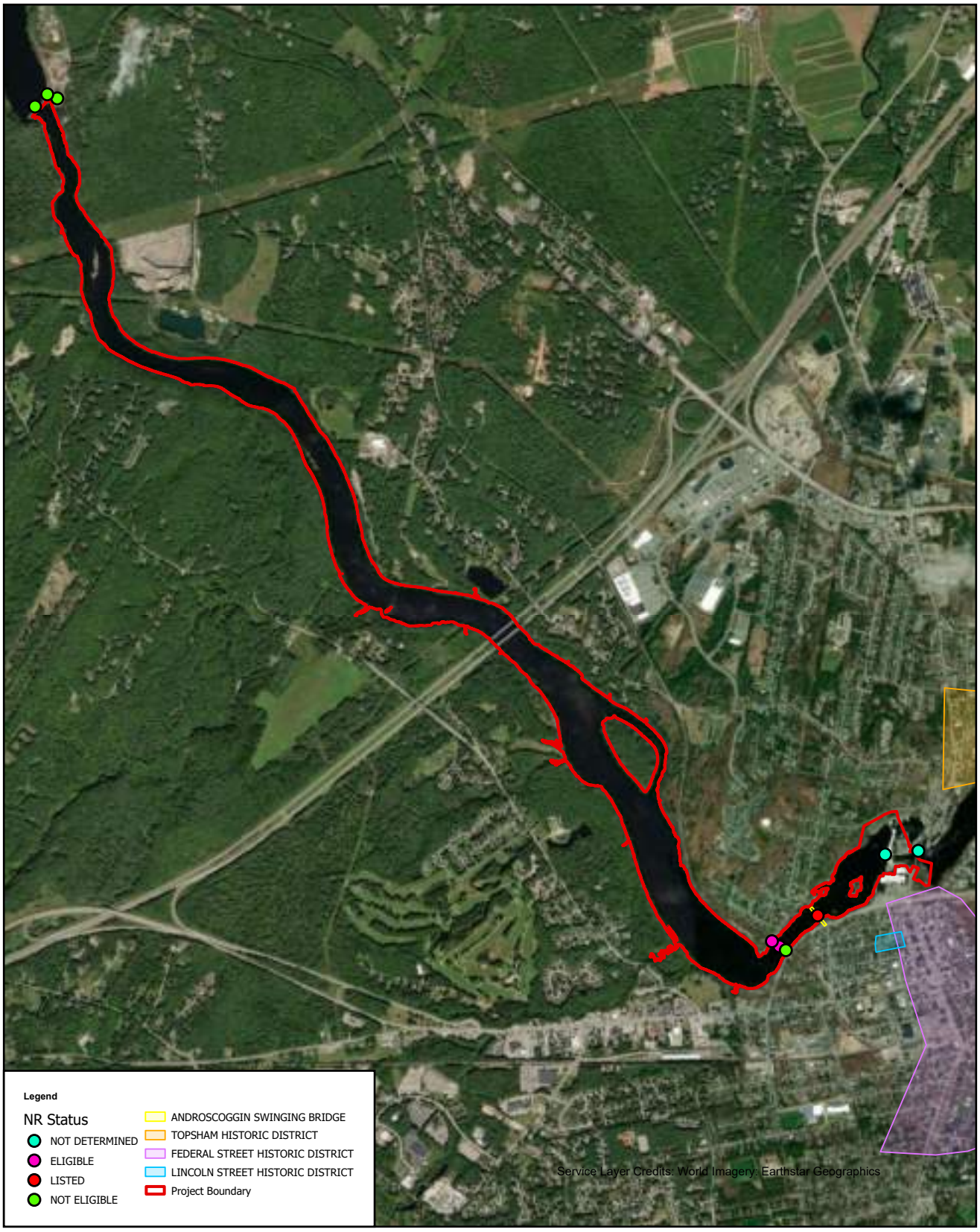
Background research in the MHPC online Cultural & Architectural Resource Management Archive (CARMA) and in the NRHP online map viewer shows the Brunswick Project boundary partially overlaps the Androscoggin Swinging Bridge Historic District (Figure 4.11.1.2.1-1). The Androscoggin Swinging Bridge Historic District (Historic District) includes the Androscoggin Swinging Bridge. The bridge was built in 1892 by John A. Roebling's Sons Co., the bridge was built so workers could cross the Androscoggin River from the Topsham Heights neighborhood to Brunswick where they worked at the Cabot Mill. The bridge also provided access to the commercial district on Mill Street in Brunswick and later to access churches in Brunswick. The bridge is one of three of its kind remaining in the State of Maine. In 1936 the bridge was damaged in a flood, destroying all the railings, original deck, and wood safety fence. Since the towers were still intact, the remainder of the bridge was rebuilt. The Swinging Bridge Historic District was listed on the NRHP in 2004.

In addition to the Swinging Bridge Historic District the Brunswick Project boundary contains the following six historic resources (Table 4.11.1.2.1-1). The Free/Black Bridge #0323, this bridge spans the Androscoggin River is eligible for listing on the NRHP. This bridge was built in 1909 and consisted of a double deck bridge with a single railroad track on the upper level and a single land road on the lower level. The lower-level road portion was removed in 2010. The Pejepscot Project is not eligible for listing on the NRHP. The Maine Central Railroad portion that spans the Androscoggin River is also not eligible for listing on NRHP. The National Register of Historic Places eligible for listing for the Frank J. Wood Bridge and the Brunswick-Topsham Dam have not been determined.

Table 4.11.1.2.1-1. Historic Resources Located Inside the Project Boundary Identified in CARMA

Name	Location	Construction Date	NRHP Status
Pejepscot Dam	Spans Androscoggin River	c. 1895	Not Eligible

Pejepscot Hydro Facility	East side of Androscoggin River	1898	Not Eligible
Free/Black Bridge #0323	Spans Androscoggin River	1909, alteration 1957 and c. 1950	Eligible
Maine Central Railroad	Spans Androscoggin River	c. 1860-1861, alteration 1909 & 19571957	Not Eligible
Androscoggin Swinging Bridge	Spans Androscoggin River	1892, alteration 1936	Listed
Brunswick-Topsham Dam	Spans Androscoggin River	c. 1908-1920	Not Determined
Frank J. Wood Bridge	Spans Androscoggin River	1932, alteration 2008	Not Determined



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

N

0 5001,000 2,000 US Feet

Figure 4.11.1.2.1-1: Historic Structures and Districts

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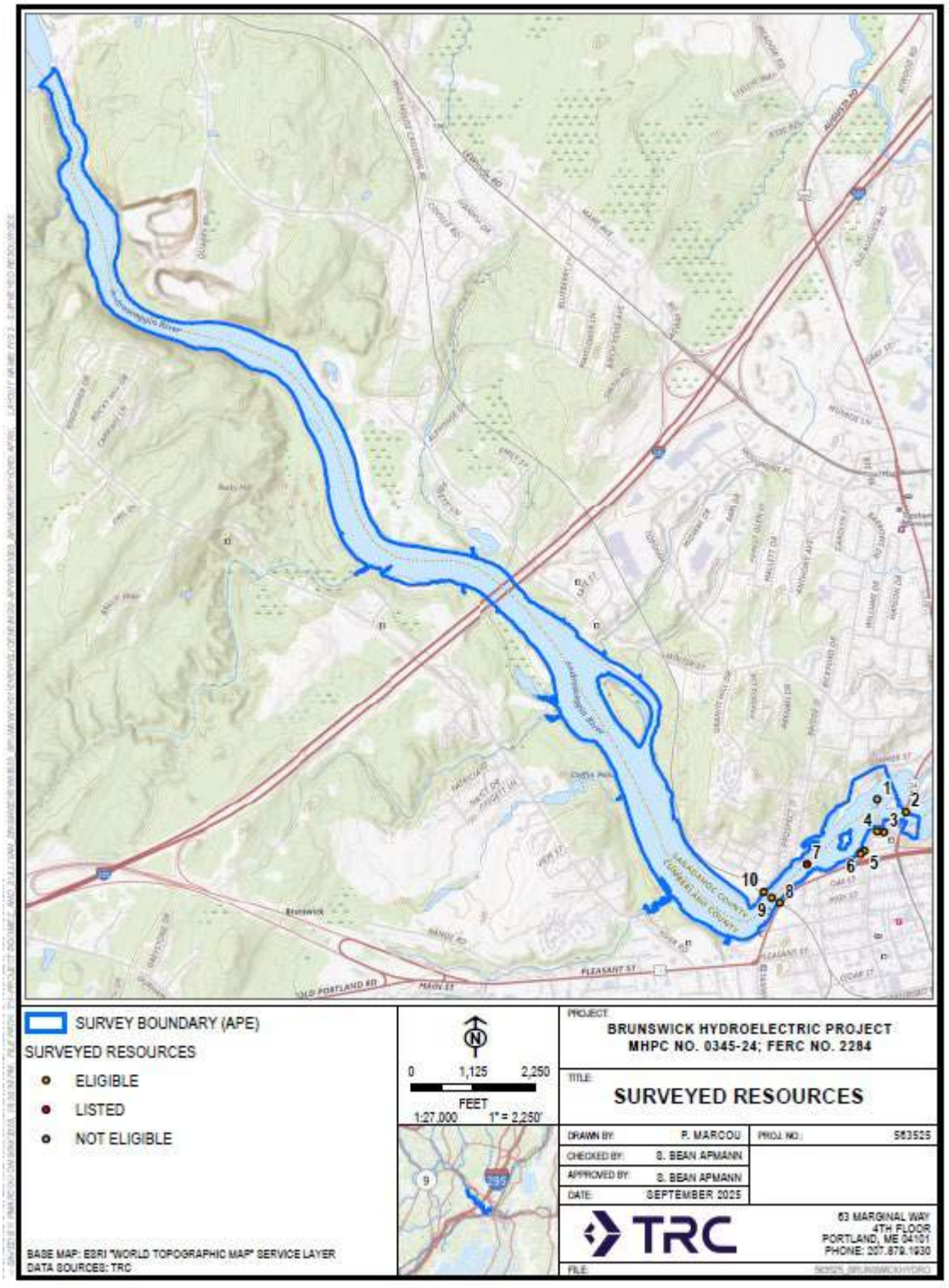
4.11.1.2.2 Architectural Survey Conducted for Relicensing

Following an initial consultation request with the MHPC, the agency requested an architectural survey for the Project (BWPH 2026c). The proposed APE of the Project area was approved by MHPC on July 14, 2025. On August 27, 2025, a field survey was conducted by BWPH within and of properties abutting the APE. Ten resources were identified and assessed for effect (Figure 4.11.1.7-1 and Table 4.11.1.2.2-1). The Pejepscot Dam, the Pejepscot Hydro Facility, and the Maine Central Railroad were not included in the survey due to their NRHP ineligibility. The Brunswick – Topsham Dam, identified as part of the background research, was erroneously dated in CARMA as having been built c. 1908-1920. In fact, the current dam was constructed between 1979 and 1982. Therefore, it does not meet the minimum age requirement of 50 years for NRHP eligibility consideration.

Table 4.11.1.2.2-1. Historic Resources Surveyed Within or Abutting the APE

Name	Location	Construction Date	NRHP Status
Brunswick – Topsham Dam	Crosses the Androscoggin River	1979-1982	Not Eligible
Free/Black Bridge #0323	Spans Androscoggin River	1909, alteration 1957 and c. 1950	Eligible
Mill Road Overpass Bridge #0999	Crosses over Town Way	1909	Eligible
Androscoggin Swinging Bridge	Spans Androscoggin River	1892, alteration 1936	Listed
Mill Street Overpass Bridge #0333	Crosses over Mill Street	1957	Eligible
Frank J. Wood Bridge	Spans Androscoggin River	1932, alteration 2008	Not Determined
Cabot Manufacturing Mills	Mill Street	1891-1892	Contributing Resource to the NRHP eligible Brunswick – Topsham Industrial Historic District
Cabot Mill (Fort Andross)	14 Maine Street	c. 1850s	Contributing Resource to the NRHP eligible Brunswick – Topsham Industrial Historic District
Cabot Tenement	18 Bow Street	c. 1850	Contributing Resource to the NRHP eligible Brunswick – Topsham Industrial Historic District
Cabot Tenement	2 Bow Street	c. 1867	Contributing Resource to the NRHP eligible Brunswick – Topsham Industrial Historic District

Figure 4.11.1.2.2-1: Historic Resources Surveyed Within or Abutting the APE



4.11.1.2.3 Finding of Effect

Based on the survey results and that no construction or other changes to the Project are planned as part of the renewal of the Project's FERC licenses, no historic properties (architectural) will be affected by the Project, as defined by Section 106. MHPC concurred with this finding on November 12, 2025.

4.11.2 Environmental Analysis

FERC's SD2 identified the following potential resource issues relating to cultural resources, which is discussed in greater detail below.

Effects of continued Project operation and maintenance activities on historic and archaeological resources, traditional cultural properties, and access to exercise traditional practices and treaty rights.

To protect cultural resources at the Project during the term of a new license, BWPH is proposing to implement a HPMP, which will provide background information on cultural resources at the Project, including maps of the APE and archaeological and historic sites, preservation goals and priorities, project effects, and consultation requirements. A draft HPMP will be provided with the FLA.

The continued operation of the Project, as proposed, will not have an effect on the identified archaeological resources or historic properties (architectural) since the proposed Project would not involve any new construction or ground disturbing activities that would impact these sites. However, in order to protect the sites from the effects of any future modification or activities that could potentially take place at the Project, the HPMP would be implemented in accordance with the conditions of a new license. Therefore, pursuant to the National Historic Preservation Act, Section 106 (16 U.S.C. § 470f), the proposed relicensing of the Project would not have any adverse effects on historic properties and archaeological resources located at the Project.

4.11.3 Proposed Environmental Measures

BWPH proposes to develop an HPMP, which will ensure that appropriate consultation occurs prior to any future activity that may affect the eligible historic properties associated with the Project.

4.11.4 Unavoidable Adverse Effects

Continued operation of the Project will not result in any unavoidable adverse impacts to cultural resources.

4.11.5 References

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4.12 Socio-Economic Resources

4.12.1 Affected Environment

The Project is located on the Androscoggin River between the towns of Brunswick and Topsham, and straddles the border between Cumberland and Sagadahoc Counties, Maine. (see Figure 3.2.1-1). The area surrounding the dam has a history of industrial use, as evidenced by the adjacent Cabot Mill building. The Cabot Mill closed in 1955 and is now used for retail businesses and office space. Today, the downtown area of Brunswick within the vicinity of the Project dam is home to Bowdoin College and has an active arts and entertainment culture. The national Main Street designation shows the commitment to economic development, while preserving the history of the town (mainstreetmaine.org 2026). The Project and BWPH continue to bring economic benefits to these communities. In addition to paying property taxes to both towns, BWPH's parent company (Brookfield Renewable, N.A.) maintains offices in Augusta, ME. Brookfield Renewable, N.A. also provides annual support and engages in various causes throughout the Androscoggin region and Maine. The following sections summarize the area's existing socioeconomic condition.

4.12.1.1 General Land Use Patterns

The County Seat for Cumberland County is Portland, Maine. Cumberland County accounts for only about 4% of the total land mass in Maine, however, is the most densely populated county, with approximately 23% of the population of the state (Cumberland County, Maine, 2021). Within Cumberland County, approximately 60% of the housing units are considered urban; this value is significantly higher than the state's 36%, and Sagadahoc County's 38%. In Cumberland County, 60% of the housing units are in urban settings, with 40% in rural areas (Table 4.12.1.1-1).

The town of Brunswick is more than double the population of Topsham, however they have similar urban and rural housing unit percentages, with 79% urban in Brunswick, and 78% in Topsham. Similarly, 21% of the housing units in Brunswick are rural, and 22% are rural in Topsham (Table 4.12.1.1-1).

Table 4.12.1.1-1. Land Use and Population Density

	Cumberland County	Sagadahoc County	Town of Brunswick	Town of Topsham	State of Maine
Population	317,222	37,979	23,055	9,982	1,414,874
Total Housing units	153,286	19,239	9,523	4,313	751,876
Percent Urban Residences	60%	38%	79%	78%	36%
Percent Rural Residences	40%	62%	21%	22%	64%
Land Area (Square Miles)	836.22	253.97	46.78	32.18	30,845.10
Persons per square mile	362.4	144.5	465.1	297.1	44.2
Housing units per square mile*	183.3	75.8	203.6	134.0	24.4

Source: U.S. Census 2020, 2025

*Housing units per square mile calculated by dividing the number of housing units for a given area by the land area in square miles for the same area.

4.12.1.2 Population Patterns

The United States Census Bureau's annual estimates of the resident populations for Cumberland County, Sagadahoc County, Topsham, Brunswick, and Maine from 2010 through 2025 are shown in Table 4.12.1.2-1. As shown in Table 4.12.1.2-1, in the years between 2010 and 2020 the state of Maine saw small, relatively comparable annual increases in population, followed by a large annual increase (2.1%) in 2021. The years 2021 and 2022 saw significant increases in population in the state compared to the prior ten years, likely due to an influx of new residents seeking more rural living arrangements during the Covid-19 pandemic. According to the Portland Press Herald (2021), an established regional newspaper, typical pre-pandemic out-of-state home sales were 25%, but that number increased to 40% during the pandemic. This trend was echoed in Cumberland and Sagadahoc Counties.

Between 2010 and 2020 Cumberland County grew at a higher rate than the state and did not see any decreases in annual population during that time, while the towns of Brunswick and Topsham experienced some years of decreasing population, but an overall increase since 2010 of 13.7% and 13.6%, respectively Table 4.12.1.2-1.

The Maine Department of Administration and Financial Services, State Economist (MEDAFS) continually produces growth projections for the state, including counties and towns, for 5-year intervals. The current projections extend through 2042 and are summarized in Table 4.12.1.2-2. Generally, MEDAFS predicts growth for the state of Maine, both counties, and both towns that the Project is located within (Table 4.12.1.2-2.). Sagadahoc County is predicted to have the most significant growth between 2022 and 2042 at 6.8%, which is 6.0% higher than the expected growth for the state (Table 4.12.1.2-2).

Table 4.12.1.2-1. Population Change from 2010 to 2025

	Census		Population Estimate													
Area	**2010**	**2020**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2021**	**2022**	**2023**	**2024**	**2025**
Cumberland County	281,674	303,069	282,709	283,645	285,537	288,086	289,488	291,191	292,181	293,673	295,003	305,231	307,451	305,940	308,827	317,222
Annual Change			0.40%	0.30%	0.70%	0.90%	0.50%	0.60%	0.30%	0.50%	0.50%	3.50%	0.70%	-0.50%	0.94%	2.72%
Change from 2010		7.60%	0.40%	0.70%	1.40%	2.30%	2.80%	3.40%	3.70%	4.30%	4.70%	8.40%	9.20%	8.61%	9.64%	12.62%
Sagadahoc County	35,293	36,699	35,121	35,115	35,021	35,076	35,120	35,156	35,436	35,690	35856	36,530	37,393	37,093	37,285	37,979
Annual Change			-0.50%	0.00%	-0.30%	0.20%	0.10%	0.10%	0.80%	0.70%	0.50%	1.88%	2.36%	-0.80%	0.52%	1.86%
Change from 2010		4%	-0.50%	-0.50%	-0.80%	-0.60%	-0.50%	-0.40%	0.40%	1.10%	1.60%	3.50%	6.00%	5.10%	5.64%	7.61%
Town of Brunswick	20,278	21,756	20,297	20,325	20,354	20,427	20,596	20,497	20,460	20,528	20,535	21,589	21,830	22,081	22,336	23,055
Annual Change			0.10%	0.10%	0.10%	0.40%	0.80%	-0.50%	-0.20%	0.30%	0.00%	5.13%	1.12%	1.15%	1.15%	3.22%
Change from 2010		7.70%	0.10%	0.20%	0.40%	0.70%	1.60%	1.10%	0.90%	1.20%	1.30%	6.47%	7.65%	8.89%	10.15%	13.69%
Town of Topsham	8,784	9,560	8,723	8,714	8,691	8,713	8,731	8,743	8,805	8,866	8,878	9,431	9,741	9,644	9,706	9,982
Annual Change			-0.60%	-0.10%	-0.30%	0.30%	0.20%	0.10%	0.70%	0.70%	0.10%	6.23%	3.29%	-1.00%	0.64%	2.84%
Change from 2010		10.90%	-0.60%	-0.80%	-1.10%	-0.80%	-0.60%	-0.50%	0.20%	0.90%	1.10%	7.37%	10.89%	9.79%	10.50%	13.64%
Maine	1,328,361	1,362,359	1,328,284	1,327,729	1,328,009	1,330,513	1,328,262	1,331,317	1,334,612	1,339,057	1,344,212	1,372,247	1,385,340	1,377,400	1,387,817	1,414,874
Annual Change			0.00%	0.00%	0.00%	0.20%	-0.20%	0.20%	0.20%	0.30%	0.40%	2.10%	1.00%	-0.57%	0.76%	1.95%
Change from 2010		2.60%	0.00%	0.00%	0.00%	0.20%	0.00%	0.20%	0.50%	0.80%	1.20%	3.30%	4.30%	3.69%	4.48%	6.51%

Source: U.S. Census 2024a[9], 2025

[9] Data 2024 and older was obtained using the DP05 Census table and selecting different years as needed.

Table 4.12.1.2-2. Population Projections 2022 through 2042

Area	Observed*	Projections				Percent Change from Previous Period				Ten-Year Percent Change	Total Percent Change
	2022	2027	2032	2037	2042	2022-2027	2027-2032	2032-2037	2037-2042	2022-2032	2022-2042
Maine	1,389,338	1,419,888	1,438,344	1,438,019	1,424,857	2.2%	1.3%	0.0%	-0.9%	2.4%	1.8%
Cumberland County	308,837	316,999	322,973	325,336	324,302	2.6%	1.9%	0.7%	-0.3%	4.6%	5.0%
Sagadahoc County	37,372	38,859	39,717	40,003	39,922	4.0%	2.2%	0.7%	-0.2%	6.3%	6.8%
Town of Brunswick	22,475	23,336	24,107	24,618	24,873	3.5%	5.5%	3.8%	3.3%	2.1%	1.0%
Town of Topsham	9,736	10,191	10,481	10,623	10,667	4.7%	5.0%	4.7%	2.8%	1.4%	0.4%

Source: MEDAFS 2025

*There are minor variations in the observed population totals between the Census data and the State Economist data. Variations incorporated to maintain percent values.

4.12.1.3 Households / Family Distribution and Income

Household statistics for 2024, including income and poverty levels, are presented in Table 4.12.1.3-1. As shown, average household sizes do not vary greatly in the Project area. The average household sizes for Cumberland County, Sagadahoc County, Brunswick, Topsham, and the state of Maine range between 2.24 and 2.38 people per household (Table 4.12.1.3-1).

Within the Project area, Cumberland County's median and per capita incomes were the highest, at $95,677, and $55,739, respectively, while the lowest median and per capita incomes were observed in the town of Brunswick, at $74,952, and $44,065, respectively (Table 4.12.1.3-1). The median and per capita incomes for the town of Topsham were slightly higher than Sagadahoc County, at $91,028, and $51,713, respectively, in the town of Topsham, and $87,806, and $47,808, respectively, in Sagadahoc County (Table 4.12.1.3-1). All towns and counties within the Project area have higher median and per capita incomes than the state of Maine, with median and per capita household incomes of $74,733, and $43,742, respectively (Table 4.12.1.3-1).

Maine's poverty rate (i.e., the percentage of persons in poverty) for all ages was 10.6% in 2024 (Table 4.12.1.3-1). Cumberland County, Sagadahoc County, and the towns of Brunswick and Topsham all had lower poverty rates than the state of Maine, at 8.0, 7.8, and 7.7, and 6.4%, respectively (Table 4.12.1.3-1).

Table 4.12.1.3-1. Income and Poverty, 2020 - 2024

	Cumberland County	Sagadahoc County	Town of Brunswick	Town of Topsham	State of Maine
Total households	132,168	16,446	8,913	4,011	597,159
Average household size	2.26	2.25	2.24	2.38	2.26
Median household income	$95,677	$87,806	$74,952	$91,028	$74,733
Percentage of State	128%	117%	100%	122%	--
Percentage of U.S. ($69,021)	139%	127%	109%	132%	108%
Per capita income	$55,739	$47,808	$44,065	$51,713	$43,742
Percentage of State	127%	109%	101%	118%	--
Percentage of U.S. ($37,638)	148%	127%	117%	137%	116%
Persons in Poverty	8.0%	7.8%	7.7%	6.4%	10.6%

Source: U.S. Census 2025

4.12.1.4 Project Vicinity Employment Sources

Table 4.12.1.4-1 depicts the Census Bureau's 2024 statistics for the unemployment rate and labor force for the Project area. As shown, the 3.1% unemployment rate in Cumberland County is slightly lower than the state unemployment rate of 3.8% (Table 4.12.1.4-1). Sagadahoc County, the town of Brunswick, and the town of Topsham are all slightly higher than Maine's unemployment rate, at 4.6, 4.6, and 4.3%, respectively (Table 4.12.1.4-1).

Table 4.12.1.4-2 presents industry and occupation statistics for 2024 within the Project area. Management, business, science, and arts are the most common occupations in the Project area, followed by sales and office occupations, and service occupations (Table 4.12.1.4-2). Natural resources, construction, and maintenance is the next most common occupation in Sagadahoc County, and Topsham, while production, transportation, and material moving is the next most common occupation in Cumberland County, the town of Brunswick, and the state of Maine (Table 4.12.1.4-2). The most common industries for all municipalities and counties within the Project area were educational services, health care, and social assistance (Table 4.12.1.4-2).

In both Cumberland and Sagadahoc Counties, one employer employs significantly higher numbers of people than any of the others; in Cumberland County that employer is MaineHealth, with 6,501 – 7,000 employees (Tables 4.12.1.4-3), and in Sagadahoc County that employer is Bath Iron Works, with 6,001 – 6,500 employees (Table 4.12.1.4-3). Within Cumberland County Unum Group employs the second largest number of people at 2,001 to 2,500, and Bowdoin College, L.L. Bean, and Idexx Laboratories Inc. employ approximately the same number of individuals, at 1,001 to 1,500 people. Finally, Idexx Operations Inc., L.L. Bean Inc., MaineHealth, Mercy Hospital, and the University of New England, each employing approximately 501 – 1,000 people (Table 4.12.1.4-4).

Within Sagadahoc County, with the exception of Bath Iron Works, the companies generally employ fewer numbers of people. The remaining top nine employers each employ approximately 1 to 500 people. These include the Bath Area Family YMCA, Demoulas Super Markets, Reed & Reed Inc., Grace Management Inc., Hannaford Bros Co., Crooker Constructions LLC, Target Corp., Shaws Supermarkets Inc., and Home Depot (Table 4.12.1.4-4).

Table 4.12.1.4-1. Labor Force and Unemployment, 2024

	Cumberland County	Sagadahoc County	Town of Brunswick	Town of Topsham	State of Maine
Labor Force	175,357	19,849	11,610	5,166	719,683
Unemployment	3.1%	4.6%	4.6%	4.3%	3.8%

Source: U.S. Census 2024b

Table 4.12.1.4-2. Industry and Occupation for Civilian Population 16 Years and Over, 2024

	Cumberland County	Sagadahoc County	Town of Brunswick	Town of Topsham	State of Maine
Occupation					
Management, business, science, & arts	52.4%	46.3%	53.5%	44.4%	42.5%
Service	14.0%	15.6%	14.6%	22.0%	15.8%
Sales & office	18.2%	18.7%	16.3%	17.6%	19.6%
Natural resources, construction, maintenance	6.3%	10.8%	6.3%	11.9%	10.3%
Production, transportation, material moving	9.2%	8.6%	9.3%	4.2%	11.9%
Industry					
Agriculture, forestry, fishing and hunting, and mining	1.1%	1.5%	2.2%	1.5%	2.4%
Construction	5.8%	7.9%	3.5%	8.1%	7.7%
Manufacturing	7.7%	11.4%	9.0%	6.5%	8.879%
Wholesale trade	1.9%	1.6%	1.8%	1.5%	1.7%
Retail trade	11.0%	12.5%	10.9%	12.3%	12.6%
Transportation and warehousing, and utilities	3.8%	2.9%	2.3%	1.9%	4.3%
Information	2.2%	0.9%	1.6%	1.2%	1.6%
Finance and insurance, and real estate and rental and leasing	8.9%	6.3%	4.8%	5.3%	6.4%

	Cumberland County	Sagadahoc County	Town of Brunswick	Town of Topsham	State of Maine
Professional, scientific, and management, and administrative and waste management services	14.3%	11.2%	11.3%	8.1%	10.4%
Educational services, and health care and social assistance	27.4%	25.8%	33.3%	27.2%	27.4%
Arts, entertainment, and recreation, and accommodation and food services	8.8%	7.6%	11.4%	12.2%	7.8%
Other services, except public administration	4.2%	5.4%	5.6%	9.1%	4.4%
Public administration	2.9%	5.0%	2.0%	5.1%	4.4%

Source: U.S. Census 2024b

Table 4.12.1.4-3. Top 10 Private Employers in Cumberland County by Average Monthly Employment (4th Quarter 2025)

Rank	Name	Employment Range	Business Description
1	Mainehealth	6,501 to 7,000	General Medical and Surgical Hospitals
2	Unum Group	2,001 to 2,500	Direct Life Insurance Carriers
3	Bowdoin College	1,001 to 1,500	Colleges, Universities, and Professional Schools
4	L.L.Bean, INC.	1,001 to 1,500	General Warehousing and Storage
5	Idexx Laboratories INC	1,001 to 1,500	Pharmaceutical Preparation Manufacturing
6	Idexx Operations INC	501 to 1,000	Drugs and Druggists' Sundries Merchant Wholesalers
7	L.L.Bean, INC.	501 to 1,000	Corporate, Subsidiary, and Regional Managing Offices
8	Mainehealth	501 to 1,000	General Medical and Surgical Hospitals
9	Mercy Hospital	501 to 1,000	General Medical and Surgical Hospitals
10	University Of New England	501 to 1,000	Colleges, Universities, and Professional Schools

Source: Maine.gov 2025

Table 4.12.1.4-4. Top 10 Private Employers in Sagadahoc County by Average Monthly Employment (4th Quarter 2025)

Rank	Name	Employment Range	Business Description
1	Bath Iron Works Corp Gen Dynamics	6,001 to 6,500	Ship Building and Repairing
2	Bath Area Family Ymca	1 to 500	Civic and Social Organizations
3	Demoulas Super Markets INC	1 to 500	Supermarkets and Other Grocery Retailers (except Convenience Retailers)
4	Reed & Reed INC	1 to 500	Highway, Street, and Bridge Construction
5	Grace Management INC	1 to 500	Continuing Care Retirement Communities
6	Hannaford Bros Co	1 to 500	Supermarkets and Other Grocery Retailers (except Convenience Retailers)
7	Crooker Construction LLC	1 to 500	Highway, Street, and Bridge Construction
8	Target Corp	1 to 500	Department Stores
9	Shaws Supermarkets INC	1 to 500	Supermarkets and Other Grocery Retailers (except Convenience Retailers)
10	Home Depot U S A INC	1 to 500	Home Centers

Source: Maine.gov 2025

4.12.2 Environmental Analysis

FERC's SD2 did not identify any potential resource issues related to socioeconomic resources.

As a generator of electric power, an employer, and a taxpayer in the region, BWPH contributes to socioeconomic resources of the region. In addition, the Project provides recreational facilities on the Androscoggin River. BWPH is not proposing any changes to Project operations and the socioeconomic benefits associated with the Project will continue.

4.12.3 Proposed Environmental Measures

BWPH is not proposing any PME measures related to socioeconomic resources.

4.12.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts to socioeconomic resources are expected to occur as a result of the continued operation of the Project.

4.12.5 References

Cumberland County, Maine. 2021. Recovery Plan | State and Local Fiscal Recovery Funds, 2021 Report, Report 1. [Online] URL: https://home.treasury.gov/system/files/136/Cumberland-County_2021-Recovery-Plan_SLT-0709.pdf. Accessed August 6, 2026.

Maine Department of Administration and Financial Services State Economist (MEDAFS). 2025. Demographic Projections. April 2025 release. [Online] URL: https://www.maine.gov/dafs/economist/demographic-projections. Accessed August 6, 2026.

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United States Census Bureau (U.S. Census). 2020. H2 | Urban and Rural. [Online] URL: https://data.census.gov/table/DECENNIALDHC2020.H2?q=H2:+URBAN+AND+RURAL&g=040XX00US23_050XX00US23005,23023_060XX00US2300508430,2302376960. Accessed August 6, 2026.

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United States Census Bureau (U.S. Census). 2024b. DP03 | Selected Economic Characteristics. [Online] URL: https://data.census.gov/table/ACSDP5Y2024.DP03?q=DP03&g=040XX00US23_050XX00US23005,23023_060XX00US2300508430,2302376960&moe=false. Accessed August 6, 2026.

United States Census Bureau (U.S. Census). 2025. QuickFacts | Maine; Topsham town, Sagadahoc County, Maine; Brunswick town, Cumberland County, Maine; Sagadahoc County, Maine; Cumberland County, Maine. [Online] URL: https://www.census.gov/quickfacts/fact/table/ME,topshamtownsagadahoccountymaine,brunswicktowncumberlandcountymaine,sagadahoccountymaine,cumberlandcountymaine/HSG010225#HSG010225. Accessed July 31, 2026.

5 ECONOMIC ANALYSIS

This section presents the estimated annual value of developmental resources associated with the Project under the current license, the cost of operating and maintaining the Project under the existing license, the cost of each PME measure, and the reduction in the value of the developmental resources of the Project attributed to proposed PME measures.

5.1 Costs and Value of Developmental Resources Associated with the Project

[TO BE PROVIDED IN FINAL LICENSE APPLICATION]

5.2 Costs of Proposed PME Measures

[TO BE PROVIDED IN FINAL LICENSE APPLICATION]

6 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, and conserving waterways affected by the Project. In accordance with Section 10(a)(1) of the FPA, the list of Commission approved federal and state comprehensive plans was reviewed to determine applicability to the Project. The federal resources agencies, as well as the State of Maine, have prepared a number of comprehensive plans, which provide a general assessment of a variety of environmental conditions in Maine. These plans address water quality, water pollution control, wetlands, recreation, and land management issues. In addition, the State of Maine's plans include policies related to ensuring that the State's energy needs are met and supporting hydropower, a renewable and indigenous source, as a valuable portion of the energy mix. The Project's consistency with pertinent state and federal comprehensive plans is discussed in Exhibit H, which provides a review of the proposed relicensing in consideration of any existing FERC approved comprehensive management plans.

APPENDIX E-1: HISTORIC PROPERTIES MANAGEMENT PLAN

TO BE PROVIDED IN FINAL LICENSE APPLICATION

APPENDIX E-2: DRAFT LICENSE APPLICATION COMMENT RESPONSIVENESS SUMMARY

This section summarizes the stakeholder comments received on the DLA as well as BWPH response detailing how the comment was addressed in the FLA. Stakeholder comments were due on or before December 29, 2026. BB2H received timely comments from the following entities:

- TO BE PROVIDED IN FINAL LICENSE APPLICATION

Comment ID	Comment	How Addressed in FLA
TO BE PROVIDED IN FINAL LICENSE APPLICATION		

EXHIBIT F
GENERAL DESIGN DRAWINGS AND SUPPORTING DESIGN REPORT

October 2026

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT F
GENERAL DESIGN DRAWINGS AND SUPPORTING DESIGN REPORT

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3 Critical Energy Infrastructure Information 1

LIST OF ABBREVIATIONS AND DEFINITIONS

BWPH	Brookfield White Pine Hydro
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
Commission	Federal Energy Regulatory Commission
FERC	Federal Energy Regulatory Commission
FOIA	Freedom of Information Act
Project	Brunswick Hydroelectric Project (FERC No. 2284)

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT F
GENERAL DESIGN DRAWINGS AND SUPPORTING DESIGN REPORT

1 EXHIBIT F DRAWINGS

The following design drawings showing plan, elevations, and sections of the principal Brunswick Hydroelectric Project (Project) works are included. BWPH is requesting that the Exhibit F Drawings for the Project be given privileged treatment as CEII.

Sheet No.	Title
F-1	Project Plan
F-2	Powerhouse Plan, Sections & Elevation
F-3	Project Elevation and Sections

2 SUPPORTING DESIGN REPORT

18 C.F.R. §4.41(g)(3) requires that an applicant for a new license file with the Commission a Supporting Design Report when the applicant files a license application. The purpose of the Supporting Design Report is to demonstrate that the existing structures are safe and adequate to fulfill their stated functions. BWPH is requesting that the Supporting Design Report for the Project be given privileged treatment as CEII.

3 CRITICAL ENERGY INFRASTRUCTURE INFORMATION

In accordance with Federal Energy Regulatory Commission (FERC or the Commission) regulations, certain sensitive information related to this relicensing proceeding is being filed under separate cover with the Commission only (see Volume II-CEII). Special handling of this material is required to protect the security of critical energy infrastructure.

In order to protect critical energy infrastructure, the Commission has enacted regulations to govern public access to certain information. The Exhibit F drawings and Supporting Design Report referenced herein contain sensitive and detailed engineering information that, if used improperly, may compromise the safety of the Project and those responsible for its operation. Therefore, the Exhibit F drawings and Supporting Design Report have been labeled “Contains Critical Energy Infrastructure Information – Do Not Release.” This information has been submitted to FERC under separate cover. Agencies may file a CEII request under 18 C.F.R. §

388.113 or a Freedom of Information Act (FOIA) request under 18 CFR § 388.108 to obtain the Exhibit F drawings.

EXHIBIT G
PROJECT MAPS

October 2026

BRUNSWICK HYDROELECTRIC PROJECT

(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT G
PROJECT MAPS

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LIST OF ABBREVIATIONS AND DEFINITIONS

BWPH	Brookfield White Pine Hydro
CFR	Code of Federal Regulations
Commission	Federal Energy Regulatory Commission
FERC	Federal Energy Regulatory Commission
Project	Brunswick Hydroelectric Project (FERC No. 2284)

BRUNSWICK HYDROELECTRIC PROJECT
(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT G
PROJECT MAPS

1 PROJECT MAPS

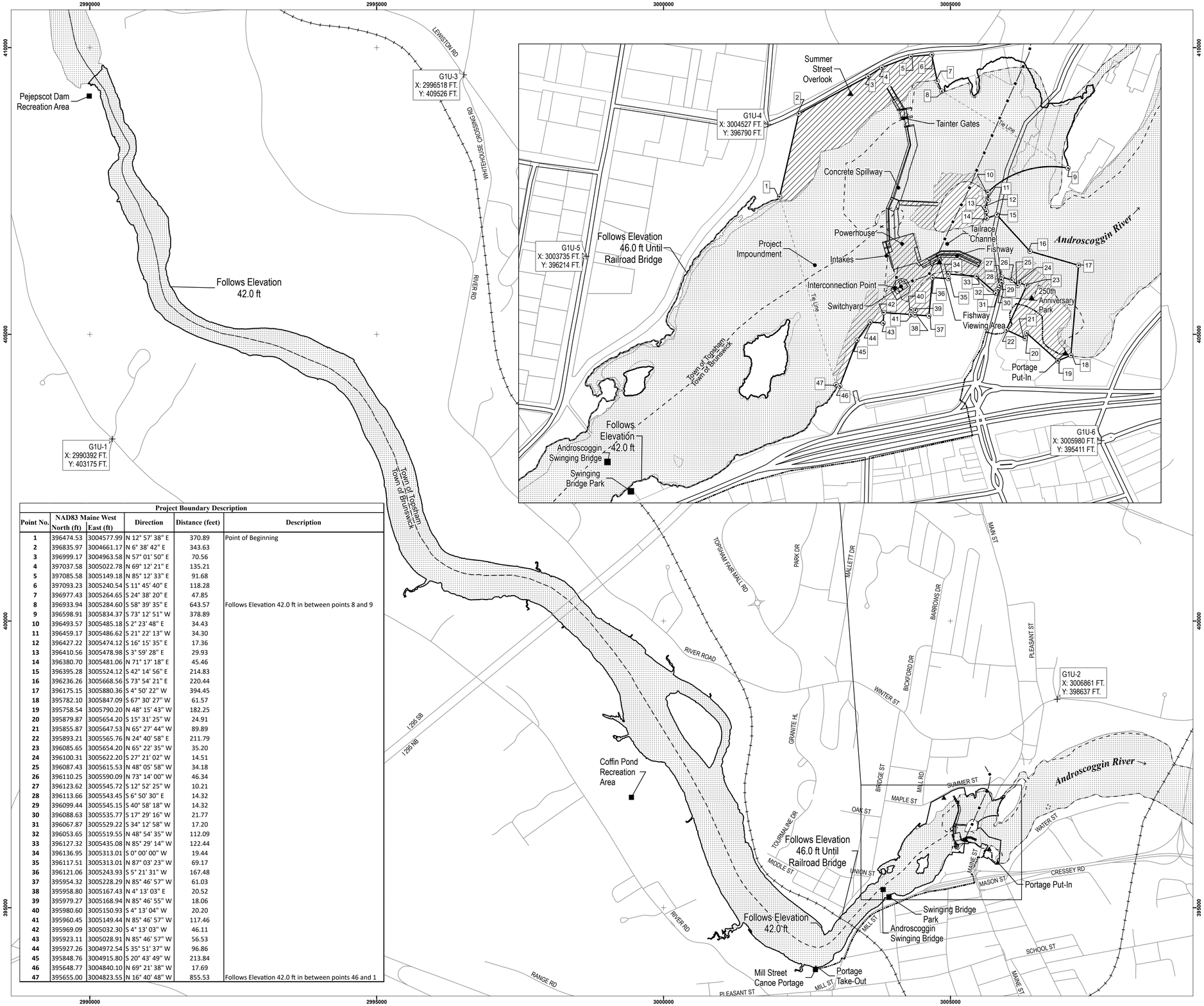
The following maps define the location of the Brunswick Hydroelectric Project (Project), principal features, and Project boundary:

Sheet No.	Title
G-1	Project Boundary Map

The Project boundary maps have been prepared in accordance with the requirements of 18 Code of Federal Regulations (CFR) §§ 4.39 and 4.41(h) and applicable Federal Energy Regulatory Commission (FERC) guidance.

There are no public lands or reservations of the United States within the Project boundary.

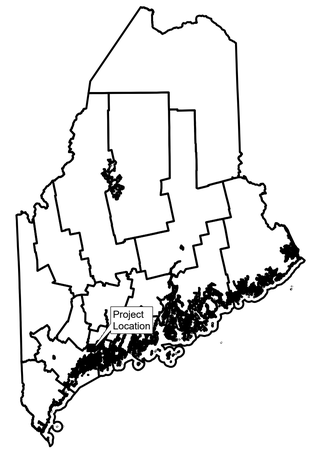
BWPH has acquired, either through fee, easement, or lease, all land rights necessary to operate the Project. Lands to which BWPH holds title or rights to are identified on the attached Exhibit G maps.



Project Boundary Description

Point No.	NAD83 Maine West North (ft)	NAD83 Maine West East (ft)	Direction	Distance (feet)	Description
1	396474.53	3004577.99	N 12° 57' 38" E	370.89	Point of Beginning
2	396835.97	3004661.17	N 6° 38' 42" E	343.63	
3	396999.17	3004963.58	N 57° 01' 50" E	70.56	
4	397037.58	3005022.78	N 69° 12' 21" E	135.21	
5	397085.58	3005149.18	N 85° 12' 33" E	91.68	
6	397093.23	3005240.54	S 11° 45' 40" E	118.28	
7	396977.43	3005264.65	S 24° 38' 20" E	47.85	
8	396933.94	3005284.60	S 58° 39' 35" E	643.57	Follows Elevation 42.0 ft in between points 8 and 9
9	396598.91	3005834.37	S 73° 12' 51" W	378.89	
10	396493.57	3005485.18	S 2° 23' 48" E	34.43	
11	396459.17	3005486.62	S 21° 22' 13" W	34.30	
12	396427.22	3005474.12	S 16° 15' 35" E	17.36	
13	396410.56	3005478.98	S 3° 59' 28" E	29.93	
14	396380.70	3005481.06	N 71° 17' 18" E	45.46	
15	396395.28	3005524.12	S 42° 14' 56" E	214.83	
16	396236.26	3005668.56	S 73° 54' 21" E	220.44	
17	396175.15	3005880.36	S 4° 50' 22" W	394.45	
18	395782.10	3005847.09	S 67° 30' 27" W	61.57	
19	395758.54	3005790.20	N 48° 15' 43" W	182.25	
20	395879.87	3005654.20	S 15° 31' 25" W	24.91	
21	395855.87	3005647.53	N 65° 27' 44" W	89.89	
22	395893.21	3005565.76	N 24° 40' 58" E	211.79	
23	396085.65	3005654.20	N 65° 22' 35" W	35.20	
24	396100.31	3005622.20	S 27° 21' 02" W	14.51	
25	396087.43	3005615.53	N 48° 05' 58" W	34.18	
26	396110.25	3005590.09	N 73° 14' 00" W	46.34	
27	396123.62	3005545.72	S 12° 52' 25" W	10.21	
28	396113.66	3005543.45	S 6° 50' 30" E	14.32	
29	396099.44	3005545.15	S 40° 58' 18" W	14.32	
30	396088.63	3005535.77	S 17° 29' 16" W	21.77	
31	396067.87	3005529.22	S 34° 12' 58" W	17.20	
32	396053.65	3005519.55	N 48° 54' 35" W	112.09	
33	396127.32	3005435.08	N 85° 29' 14" W	122.44	
34	396136.95	3005313.01	S 0° 00' 00" W	19.44	
35	396117.51	3005313.01	N 87° 03' 23" W	69.17	
36	396121.06	3005243.93	S 5° 21' 31" W	167.48	
37	395954.32	3005228.29	N 85° 46' 57" W	61.03	
38	395958.80	3005167.43	N 4° 13' 03" E	20.52	
39	395979.27	3005168.94	N 85° 46' 55" W	18.06	
40	395980.60	3005150.93	S 4° 13' 04" W	20.20	
41	395960.45	3005149.44	N 85° 46' 57" W	117.46	
42	395969.09	3005032.30	S 4° 13' 03" W	46.11	
43	395923.11	3005028.91	N 85° 46' 57" W	56.53	
44	395927.26	3004972.54	S 35° 51' 37" W	96.86	
45	395848.76	3004915.80	S 20° 43' 49" W	213.84	
46	395648.77	3004840.10	N 69° 21' 38" W	17.69	
47	395655.00	3004823.55	N 16° 40' 48" W	855.53	Follows Elevation 42.0 ft in between points 46 and 1

Index Map



Legend

- Project Boundary
- Maine Parcels
- Owned in Fee
- Project Boundary Point (see Project Boundary Description table for metes and bounds)
- Reference Points
- Project Recreation Site
- Non-Project Recreation Site
- Railroad
- Transmission Lines
- Portage Trail
- Municipality Boundary
- Waterbody

The licensee has acquired rights in fee or easement to all lands necessary for construction, maintenance, and operation of the project. Lands within the Project Boundary are owned in fee by the Licensee except where indicated. All islands above 42.2 feet are outside of the project boundary.

Coordinate System:
NAD83 State Plane
Maine West (feet)
Horizontal Datum:
NAD 1983
Vertical Datum:
NGVD 1929

14° 34' W
+/- 0° 22'
MN
TN
Declination changing by
0° 6' E per year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE BRUNSWICK HYDROELECTRIC PROJECT (FERC NO. P-2284) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE BRUNSWICK HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

EXHIBIT G - PROJECT BOUNDARY
BRUNSWICK HYDROELECTRIC PROJECT
FERC PROJECT NO. P-2284

Brookfield Renewable
460 Civic Center Drive
Augusta, ME 04330

0 400 800 1,600 2,400 3,200 Feet

EXHIBIT G-1 | 1 inch equals 800 feet | 1:9,600

Path: D:\Brookfield\02456\GIS\Maps\exhibit_g\exhibit_g.aprx

Project Boundary Description

Point ID	NAD83 State Plane Maine West		Direction	Distance (ft)	Description
	Northing	Easting			
1	396474.53	3004577.99	N 12° 57' 38" E	370.89	Point of Beginning
2	396835.97	3004661.17	N 6° 38' 42" E	343.63	
3	396999.17	3004963.58	N 57° 01' 50" E	70.56	
4	397037.58	3005022.78	N 69° 12' 21" E	135.21	
5	397085.58	3005149.18	N 85° 12' 33" E	91.68	
6	397093.23	3005240.54	S 11° 45' 40" E	118.28	
7	396977.43	3005264.65	S 24° 38' 20" E	47.85	
8	396933.94	3005284.60	S 58° 39' 35" E	643.57	Follows Elevation 42.0 ft in between points 8 and 9
9	396598.91	3005834.37	S 73° 12' 51" W	378.89	
10	396493.57	3005485.18	S 2° 23' 48" E	34.43	
11	396459.17	3005486.62	S 21° 22' 13" W	34.30	
12	396427.22	3005474.12	S 16° 15' 35" E	17.36	
13	396410.56	3005478.98	S 3° 59' 28" E	29.93	
14	396380.70	3005481.06	N 71° 17' 18" E	45.46	
15	396395.28	3005524.12	S 42° 14' 56" E	214.83	
16	396236.26	3005668.56	S 73° 54' 21" E	220.44	
17	396175.15	3005880.36	S 4° 50' 22" W	394.45	
18	395782.10	3005847.09	S 67° 30' 27" W	61.57	
19	395758.54	3005790.20	N 48° 15' 43" W	182.25	
20	395879.87	3005654.20	S 15° 31' 25" W	24.91	
21	395855.87	3005647.53	N 65° 27' 44" W	89.89	
22	395893.21	3005565.76	N 24° 40' 58" E	211.79	
23	396085.65	3005654.20	N 65° 22' 35" W	35.20	
24	396100.31	3005622.20	S 27° 21' 02" W	14.51	
25	396087.43	3005615.53	N 48° 05' 58" W	34.18	
26	396110.25	3005590.09	N 73° 14' 00" W	46.34	

Point ID	NAD83 State Plane Maine West		Direction	Distance (ft)	Description
	Northing	Easting			
27	396123.62	3005545.72	S 12° 52' 25" W	10.21	
28	396113.66	3005543.45	S 6° 50' 30" E	14.32	
29	396099.44	3005545.15	S 40° 58' 18" W	14.32	
30	396088.63	3005535.77	S 17° 29' 16" W	21.77	
31	396067.87	3005529.22	S 34° 12' 58" W	17.20	
32	396053.65	3005519.55	N 48° 54' 35" W	112.09	
33	396127.32	3005435.08	N 85° 29' 14" W	122.44	
34	396136.95	3005313.01	S 0° 00' 00" W	19.44	
35	396117.51	3005313.01	N 87° 03' 23" W	69.17	
36	396121.06	3005243.93	S 5° 21' 31" W	167.48	
37	395954.32	3005228.29	N 85° 46' 57" W	61.03	
38	395958.80	3005167.43	N 4° 13' 03" E	20.52	
39	395979.27	3005168.94	N 85° 46' 55" W	18.06	
40	395980.60	3005150.93	S 4° 13' 04" W	20.20	
41	395960.45	3005149.44	N 85° 46' 57" W	117.46	
42	395969.09	3005032.30	S 4° 13' 03" W	46.11	
43	395923.11	3005028.91	N 85° 46' 57" W	56.53	
44	395927.26	3004972.54	S 35° 51' 37" W	96.86	
45	395848.76	3004915.80	S 20° 43' 49" W	213.84	
46	395648.77	3004840.10	N 69° 21' 38" W	17.69	
47	395655.00	3004823.55	N 16° 40' 48" W	855.53	Follows Elevation 42.0 ft in between points 46 and 1

EXHIBIT H
DESCRIPTION OF PROJECT MANAGEMENT AND NEED FOR PROJECT POWER

October 2026

BRUNSWICK HYDROELECTRIC PROJECT

(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT H
DESCRIPTION OF PROJECT MANAGEMENT AND NEED FOR PROJECT POWER

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LIST OF ABBREVIATIONS AND DEFINITIONS

ASMFC	Atlantic States Marine Fisheries Commission
BWPH	Brookfield White Pine Hydro
cfs	Cubic feet per second
Commission	Federal Energy Regulatory Commission
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
Licensee	Brookfield White Pine Hydro
MDEP	Maine Department of Environmental Protection
MDIFW	Maine Department of Inland Fisheries and Wildlife
ME	Maine
NRI	National Rivers Inventory
Project	Brunswick Hydroelectric Project (FERC No. 2284)
SCORP	Maine Statewide Comprehensive Outdoor Recreation Plan

BRUNSWICK HYDROELECTRIC PROJECT

(FERC NO. 2284)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT H
DESCRIPTION OF PROJECT MANAGEMENT AND NEED FOR PROJECT POWER

1 INTRODUCTION

The Brunswick Hydroelectric Project (Project) is an existing hydroelectric project owned by, and licensed to, Brookfield White Pine Hydro LLC (BWPH). BWPH is an independent power producer and, as such, does not provide electric service to any particular group or class of customers. The Project generates clean, carbon-free, renewable power that is currently sold to the New England wholesale market administered by the non-profit Independent System Operator (ISO) for New England. ISO New England administers all significant aspects of the New England Power Pool (NEPOOL) power market including: (i) the NEPOOL Open Access Transmission Tariff; (ii) the dispatch, billing and settlement system for interchange power in NEPOOL; (iii) NEPOOL energy and automatic generation control markets; and (iv) the NEPOOL installed capability market.

2 INFORMATION TO BE SUPPLIED BY ALL APPLICANTS

2.1 Plans and Ability of Owners of Brunswick Dam to Operate and Maintain the Project

2.1.1 Plans to Increase Capacity or Generation

BWPH has no current plans to increase the capacity or generation of the Project.

2.1.2 Plans to Coordinate the Operation of the Project with Other Water Resource Projects

There are 18 Federal Energy Regulatory Commission (FERC or Commission) licensed hydroelectric projects on the Androscoggin River that consist of 22 developments (see Figure 2.1.2-1; Table 2.1.2-1). The operations for these Projects have been established through each Project's FERC licenses. The Androscoggin River flow regime is determined in part, by operation of the Upper Androscoggin River Storage System, which consists of a series of headwater storage reservoirs located in Maine and New Hampshire. Outflow from the storage reservoirs is set in accordance with various legal agreements and is managed in cooperation with downstream hydroelectric power generators to provide a relatively uniform flow regime. The

storage reservoirs are operated as seasonal storage reservoirs and have a combined capacity of approximately 644,000 acre-feet.

The current FERC license requires that the Project be operated in a run-of-river mode with no storage or flood control capacity. The Project does not exercise operational control over seasonal or daily river flows. As a result, the Project neither regulates flows for peaking purposes nor alters the timing or magnitude of flows released from upstream water resource projects. Project outflows closely track contemporaneous inflows, subject only to short-term hydraulic response and required minimum releases. Due to its limited storage (approximately 250 acre-feet), the Project cannot materially affect river flows on a daily or seasonal basis.

BWPH is proposing to operate the Project in the same manner as it has been operated over the course of its current license. As a result, there will be no change to the Project impoundment or to downstream flows.

The Brunswick Project provides 19-megawatts of clean renewable power. Average annual generation for the period 2013-2025 was approximately 92,250 megawatt hours per year.

Table 2.1.2-1: FERC-Licensed Projects on the Androscoggin River

Project No.	Project Name	Authorized Capacity (kW)	Licensee	State
P-3133	Errol	2,031	Brookfield White Pine Hydro, LLC	NH
P-2861	Pontook	9,600	Pontook Operating Limited Partnership and NH Dept-Environmental Services-Water Resources Division	NH
P-2422	Sawmill	3,174	Great Lakes Hydro America LLC	NH
P-2423	Riverside	7,900	Great Lakes Hydro America LLC	NH
P-2287	J. Brodie Smith	15,000	CRP NH Smith, LLC	NH
P-2326	Cross Power	3,220	Great Lakes Hydro America LLC	NH
P-2327	Cascade	7,920	Great Lakes Hydro America LLC	NH
P-2311	Gorham	4,800	Great Lakes Hydro America LLC	NH
P-2288	Gorham	2,150	CRP NH Gorham LLC	NH
P-2300	Shelburne	3,720	Great Lakes Hydro America LLC	NH
P-2333	Rumford Falls	44,500	Rumford Falls Hydro LLC	ME
P-2375	Riley-Jay-Livermore	19,725	Andro Hydro, LLC	ME
P-8277	Otis	10,350	Andro Hydro, LLC	ME
P-2283	Gulf Island-Deer Rips	38,133	Brookfield White Pine Hydro, LLC	ME
P-2302	Lewiston Falls	28,440	Brookfield White Pine Hydro, LLC	ME

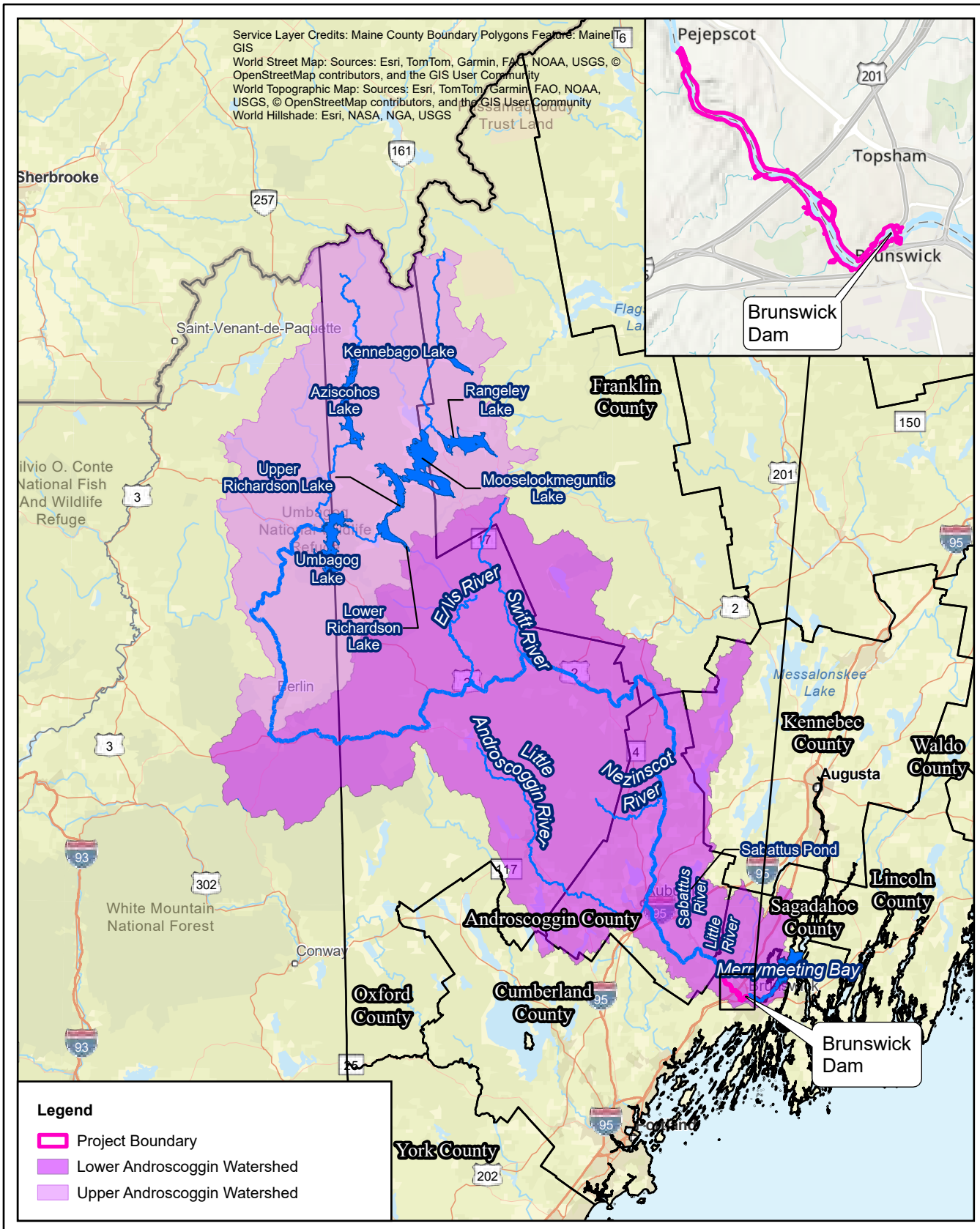
Project No.	Project Name	Authorized Capacity (kW)	Licensee	State
P-3428	Worumbo	19,100	Brown Bear II Hydro, LLC	ME
P-4784	Pejepscot	13,880	Topsham Hydro Partners Ltd Pt	ME
P-2284	Brunswick	19,000	Brookfield White Pine Hydro, LLC	ME

2.1.3 Plans to Coordinate the Operation of the Project with Other Electrical Systems

BWPH is an independent power producer and member of NEPOOL that currently sells power wholesale from the Project to ISO New England. NEPOOL is a voluntary association whose members include not only traditional vertically integrated electric utilities, but independent power producers such as BWPH that are participating in the competitive wholesale electricity marketplace. ISO New England serves as the independent system operator of the regional bulk power system and administers the wholesale marketplace. The primary responsibilities of ISO New England are to coordinate, monitor, and direct the operations of the major generating and transmission facilities in the region. The objective of ISO New England is to promote a competitive wholesale electricity marketplace while maintaining the electrical system's integrity and reliability. ISO New England seeks to ensure both maximum reliability and economy of the bulk power supply for New England.

To this end, the electric facilities of NEPOOL member companies are operated as if they comprised a single power system. ISO New England accomplishes this by central dispatching of available power resources and using the lowest cost generation and transmission equipment available at any given time consistent with meeting reliability requirements. As a result of this economic dispatch, utilities and their customers realize significant savings annually. NEPOOL participants also have strengthened the reliability of the bulk power system through shared operating reserves and coordinated maintenance scheduling.

ISO New England staff constantly monitors and directs the operation of more than 300 generators and more than 7,600 miles of transmission lines in New England. ISO New England is also responsible for forecasting the various levels of daily electricity demand that will occur throughout the region and scheduling resources to meet the demand.



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

N

0 5 10 20 Miles

Figure 2.1.2-1: Androscoggin River Watershed

Path: D:\Brookfield\02456\GIS\Maps\DLA\DLA.aprx

2.2 Need for Electricity Generated by the Project

2.2.1 The Reasonable Costs and Availability of Alternative Sources of Power

The Project generates carbon-free, renewable power. The electrical output from the Project is sold wholesale into the ISO New England administered market.

The replacement of energy and capacity provided by the Project would be met through other sources, likely to be fossil-fired generating units, whose fuel and other variable costs would be significantly higher than those of the Project. As the lowest variable cost resource among power supply alternatives, hydroelectric assets such as the Project can bid energy into the ISO New England market at lower prices than alternative resources. Therefore, loss of a low-variable cost resource such as the Lewiston Falls Project would result in upward pressure on the clearing prices in the NEPOOL market, thereby affecting the prices paid by electric consumers in New England.

The Project provides carbon-free, renewable power, without the emissions of air pollutants or greenhouse gases that the marginal fossil fuel plants produce. This is an increasingly important fact in New England where all six New England states have enacted legislation to reduce the dependence on fossil-fired generation through the introduction of Renewable Portfolio Standards (RPS), or similar legislation, that encourages and requires the use of renewable power sources in the state's total resource output. Many of these RPS programs include an annual escalating supply requirement to further encourage reliance on renewable power sources. Legislation that has been enacted is designed to increase the amount of renewable power supply in the region's mix of generation resources or, alternatively, reduce the amount of fossil-fired generation as a percentage of the total resource output.

As these statutes and rules are implemented or adopted in New England, clean, carbon-free hydroelectric generation becomes an even more important and valuable part of the fuel mix for electric suppliers in the region.

2.2.2 Increase in Costs if the Licensee is not Granted a License

If BWPH is not granted a license, this Project would cease to provide affordable, renewable, and clean electricity to NEPOOL from its generation, likely resulting in an unquantified increase in costs to the New England electric consumer and greenhouse gas emissions to the environment.

2.2.3 Effects of Alternative Sources of Power

2.2.3.1 Effects on Licensee's Customers

This section is not applicable since BWPH is a wholesale supplier.

2.2.3.2 Effect on Licensee's Operating and Load Characteristics

BWPH is an independent power producer and, as such, does not maintain a separate transmission system which could be affected by replacement or alternative power sources.

2.2.3.3 Effect on Communities Served by the Project

See the discussion above in Sections 2.2.1 and 2.2.2 regarding the loss of the Project's generation. Because BWPH cannot predict with any certainty the actual type or location of a potential alternative facility providing replacement power, they cannot specifically discuss potential effects of any particular community. However, if ISO New England must replace the power benefits generated at the Project, the replacement power cost would be significantly greater than the projected cost of operating the Project under the new license.

2.3 Need, Reasonable Cost, and Availability of Alternative Sources of Power

BWPH is an independent power producer and, as such, does not have an obligation or need to prepare load and capability forecasts in reference to any particular group or class of customers. For the region, those obligations and tasks remain within the scope of services provided by ISO New England and NEPOOL.

2.4 Effect of Power on Licensee's Industrial Facility

This section is not applicable to BWPH, which does not own industrial facilities.

2.5 Need of Indian Tribe Licensee for Electricity Generated by the Project

This section is not applicable to BWPH.

2.6 Impacts on the Operations and Planning of Licensee's Transmission System

Because BWPH is an independent power producer and does not own the local transmission system, this section is not applicable. BWPH maintains a single-line diagram (Appendix H-1) for the Project that is considered Critical Energy Infrastructure Information (CEII) in accordance with the Commission's regulations, and thus BWPH is filing a copy of the Project's single-line diagram as CEII with the Commission within Volume II of this application.

2.7 Statement of Need for Modifications

BWPH is not proposing any fundamental changes to the Project facilities or operation. The Licensee is proposing certain protection, mitigation and enhancement (PME) measures for the Project related to environmental, recreation, and aesthetic resources. However, none of the PME measures proposed will result in any fundamental changes to Project facilities or Project operations. Therefore, relicensing and continued operation of the Project would remain compatible with the comprehensive development and utilization of the waterway and conform to

the various comprehensive natural resource plans developed by resource management agencies, as discussed below.

2.8 Consistency with Comprehensive Plans

Section 10(a)(2) of the Federal Power Act (FPA) requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, and conserving waterways affected by the Project. In accordance with Section 10(a)(1) of the FPA, the list of Commission approved federal and state comprehensive plans was reviewed to determine applicability to the Project. The federal resources agencies, as well as the State of Maine, have prepared a number of comprehensive plans, which provide a general assessment of a variety of environmental conditions in Maine. These plans address water quality, water pollution control, wetlands, recreation, and land management issues. In addition, the State of Maine's plans include policies related to ensuring that the State's energy needs are met and supporting hydropower, a renewable and indigenous source, as a valuable portion of the energy mix. The Project's consistency with pertinent state and federal comprehensive plans is discussed below.

2.8.1 FERC-Approved State of Maine Comprehensive Plans[1]

Maine State Planning Office. 1987. Maine Comprehensive Rivers Management Plan. Augusta, Maine. May 1987

In 1982, the Maine State Planning Office (MSPO) submitted to FERC the Maine Comprehensive Rivers Management Plan, which was comprised of two volumes and approved by FERC in October 1982. In 1987, the Maine State Planning Office (eliminated in July 2012) submitted to FERC a three-volume update to the Comprehensive Rivers Management Plan. Volumes 1 and 2 of the Plan included the Comprehensive Hydropower Plan and Executive Department Orders and other river-related plans. Volume 3 of the Plan, included in the updated submittal in 1987, contained hydro-related core laws, Executive Orders, and other plans. In 1992 and 1993, the State of Maine produced Volumes 4 and 5 of the Comprehensive Rivers Management Plan, respectively. These volumes have also been approved by FERC. Each volume and its respective components are described in greater detail below.

State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 1

Volume 1 contains the Comprehensive Hydropower Plan issued by the Maine Office of Energy Resources (MOER) in October 1982[2]. The Comprehensive Hydropower Plan consists of three

[1] Unless otherwise noted, these plans have not been updated or updates have not been submitted to FERC for approval since the development dates noted.

[2] The Office of Energy Resources has since been disbanded. The State Planning Office was responsible for oversight and development of Maine's comprehensive plans until it was disbanded in July 2012, although the Department of Agriculture, Conservation, and Forestry does provide municipal level assistance in municipal level comprehensive planning.

parts: Maine Rivers Policy, The Projected Contribution of Hydroelectric Generation to Meeting Maine's Electricity Needs in 1990 and 2000, and the Statewide Fisheries Plan, Summary.

1. *"Maine Rivers Policy," Executive Order No. 1, FY82/83*

On July 6, 1982, then Governor Joseph E. Brennan issued the Maine Rivers Policy which designates certain river stretches as meriting special protection. The Order stated that no new dams shall be constructed on these stretches and that additional development or redevelopment of existing dams on these stretches be designated and executed in a manner that either enhances significant resources values or does not diminish them. This policy was adopted legislatively as part of the Maine Rivers Act.

The section of the Androscoggin River on which the Project is located is not one of the listed river segments meriting special protection. Therefore, the Project conforms to this portion of the Plan.

2. *The Projected Contribution of Hydroelectric Generation to Meeting Maine's Electricity Needs in 1990 and 2000 (MOER, October 1982)*

Executive Order No. 1, FY82/83 directed MOER to prepare an estimate of the contribution that hydropower could make to meet the State's electricity needs in the years 1990 and 2000. The report was prepared in 1982; therefore, a majority of the information in the MOER report is outdated. However, the report does stress that Maine's energy policy "call for increased reliance on indigenous and renewable resources, such as hydro, in preference to imported and nonrenewable resources, such as oil." This projection does not appear to have been revised or updated since publication.

The Project currently conforms to this portion of the Plan in that it contributes hydroelectric generation (an indigenous and renewable resource) in meeting Maine's electricity needs. The new license for the Project is projected to be issued in 2029. Assuming that the Project will continue to generate electricity, it conforms to this portion of the Plan.

3. *Statewide Fisheries Plan, Summary (Maine Department of Inland Fisheries and Wildlife (MDIFW), June 1982)*

The Statewide Fisheries Plan evaluates, by river basin, whether new or improved fish passage facilities may be needed at hydroelectric projects and specifies the fishery agencies management goals, as they existed in 1982. This Plan represents the policies of the three author agencies (MDIFW, Maine Department of Marine Resources, and the Atlantic Sea-Run Salmon Commission (ASC)) regarding conservation, management, and enhancement of river fishery resources in Maine. The Plan also identifies and evaluates significant river fisheries based upon several criteria.

A discussion of existing fishery resources in the Project study area is contained in Exhibit E, Section 4.6.

State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 2

Volume 2 of the State of Maine Comprehensive Rivers Management Plan consists of the 1982 Maine Rivers Study. The Maine Rivers Study, generated by the Maine Department of Conservation (MDOC) and the National Park Service (NPS), defines a list of unique and natural recreation rivers and classifies the rivers as AA, A, B, C, or D. The mainstem of the Androscoggin River is a Class B waterbody from its confluence with the Atlantic Ocean at Merrymeeting Bay through Project waters, upstream to Worumbo Dam in Lisbon Falls. Details regarding the unique or significant resources that are located in the Project area can be found in Exhibit E.

State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 3, Part I

Volume 3 of the State of Maine Comprehensive Rivers Management Plan contains two parts. Part I is a compilation of laws which affect the construction, operation, maintenance, and licensing of hydro projects in Maine, including:

- The Maine Rivers Act 12 M.R.S.A. §401 et. seq.
- Maine Waterway Development and Conservation Act (MWDCA) 38 M.R.S.A. §630 et. seq.
- An Act Concerning Fishways in Dams and Other Artificial Obstructions in Inland Waterways 12 M.R.S.A. §7701-A.
- An Act Concerning Fishways in Dams and Other Artificial Obstruction in Coastal Waterways 12 M.R.S.A. §6121.
- An Act to Amend the Classification System for Maine Waters and Change the Classification of Certain Waters 38 M.R.S.A. §464 et. seq.
- Alteration of Rivers, Streams, and Brooks 38 M.R.S.A. §425 et. seq.
- Mandatory Shoreland Zoning and Subdivision Control 38 M.R.S.A. §435 et. seq.
- Land Subdivision 30-A M.R.S.A. §4401-4407.
- Land Use Regulations 12 M.R.S.A. §681 et. seq.

The applicability of these Core Laws to the Project is discussed below.

1. *Maine Rivers Act*

In the *Maine Rivers Act* 12 M.R.S.A. §401 *et. seq*., the Legislature expressly found:

> …the state's rivers comprise one of its most important natural resources, historically vital to the state's commerce and industry; that the value of the state's rivers and streams has

increased due to the growth in demand for hydropower; that the rivers and streams afford Maine people with major opportunities for economic expansion through the development of hydropower; and that "the best interests of the state's people are served by a policy which recognizes the importance that their rivers and streams have for meeting portions of several public needs, provides guidance for striking a balance among the various uses which affords the public the maximum benefit and seeks harmony rather than conflict among these uses." 38 M.R.S.A. §402(6)

BWPH has consulted with and actively worked to resolve issues as they were raised by appropriate federal and state agencies, tribes, local governments, and non-governmental organizations during the relicensing process. This process has identified the importance of continued operation of the Project while identifying the relative importance of the river and its resources for various uses in providing public health benefits. Where BWPH has worked with the various interests to develop a proposal that balances all of the applicable needs, the Project conforms to this portion of the Plan.

2. *Maine Waterway Development and Conservation Act (MWDCA) 38 M.R.S.A. §630 et. seq.*

The MWDCA replaced several earlier laws and requires the developer to obtain one permit from the Maine Department of Environmental Protection (MDEP). The legislature emphasized the importance of hydropower to the State of Maine when it enacted the MWDCA.

The legislature found and declared that the surface waters of the State constitutes a valuable indigenous and renewable energy resource; and that hydropower development utilizing these waters is unique in its benefits and impacts to the natural environment, and makes a significant contribution to the general welfare of the citizens of the State for the following reasons:

- Hydropower is the State's only economically feasible, large-scale energy resource which does not rely on combustion of a fuel, thereby avoiding air pollution, solid waste disposal problems and hazards to human health from emissions, wastes, and by-products. Hydropower can be developed at many sites with minimal environmental impacts, especially at sites with existing dams or where current type turbines can be used.
- Like all energy generating facilities, hydropower projects can have adverse effects; in contrast with other energy sources, they may also have positive environmental effects. For example, hydropower dams can control floods and augment downstream flow to improve fish and wildlife habitats, water quality, and recreation opportunities.
- Hydropower is presently the State's most significant indigenous resource that can be used to free our citizens from their extreme dependence on foreign oil for peaking power.

BWPH is proposing to continue operating the Project for power generation in coordination with upstream storage facilities in the Androscoggin River system to provide a source of renewable energy available to the people of Maine and a reliable flow of water to downstream commercial

and recreational users. Therefore, the continued operation of the Project is consistent with the policies expressed by the Maine legislature. By continuing to operate the Project, the energy-related benefits noted above will continue, in addition to fish and wildlife habitat, water quality, and recreation opportunities.

3. *An Act Concerning Fishways in Dams and Other Artificial Obstructions in Inland Waterways 12 M.R.S.A. §7701-A*

This Act was enacted with the intent of conserving, developing, or restoring anadromous or migratory fish resources by requiring the construction or repair of fishways. Under the Act, the decision to require a fishway at a dam must be based on the restoration of one or more fish species of anadromous or migratory fish to the area upstream of the obstruction. The decision to require a fishway may be justified by the protection or enhancement of any rare, threatened, or endangered fish species.

The Project area contains both riverine and impoundment fisheries habitats (see Exhibit E, Section 4.6). Upstream and downstream fish passage is required at the Project due to the presence of anadromous or other migratory fish runs within the Project area. Fish passage is provided at the three lowermost hydroelectric project dams on the mainstem Androscoggin (Brunswick, Pejepscot, and Worumbo). The resource agencies and hydropower Licensees have been addressing upstream and downstream fish passage in the lower Androscoggin River basin within various regulatory proceedings (i.e., ESA consultation, development of SPPs, and FERC licensing proceedings) over recent years.

4. *An Act Concerning Fishways in Dams and Other Artificial Obstructions in Coastal Waters 12 M.R.S.A. §6121*

This Act is not pertinent to the Project given the Project's location along an inland waterway.

5. *The Maine Dam Inspection, Registration, and Abandonment Act 38 M.R.S.A. §815 et. seq.*[3]

This law allows MDEP to establish water level regimes and minimum flow requirements for impoundments not within the jurisdiction of FERC.

BWPH currently holds a valid FERC license for Project operation and is submitting a License Application to FERC for the continued operation of the Project. Therefore, the Project is not subject to MDEP jurisdiction regarding establishment of water levels for non-FERC jurisdictional projects.

[3] Legislative actions in recent years have changed the scope of this act.

6. *An Act to Amend the Classification System for Maine Waters and Change the Classification of Certain Waters 38 M.R.S.A. §464 et. seq.*

This Act was legislated to restore and maintain the chemical, physical, and biological integrity of the State's waters and to preserve certain pristine state waters. Water quality standards for fresh surface waters established by the Act that are pertinent to the Project consist of Class B waters.

The mainstem of the Androscoggin River is a Class B waterbody from its confluence with the Atlantic Ocean at Merrymeeting Bay through Project waters, upstream to Worumbo Dam in Lisbon Falls.

Class B waters must meet standards ensuring they are suitable for the designated uses of drinking water supply after treatment, agriculture, fishing, recreation in and on water, industrial process and cooling water supply, navigation, habitat for fish and other aquatic life (the habitat must be characterized as unimpaired), and hydroelectric power generation, except as prohibited under Title 12, section 403.

The operation of the Project and its consistency with these standards is discussed in Exhibit E, Section 4.5.

7. *Alteration of Rivers, Streams, and Brooks 38 M.R.S.A. §425 et. seq.*

This article prohibited the alteration of a river, stream, or brook or areas adjacent to rivers, streams, or brooks due to dredging, filling, or construction such that any dredged spoil, fill or structure may fall or be washed into these waters without first obtaining a permit from the Commissioner. This act was replaced with the Natural Resources Protection Act (NRPA), 38 M.R.S.A.§480-A *et. seq.*, which regulates similar activities along the State's waters. However, projects that are reviewed under the MWDCA are not subject to review under NRPA.

BWPH is not proposing any construction or redevelopment of the Project that would require an NRPA permit. If any construction is proposed in the future, the appropriate permits will be obtained.

8. *Mandatory Shoreland Zoning and Subdivision Control 38 M.R.S.A. §435 et. seq.*

This article requires that lands within 250 feet of the normal high water mark of certain waters or wetlands be subjected to municipal zoning and subdivision control.

The adjoining towns currently have zoning requirements for those lands located within 250 feet of the normal high water mark of the Project impoundment. BWPH will obtain any required shoreland zoning permits from the adjoining towns, prior to construction of any of the new facilities.

9. *Land Subdivision 30-A M.R.S.A. §4401-4407*

This article grants special protection from land subdivisions to particular river reaches identified in the article.

This article does not mention any Project lands. Land use and shoreline issues are discussed in Exhibit E, Section 4.10. The Project conforms to this portion of the Plan.

10. *Land Use Regulations 12 M.R.S.A. §681 et. seq.*

This article requires sound planning, zoning, and subdivision control of the unorganized and organized townships of the State.

The Project is consistent with the towns of Topsham and Brunswick's regulations and zoning. Land use and shoreline issues are discussed in Exhibit E, Section 4.10.

State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 3, Part II

Part II is a compilation of Executive Department Orders and other plans, including: Maine Rivers Policy Executive Order No. 1, FY82/83; Recreation Management and Resource Protection for Maine's Rivers; Designating the State Agencies Responsible for Water Quality Certification, Executive Order No. 5, FY85/86 Note: Updated Order No. 3, 96/97. (Note: A discussion of revised laws and Executive Department Orders implemented after the submittal of Volume 3 to the FERC in 1987 is contained in Volume 4 of the State of Maine Comprehensive Rivers Management Plan submitted to FERC in 1992, see discussion below.)

1. *Maine Rivers Policy Executive Order No. 1, FY82/83*

The Project's compliance with the Maine Rivers Policy has previously been discussed under Part I, Volume 3 of the State of Maine Comprehensive Rivers Management Plan.

2. *Recreation Management and Resources Protection for Maine's Rivers*

This is a 1985 summary report of the 1983 study titled "Maine Rivers Access and Easement Plan" by Joseph W. Hardy. This document summarizes a strategy developed in 1983 by the MDOC for protecting unique natural values and for maintaining recreational opportunities along Maine's rivers.

BWPH's proposal for continued operation of the Project is consistent with this document. BWPH manages the Project impoundment and tailwater areas to provide fishing, and both motorized and non-motorized boating opportunities for the general public.

3. *Designating the State Agencies Responsible for Water Quality Certification, Executive Order No. 5, FY85/86 Note: Updated Order No. 3, 96/97*

This Executive Order identifies the state agencies responsible for reviewing and authorizing water quality certifications for hydropower projects. MDEP has jurisdiction for water quality certification for the relicensing of the Project.

BWPH will apply for water quality certification from MDEP. Proof of receipt of delivery of the 401 Water Quality Certification Application to MDEP will be filed with the Commission when it is available.

State of Maine Comprehensive River Management Plan – December 1992 – Volume 4, Part I

Volume 4 of the State of Maine Comprehensive River Management Plan consists of three sections. Part I is a summary of the revised Core Hydro Laws subsequent to those contained in Volume 3, which were approved in 1987.

The revisions to the Core Hydro Laws contained in Volume 4 of the Plan are not all pertinent to the Project. The revised Core Hydro Laws that are pertinent to the Project are discussed below.

1. *Special Protection for Outstanding Rivers*

This law identifies river segments that are protected from further hydroelectric development in the State of Maine.

The Project is not located on an Outstanding River segment and is therefore compliant with this plan.

2. *Hydropower Relicensing Standards*

These standards require that existing hydropower impoundments be managed to protect habitat and aquatic life criteria commensurate with the appropriate water quality classifications. The standards are pertinent to the Project in that the Project area is subject to Class B water quality standards. Maine statutes at 38 M.R.S.A. subsection 464(10) clarifies that hydropower projects with riverine impoundments must satisfy the aquatic life criteria contained in 38 M.R.S.A. subsection 465(4)(c), which states that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.

The Project is consistent with the Hydropower Relicensing Standards in that operation of the Project impoundment supports all species of indigenous fish and maintains the structure and function of the resident biological community (see Exhibit E, Sections 4.5 and 4.6 for details).

State of Maine Comprehensive River Management Plan – December 1992 – Volume 4, Part II – Compilation of Executive Orders and Other Plans

Part II is a compilation of Executive Orders and other plans including Maine resource agency policy regarding hydropower. Part II of Volume 4, Implementing Plans and Orders, contains State resource agency plans and policies regarding hydropower. The following plans and orders are discussed:

1. *State of Maine Statewide River Fisheries Management Plan, June 1982*

This Plan is discussed previously under State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume I.

2. *Maine Comprehensive Hydropower Plan, July 1992*

This Plan assessed the then current and future demand for hydropower in the State of Maine. Hydropower is recognized as a significant resource available for use in meeting current and future energy needs.

Operation of the Project is consistent with this Plan as it will continue to produce reliable, efficient indigenous energy from hydropower to meet the State of Maine energy needs.

3. *Maine State Agency Hydropower Policy Statements*

These policy statements provide the basis for agency comments on hydro-project license applications.

These statements are not directly applicable to the Project as they set out the policy for State agencies to follow in commenting on hydro projects in general. Agency comments on the Project are addressed in the appropriate sections of Exhibit E.

4. *Executive Order Designating the State Agencies Responsible for Water Quality Certification*

This order identifies MDEP as the agency responsible for reviewing and providing water quality certification.

BWPH will apply for water quality certification from MDEP. Proof of receipt of delivery of the 401 Water Quality Certification Application to MDEP will be filed with the Commission when it is available.

5. *Feasibility Study of Maine's Small Hydropower Potential*

This study was performed for the MOER and examined the potential for development/expansion of hydropower development of Maine's low head dams.

This Plan is not applicable to the Project.

6. *Maine Hydropower Licensing and Relicensing Status Report 1989-1991*

These reports update hydropower licensing and relicensing activities in the State of Maine for 1989 through 1991.

The Project relicensing began after this report was written and is not included in this summary of licensing activities.

<u>State of Maine Comprehensive River Management Plan – December 1992 – Volume 4, Part III – Hydropower and Relicensing Reports and Studies</u>

This section of Volume 4 of the State of Maine Comprehensive River Management Plan described the regulations for hydropower relicensing and reported the status of Maine projects with regard to the federal relicensing process.

The studies and reports contained in Part III of the State of Maine Comprehensive River Management Plan are not pertinent to the Project.

State of Maine Comprehensive River Management Plan – February 1993 – Volume 5

Volume 5 of the State of Maine Comprehensive River Management Plan contains the MSPO[4] Natural Resources Policy Division's publication entitled Kennebec River Resource Management Plan: Balancing Hydropower Generation and Other Uses. This document provides a description of the various resources and beneficial uses contained in the Kennebec River Basin and provides recommendations on balancing the needs of these resources and uses. Given that the Project is located on the Androscoggin River, the Plan is not applicable to the Project.

Management of Atlantic Salmon in the State of Maine: A Strategic Plan – July 1984, Maine Atlantic Sea-Run Salmon Commission

This Plan lists as its objectives the maintenance of Atlantic Salmon populations in rivers where they currently exist, and the restoration of Atlantic Salmon populations in historical salmon rivers. The plan also identifies specific strategies to achieve the stated objectives, including fishway installation or improvement, increased hatchery capacity, and diversion of hatchery stocks once natural reproduction increases in stocked rivers.

BWPH maintains and operates both upstream and downstream fish passage facilities and related measures at the Project and is actively consulting with applicable resource agencies in accordance with the requirements of the Endangered Species Act (ESA).

Maine State Comprehensive Outdoor Recreation Plan (SCORP) 2014-2019, Maine Department of Conservation, Bureau of Parks and Lands

The 2003 - 2008 SCORP is included in the FERC Comprehensive Plan, however, it was updated in 2009, 2014, and again in 2020. This Plan serves as the State's official policy document for statewide outdoor recreation planning and for acquisition and development of public outdoor recreation areas and facilities. The plan identifies outdoor recreation issues of Statewide importance based upon, but not limited to, input from the public participation program and provides information about the demand for and supply of outdoor recreation resources and facilities in the state. The SCORP satisfies the requirements of the Land and Water Conservation Fund (LWCF) Act (P.I. 88-578) which dictates that each state have an approved SCORP available on file with the National Park Service to participate in the LWCF program. The SCORP contains an implementation program that identifies the State's strategies, priorities, and actions for the obligation of its LWCF apportionment. The SCORP also includes a wetlands priority component with Section 303 of the Emergency Wetlands Resources Act of 1986. This wetland component provides information on state wetland conservation planning efforts as reflected in the Maine Wetlands Priority Conservation Plan published in 1988.

[4] The SPO was disbanded in July 2012, although the Department of Agriculture, Conservation, and Forestry does provide municipal level assistance in municipal level comprehensive planning.

The SCORP does not contain any recommendations or assessments that are specific to the Project area. BWPH has consulted with MDIFW on access and other recreation issues in the Project area throughout the relicensing process. Details on proposed recreation enhancements are provided in Exhibit E, Section 4.9.3. BWPH is in compliance with the strategies outlined in this Plan.

2.8.2 FERC-Approved Federal Comprehensive Plans

Atlantic Salmon Restoration in New England, Final Environmental Impact Statement 1989-2021. U.S. Fish and Wildlife Service, 1989

This document discusses the stated aim of the United States Fish and Wildlife Service relative to Atlantic Salmon (i.e., the restoration of self-sustaining populations of Atlantic Salmon by the year 2021 to several rivers).

BWPH maintains and operates both upstream and downstream fish passage facilities at the Project and is actively consulting with applicable resource agencies in accordance with the requirements of the ESA.

Nationwide Rivers Inventory. National Park Service. January 1982, updated 1995

In 1981, the "Nationwide Rivers Inventory (NRI)," was completed for the New England Region. It is a survey of the nation's rivers conducted to identify segments meeting the minimum criteria for further study and/or potential inclusion into the National Wild and Scenic Rivers System (NWSRS). Once included on the NRI, a river is protected to the extent pursuant to Section f(d) of the Wild and Scenic Rivers Act, and in accordance with a Presidential Directive and guidance in the form of "Procedures for Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory," issued by the Council on Environmental Quality:

> "Each federal agency shall, as part of its normal planning and environmental review process, take care to avoid or mitigate adverse effects on Rivers identified in the Nationwide Inventory."[5]

This directive gives guidance to federal agencies on protecting the resources that cause the river to qualify for listing on the NRI.

The Project is not located on any of the river segments listed by NRI. BWPH has maintained the NPS on all distributions throughout the relicensing process.

[5] Presidential Directive, August 2, 1979.

Fishery Management Report No. 35 of the Atlantic States Marine Fisheries Commission (ASMFC): Shad and River Herring – Amendments 1 thru 3 to the Interstate Fishery Management Plan for Shad and River Herring – 1999 National Marine Fisheries Service; Technical Addendum 1 to Amendment 1 of the Interstate Fisheries Management Plan for Shad and River Herring – 2000 National Marine Fisheries Service

The goal of Amendment 1 of the plan was to protect, enhance, and restore East Coast migratory spawning stocks of American Shad, Hickory Shad, and River Herrings in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass. Objectives identified in the plan were to prevent overfishing of American Shad stocks by constraining fishing mortality; develop definitions of stock restoration; determine appropriate target morality rates and specify rebuilding schedules for American Shad populations within the management unit; maintain existing or more conservative regulations for Hickory Shad and River Herring fisheries until new stock assessments suggest changes are necessary; and promote improvements in degraded or historic alosine habitat throughout the species range.

Technical Addendum 1 addresses clarifications and corrections in Amendment 1. Many of the clarifications and corrections are minor. Amendment 1 was written to "protect, enhance, and restore East Coast migratory spawning stocks of American Shad, Hickory Shad, and River Herrings in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass."

The goal of Amendment 2 to the plan for shad and River Herring is to protect, enhance, and restore East Coast migratory spawning stocks of American Shad, Hickory Shad, Alewife, and Blueback Herring to achieve stock restoration and maintain sustainable levels of spawning stock biomass. The management unit under this plan includes all migratory American Shad, Hickory Shad, Alewife, and Blueback Herring stocks of the East Coast. This Amendment prohibited commercial and recreational river herring fisheries in state waters beginning January 1, 2012, unless a state or jurisdiction has a sustainable management plan reviewed by the Technical Committee and approved by the Management Board. The Amendment defines a sustainable fishery as "a commercial and/or recreational fishery that will not diminish the potential future stock reproduction and recruitment." Amendment 2 required states to implement fisheries-dependent and independent monitoring programs. Maine has a sustainable fishery management plan for River Herring that has been approved by the ASMFC.

Amendment 3 to the plan for shad and River Herring was developed to address only measures for American Shad, whereas Amendment 2 addressed measures for Alewife and Blueback Herring (collectively River Herring). The goal of the Amendment is to protect, enhance, and restore Atlantic coast migratory stocks and critical habitat of American Shad in order to achieve levels of spawning stock biomass that are sustainable, can produce a harvestable surplus, and are robust enough to withstand unforeseen threats. This Amendment requires similar management and monitoring as developed in Amendment 2. Specifically, Amendment 3 prohibits shad commercial and recreational fisheries in state waters beginning January 1, 2013, unless a state or jurisdiction has a sustainable management plan reviewed by the Technical Committee and approved by the Management Board. American Shad are not commercially harvested in Maine.

BWPH maintains and operates both upstream and downstream fish passage facilities at the Project and is actively consulting with applicable resource agencies regarding measures to protect and enhance American Shad and River Herring at the Project.

Interstate Fishery Management Plan for American Eel (Anguilla rostrata) (Report No. 36) – 2000 Atlantic States Marine Fisheries Commission

The Atlantic States Marine Fisheries Commission prepared a Fisheries Management Plan for the American Eel fishery in order to protect and restore the species. The Atlantic States Marine Fisheries Commission American Eel Fisheries Management Plan is a working document that describes the goals and objectives for the species, its current status, the ecological challenges affecting the species, and management options and actions needed to reach and maintain management goals. The stated goals of the Fisheries Management Plan are to: (1) protect and enhance the abundance of American Eel in inland and territorial waters of the Atlantic States and jurisdictions and contribute to the viability of the American Eel spawning population, and (2) provide for sustainable commercial and recreational fisheries preventing the over harvest of any eel life stage.

BWPH maintains and operates both upstream and downstream fish passage facilities at the Project and is actively consulting with applicable resource agencies regarding measures to protect and enhance American Eel at the Project.

Atlantic States Marine Fisheries Commission. 2008. Amendment 2 to the Interstate Fishery Management Plan for American Eel. Arlington, Virginia. October 2008.

This Addendum recommends stronger regulatory language to improve upstream and downstream passage of American Eel to state and federal regulatory agencies. Addendum 2 does not contain any new compliance requirements and does not alter any other provisions from the 2000 FMP and makes no changes to Addendum I of the FMP.

Atlantic States Marine Fisheries Commission. 2013. Amendment 3 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. August 2013.

The ASMFC American Eel Management Board initiated Addendum 3 with the goal of reducing mortality and increasing conservation of American eel stocks across all life stages. This came in response to the 2012 Benchmark Stock Assessment which found that the population of American eels in U.S. waters was depleted. This Addendum established new management measures for both the commercial and recreational eel fisheries, as well as implements fishery dependent and independent monitoring requirements.

Currently, Maine still allows commercial fishing for American Eel, by permit only. To the BWPH's knowledge there is no commercial eel fishing currently on the Androscoggin River in the vicinity of the Project.

Atlantic States Marine Fisheries Commission. 2014. Amendment 4 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2014.

Following approval of Addendum 3 in August 2013, only certain management measures were approved, while other measures were split out for further consideration and development in Addendum 4. This addendum addresses the commercial glass, yellow, and silver eel fisheries and modifies previous management programs. There are no specific recommendations related to the Project in this plan.

National Marine Fisheries Service. 2018. Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon. Hadley, Massachusetts. January 2019.

Section 4(f) of the ESA directs NMFS to develop and implement recovery plans for listed species. The GOM DPS of Atlantic Salmon was listed as endangered in 2000, and the range of the DPS was expanded in 2009. This recovery plan specifically addresses the planning requirements of the GOM DPS of Atlantic Salmon listed in 2009 and supersedes the 2005 recovery plan for the DPS listed in 2000. The updated plan represents a recovery strategy based on the species' ecological and biological needs and also discusses threats to the species and conservation accomplishments that affect its long-term viability.

Federally designated critical habitat for GOM DPS Atlantic Salmon in the Androscoggin River extends from just below Cedar Street in Lewiston down through its convergence with the Kennebec River at Merrymeeting Bay. In response to the listing of GOM DPS of Atlantic Salmon, BWPH developed an Interim Species Protection Plan (ISPP) for the Brunswick Project.[6] The ISPP was developed in consultation with the fishery resource agencies, and the Project FERC license was amended on December 13, 2013, to incorporate the terms and conditions of the ISPP. In 2019, upon expiration of the ISPP, BWPH developed a final Species Protection Plan (SPP) for the Project, the terms of which were incorporated into the Project license by FERC on August 16, 2022. The purpose of both the ISPP and SPP is to guide Project operation and management, including fishway operations until relicensing. Terms and conditions of the ISPP include provisions for fishway operation and monitoring, Project operation, and the conduct of certain fish passage studies. BWPH is proposing to continue to implement the provisions of the SPP for the term of the new Project license.

BWPH maintains and operates both upstream and downstream fish passage facilities at the Project and is actively consulting with applicable resource agencies regarding measures to protect and enhance American Shad and River Herring at the Project.

National Marine Fisheries Service. 2020. Androscoggin River Watershed Comprehensive Plan for Diadromous Fish. Greater Atlantic Region Policy Series 20-01. NOAA Fisheries Greater Atlantic Regional Fisheries Office, Gloucester, MA. 2020.

This plan was developed by NMFS as a framework to balance restoration of diadromous fish, the interests of diverse stakeholders, and the need for sustainable energy production on the lower

[6] The ISPP for the Brunswick Project also includes provisions for listed Atlantic and Shortnose Sturgeon.

Androscoggin River prior to the onset of several hydropower relicensing proceedings in the watershed. This plan builds off the existing management actions in the 2019 Recovery Plan for the GOM DPS of Atlantic Salmon and the Draft Androscoggin Fisheries Management Plan. This plan focuses on restoration efforts downstream of Lewiston Falls, the Little Androscoggin River, the Sabattus River, and the Little River. The objective of the plan is to support development of terms and conditions in hydropower licenses and foster collaboration between agencies and stakeholders.

Federally designated critical habitat for GOM DPS Atlantic Salmon in the Androscoggin River extends from just below Cedar Street in Lewiston down through its convergence with the Kennebec River at Merrymeeting Bay. In response to the listing of GOM DPS of Atlantic Salmon, BWPH developed an Interim Species Protection Plan for the Brunswick Project.[7] The ISPP was developed in consultation with the fishery resource agencies, and the Project FERC license was amended on December 13, 2013, to incorporate the terms and conditions of the ISPP. In 2019, upon expiration of the ISPP, BWPH developed a final Species Protection Plan (SPP) for the Project, the terms of which were incorporated into the Project license by FERC on August 16, 2022. The purpose of both the ISPP and SPP is to guide Project operation and management, including fishway operations until relicensing. Terms and conditions of the ISPP include provisions for fishway operation and monitoring, Project operation, and the conduct of certain fish passage studies. BWPH is proposing to continue to implement the provisions of the SPP for the term of the new Project license.

U.S. Fish and Wildlife Service. n.d. Fisheries USA: the Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. Washington, D.C.

The Recreational Fisheries Policy defines the USFWS's stewardship role in the management of the United States' recreational fishery resources. The USFWS is committed to promoting and enhancing freshwater, anadromous, and coastal fishery resources for long-term public benefit. This commitment is outlined by the following policies:

- Preserve, restore, and enhance fish populations and their habitats.
- Promote recreational fishing on USFWS and other lands to provide the public with a high-quality recreational experience.
- Ensure that recommendations concerning recreational fisheries potentials and opportunities are included as part of appropriate field studies and management assistance efforts performed by the USFWS on non-USFWS waters.
- Serve as an active partner with other federal governmental agencies, states, tribes, conservation organizations, and the public in developing recreational fisheries programs.
- Promotes the conservation and enhancement of the Nation's recreational fisheries through the USFWS's grant in aid programs.

[7] The ISPP for the Brunswick Project also includes provisions for listed Atlantic and Shortnose Sturgeon.

- Improve and expand quantifiable economic valuations of the Nation's recreational fisheries to demonstrate the importance of this resource to the health and welfare of our society and to the Nation's economy.

To accomplish these policies, the USFWS developed the following goals and strategies:

- Effect the preservation and/or increased productivity of fishery resources.
- Ensure and enhance the quality, quantity, and diversity of recreational fishing opportunities.
- Develop and enhance partnerships between governments and the private sector for conserving and managing recreational fisheries.
- Cooperate and maintain a healthy recreational fisheries industry.

There are no strategies or recommendations specific to the Brunswick Project in this plan, and MDIFW, the state agency most concerned with recreational fishing in inland waters, participated throughout the relicensing process.

U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American Waterfowl Management Plan. Department of the Interior. Environment Canada. May 1986.

The North American Waterfowl Management Plan, updated in 1994 and 2018, expands on the 1986 Plan seeking to restore waterfowl populations in Canada, the United States, and Mexico to levels recorded during the 1970s, which was considered a benchmark for waterfowl. The plan outlines the following three visions to advance waterfowl conservation:

- Ensure that Plan implementation is guided by biologically-based planning and is refined through ongoing evaluation.
- Define the landscape conditions needed to sustain waterfowl and other wetland associated species. Participate in the development of conservation, economic, management, and social policies and programs that affect the ecological health of these landscapes.
- Collaborate with other conservation efforts and reach out to other sectors and communities to form alliances.

These visions are designed to improve the status of North America's waterfowl, promote sustainable landscapes, and broaden partnerships internationally, nationally, regionally, and locally.

Most initiatives and recommendations contained in this plan are beyond the scope of the BWPH's operation of the Brunswick Project. The most relevant goals involve habitat protection and maintenance. The Project provides habitat for several of the species discussed in this plan. Continued operation of the Project, as proposed, would have no new effects to Project wildlife or their habitats, but would continue to provide waterfowl habitat for both resident and migratory

species, as described in Exhibit E, Section 4.7. Additionally, BWPH's proposal to protect and maintain fish, aquatic, and botanical resources, both of which represent potential forage sources for waterfowl, are identified in Exhibit E, Sections 4.7.

2.9 Financial and Personnel Resources

BWPH is an affiliate of Brookfield Renewable, who has considerable experience operating not only the Brunswick Project but other hydroelectric and water storage projects as well. BWPH has a complete staff of engineers, biologists, operators, mechanics, and electricians that are trained and experienced in the operation of hydroelectric projects. For example, along the Androscoggin River there are maintenance/operations personnel, the operations clerk, and the supervisor. If required, BWPH can also utilize staff from other nearby rivers and projects, or contract with contractors to undertake larger scale maintenance or upgrade projects. In addition, BWPH has available the administrative, licensing, and support personnel that are needed to maintain compliance with the terms of the license.

Information regarding the Project's expected annual costs and value are provided in Exhibit D of the License Application.

2.10 Notification of Affected Land Owners

BWPH does not propose to expand Project lands associated with this license application beyond property currently owned by BWPH.

2.11 Applicant's Electricity Consumption Efficiency Improvement Program

This section is not applicable given that BWPH is an independent power producer.

2.12 Identification of Indian Tribes Affected by the Project

There are no Indian tribes affected by the Project. The federally-recognized Indian tribes likely to be interested in the relicensing are included on the current distribution list for the Project.

3 INFORMATION TO BE PROVIDED BY AN APPLICANT WHO IS AN EXISTING LICENSEE

3.1 Measures Planned to Ensure Safe Management, Operation, and Maintenance of the Project

The Project is usually operated locally, though it has some ability to be remotely operated using a supervisory control and data acquisition link to BWPH's control system in Queensbury, New York. Local operators are available during weekdays and weekends as necessary to perform routine maintenance and operations of the facility. Daily logs of pond level, flow, and outages are maintained electronically for the Project.

BWPH has a sound compliance history for the Project. Additionally, dam safety monitoring is conducted by FERC's New York Regional Office on a regular basis. BWPH completes all necessary corrective actions to address comments and recommendations arising from FERC inspections in a timely manner. The dam is inspected annually by BWPH's Engineering and Operations staff, as well as after floods in the Project vicinity. In addition, routine repairs are performed as needed.

The Project is exempt from FERC's Emergency Action Plan (EAP) requirements. BWPH, however, maintains a Low Hazard EAP and Notification Flowchart and conducts an annual field reconnaissance upstream and downstream of the Project to verify that no changes have occurred that would reasonably be expected to adversely affect public health, safety, or property in the event of a dam failure. As part of the Low Hazard EAP, BWPH maintains and annually verifies the accuracy of a contact list to be used in the event of a failure at the Brunswick dam.

3.1.1 Existing and Planned Operation of the Project During Flood Conditions

The Project impoundment has no appreciable storage capacity and the Project is operated in run-of-river mode. The impoundment water level is maintained by Project operation. The hydraulic capacity of the generating facilities is approximately 7,475 cfs. Based on the long-term hydrology of the Androscoggin River in the vicinity of the Project, river flows exceed 7,475 cfs approximately 25% of the time. When inflows to the Project exceed this flow level, water in excess of the hydraulic capacity of the generating units is spilled at the dam. A detailed description of the existing and planned operation of the Project during normal and high flow conditions is contained in Exhibit B of this License Application.

3.1.2 Warning Devices Used to Ensure Downstream Public Safety

There are numerous safety signs at the Project and along the Androscoggin River advising the public of the Project and safety considerations. These signs are in addition to the signs attached to the upstream safety barrier (installed during the summer boating season upstream of the spillway gates and intake to protect boaters using the impoundment) and the recreational and information signs posted at the Project recreation sites and elsewhere in the vicinity of the

Project. BWPH's most recently updated Public Safety Plan for the Project was filed with the Commission on October 24, 2025 as Critical Energy/Electric Infrastructure Information (CEII).

3.1.3 Proposed Changes Affecting the Existing Emergency Action Plan

As noted above (Section 3.1) the Project is exempt from FERC's EAP requirements, as it is classified as a Low Hazard potential facility. BWPH, however, maintains a Low Hazard EAP and Notification Flowchart and conducts an annual field reconnaissance upstream and downstream of the Project to verify that no changes have occurred that would reasonably be expected to adversely affect public health, safety, or property in the event of a dam failure. As part of the Low Hazard EAP, BWPH maintains and annually verifies the accuracy of a contact list to be used in the event of a failure at the Brunswick dam. BWPH's dam safety and operations staff conduct an inspection annually, and routine repairs are performed as needed.

3.1.4 Existing and Planned Monitoring Devices

BWPH has deployed water level sensors and staff gauges to monitor the impoundment and tailwater levels associated with the Project. Headpond elevation is monitored remotely by Brookfield Renewable's North American System Control Center on a continual basis. In addition, the aforementioned instrumentation is subject to annual visual inspections.

Additional information regarding dam safety and monitoring devices is classified as CEII and can be found in the Project's Dam Safety and Surveillance Monitoring Plan and Reports, which have been filed with the Commission's New York Regional Office.

3.1.5 Project's Employee and Public Safety Record

No lost-time accidents have occurred at the Project within the last 5 years. There have been no project-related deaths or serious injuries to members of the public within the Project boundary during the past 5 years. No accidents attributable to Project operations have occurred within the period of recordkeeping for the facility.

BWPH is committed to maintaining and operating its facilities in a manner that allows the public to safely enjoy recreational activities. BWPH maintains fences, handrails, and warning signs to protect the public from the hazards of project structures and operations and seasonally installs a boat barrier for safety purposes.

3.2 Current Operation of the Project

A description of the Project operation is contained in Exhibit B of this License Application.

3.3 Project History

A description of the Project history is contained in Exhibit C of this License Application.

3.4 Lost Generation Due to Unscheduled Outages

Table 3.4-1 lists the record of unscheduled outages and related lost generation during the last five years (2021-2025).

3.5 Licensee's Record of Compliance

The Project has a good record of compliance with the terms and conditions of the existing license. A review of BWPH's records indicates no violations of the terms and conditions of the license. In addition, BWPH has not received any communication from the Commission indicating possible non-compliance.

3.6 Actions Affecting the Public

BWPH generally allows public access to the Project impoundment and the surrounding Project lands. BWPH will, however, restrict public access to specific areas that pose a threat to public safety. BWPH provides public recreation access at several formal recreation sites that provide opportunities for bank fishing and motoring and non-motorized boating. A full description of these opportunities and associated recreational facilities provided by BWPH is contained in Exhibit E of this application.

Generation at hydropower facilities generally offsets the need for increased operation at existing baseload facilities, such as oil or coal-fueled generation plants. Fossil-fueled plants produce atmospheric pollutants that must be controlled at significant costs. The avoided cost of air pollution, therefore, is a public benefit of hydroelectric generation.

BWPH's regard for public safety is demonstrated by its active program of installing warning signs and safety devices at the Project (Section 3.1.2), and its regular review of its internal Project safety plans.

3.7 Ownership and Operating Expenses That Would Be Reduced if the License Were Transferred

The current Licensee (BWPH) is applying for a long-term license to continue to maintain and operate the Project. Additionally, there is no competing application to take over the Project. Because there is no proposal to transfer the Project license, this section is not applicable to the Project.

3.8 Annual Fees for Use of Federal or Native American Lands

This section is not applicable to the Project since no Federal or Native American Lands are present in the Project area.

Table 3.4-1: Brunswick Project Unscheduled Outages and Lost Generation, 2021-2025

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	06/08/2020 08:00	03/24/2021 08:11	21,518	Overhaul
Unit 2	01/09/2021 08:42	01/09/2021 08:47	0.2	High trashrack differential
Unit 3	01/09/2021 08:50	01/09/2021 08:55	0.2	High trashrack differential
Unit 3	01/09/2021 08:57	01/09/2021 11:04	6.2	High trashrack differential
Unit 2	01/12/2021 05:53	01/12/2021 07:45	5.4	High trashrack differential
Unit 3	01/12/2021 05:53	01/12/2021 07:45	5.4	High trashrack differential
Unit 3	01/12/2021 07:46	01/12/2021 09:19	4.5	High trashrack differential
Unit 3	01/16/2021 12:14	01/16/2021 13:28	3.6	Generator bearing alarm
Unit 2	01/19/2021 08:39	01/19/2021 09:22	2.1	Trashrack raking
Unit 3	01/19/2021 09:02	01/19/2021 09:24	1.1	Trashrack raking
Unit 3	01/21/2021 05:34	01/21/2021 11:09	16.3	Trashrack icing / high differential
Unit 2	01/21/2021 06:33	01/21/2021 10:54	12.7	Trashrack icing / high differential
Unit 2	01/23/2021 20:48	01/24/2021 11:49	43.8	Icing - clogged strainers
Unit 3	01/23/2021 20:48	01/24/2021 11:49	43.8	Icing - clogged strainers
Unit 2	01/24/2021 21:37	01/25/2021 11:06	39.3	Trashrack icing - station OOS
Unit 3	01/24/2021 21:37	01/25/2021 11:06	39.3	Trashrack icing - station OOS
Unit 3	01/29/2021 05:47	01/29/2021 11:43	17.3	Trashrack icing
Unit 2	01/29/2021 06:21	01/29/2021 11:22	14.6	Trashrack icing
Unit 2	01/29/2021 21:58	01/30/2021 11:35	39.7	Trashrack icing
Unit 3	01/29/2021 21:58	01/30/2021 11:35	39.7	Trashrack icing
Unit 3	01/30/2021 22:44	01/31/2021 10:45	35.0	Trashrack icing
Unit 2	01/30/2021 23:30	01/31/2021 10:46	32.8	Trashrack icing
Unit 3	02/01/2021 02:36	02/01/2021 10:22	22.6	Trashrack icing

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	02/01/2021 04:21	02/01/2021 09:56	16.3	Trashrack icing
Unit 2	02/25/2021 11:05	02/25/2021 11:42	4.7	Rack in breaker 1
Unit 3	02/25/2021 11:05	02/25/2021 11:42	1.8	Rack in breaker 1
Unit 2	03/11/2021 19:15	03/12/2021 10:59	45.9	High stator temperature
Unit 3	03/13/2021 12:33	03/13/2021 12:38	0.2	Negative pricing
Unit 3	03/15/2021 06:41	03/15/2021 13:14	19.1	Trashrack icing
Unit 2	03/15/2021 06:56	03/15/2021 13:47	20.0	Trashrack icing
Unit 3	03/15/2021 21:35	03/16/2021 09:58	36.1	Trashrack icing
Unit 2	03/15/2021 21:41	03/16/2021 10:02	36.0	Trashrack icing
Unit 2	03/21/2021 14:20	03/21/2021 16:54	7.5	High stator temperature
Unit 3	03/23/2021 09:54	03/23/2021 09:57	0.2	Inadvertent trip during checks
Unit 2	03/26/2021 12:34	03/26/2021 13:04	1.5	Trashrack raking
Unit 3	03/26/2021 12:34	03/26/2021 13:04	1.5	Trashrack raking
Unit 2	03/28/2021 03:01	03/28/2021 11:17	24.1	High turbine bearing temperature
Unit 3	03/28/2021 15:01	03/28/2021 15:13	0.6	Trashrack flushing
Unit 2	03/29/2021 10:02	03/29/2021 11:04	3.0	Trashrack raking
Unit 3	03/29/2021 10:29	03/29/2021 11:07	1.9	Trashrack raking
Unit 1	03/29/2021 11:08	03/29/2021 11:58	8.8	Trashrack raking
Unit 1	03/30/2021 08:50	03/30/2021 14:53	64.1	Testing and brake work
Unit 3	03/30/2021 13:35	03/30/2021 15:24	5.3	Negative pricing
Unit 2	03/30/2021 15:15	03/30/2021 15:30	0.7	Negative pricing
Unit 1	04/01/2021 12:37	04/01/2021 13:40	11.1	Trashrack raking
Unit 2	04/01/2021 13:25	04/01/2021 13:40	0.7	Trashrack raking
Unit 3	04/01/2021 13:25	04/01/2021 13:40	0.7	Trashrack raking

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	04/03/2021 09:17	04/05/2021 08:51	138.7	Turbine bearing temperature alarm
Unit 3	04/04/2021 13:44	04/04/2021 15:09	4.1	Negative pricing
Unit 1	04/04/2021 15:11	04/04/2021 16:04	9.4	Negative pricing
Unit 3	04/13/2021 12:43	04/13/2021 13:47	3.1	high generator bearing temp
Unit 3	04/15/2021 11:31	04/15/2021 12:27	**N/A**	Low headpond / fish passage maintenance drawdown
Unit 3	04/15/2021 12:38	04/15/2021 12:55	**N/A**	Low headpond / fish passage maintenance drawdown
Unit 2	04/15/2021 14:50	04/15/2021 15:17	**N/A**	Low headpond / fish passage maintenance drawdown
Unit 2	04/17/2021 07:49	04/17/2021 07:58	**N/A**	Turbine bearing temperature alarm
Unit 1	05/01/2021 00:00	05/01/2021 07:00	74.2	Salmon smolt passage
Unit 1	05/02/2021 20:00	05/03/2021 07:00	116.6	Salmon smolt passage
Unit 1	05/03/2021 09:29	05/03/2021 10:02	5.8	Trashrack raking
Unit 2	05/03/2021 09:29	05/03/2021 10:02	1.6	Trashrack raking
Unit 3	05/03/2021 09:29	05/03/2021 10:02	1.6	Trashrack raking
Unit 1	05/03/2021 20:00	05/04/2021 07:00	116.6	Salmon smolt passage
Unit 1	05/04/2021 20:00	05/05/2021 07:00	116.6	Salmon smolt passage
Unit 1	05/05/2021 20:00	05/06/2021 07:00	116.6	Salmon smolt passage
Unit 3	05/05/2021 20:00	05/06/2021 07:00	32.1	Salmon smolt passage
Unit 1	05/06/2021 20:00	05/07/2021 07:09	118.2	Salmon smolt passage
Unit 3	05/07/2021 08:25	05/07/2021 10:29	6.0	Tainter gate left open - control room error
Unit 1	05/07/2021 20:00	05/08/2021 07:00	116.6	Salmon smolt passage
Unit 1	05/08/2021 20:00	05/09/2021 07:00	116.6	Salmon smolt passage
Unit 3	05/09/2021 04:16	05/09/2021 08:33	12.5	Salmon smolt passage
Unit 3	05/09/2021 09:53	05/09/2021 10:10	0.8	DNE and negative pricing
Unit 1	05/09/2021 20:00	05/10/2021 07:00	116.6	Salmon smolt passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	05/09/2021 20:00	05/10/2021 07:00	**N/A**	Salmon smolt passage
Unit 3	05/10/2021 07:57	05/10/2021 11:20	9.9	Trashrack raking
Unit 2	05/10/2021 10:17	05/10/2021 11:18	3.0	Trashrack raking
Unit 3	05/10/2021 19:52	05/11/2021 07:00	**N/A**	Salmon smolt passage
Unit 1	05/10/2021 20:00	05/11/2021 07:00	116.6	Salmon smolt passage
Unit 1	05/11/2021 20:18	05/12/2021 07:18	116.6	Salmon smolt passage
Unit 3	05/11/2021 20:18	05/12/2021 07:18	**N/A**	Salmon smolt passage
Unit 1	05/12/2021 20:00	05/13/2021 07:00	46.2	Salmon smolt passage
Unit 3	05/12/2021 20:00	05/13/2021 07:00	**N/A**	Salmon smolt passage
Unit 1	05/13/2021 20:00	05/14/2021 07:28	121.5	Salmon smolt passage
Unit 3	05/13/2021 20:00	05/14/2021 07:28	**N/A**	Salmon smolt passage
Unit 1	05/14/2021 20:00	05/15/2021 07:00	57.8	Salmon smolt passage
Unit 3	05/14/2021 20:00	05/15/2021 07:00	**N/A**	Salmon smolt passage
Unit 1	05/15/2021 20:00	05/16/2021 07:00	57.8	Salmon smolt passage
Unit 3	05/15/2021 20:00	05/16/2021 07:00	**N/A**	Salmon smolt passage
Unit 1	05/16/2021 20:00	05/17/2021 07:00	57.8	Salmon smolt passage
Unit 3	05/16/2021 20:00	05/17/2021 07:00	**N/A**	Salmon smolt passage
Unit 1	05/17/2021 20:00	05/18/2021 07:00	57.8	Salmon smolt passage
Unit 3	05/17/2021 20:00	05/18/2021 07:00	**N/A**	Salmon smolt passage
Unit 1	05/18/2021 20:00	05/19/2021 07:00	57.8	Salmon smolt passage
Unit 3	05/18/2021 20:00	05/19/2021 07:00	**N/A**	Salmon smolt passage
Unit 2	05/19/2021 14:58	05/19/2021 17:12	**N/A**	winding temp alarm
Unit 1	05/19/2021 20:00	05/20/2021 07:00	**N/A**	Salmon smolt passage
Unit 3	05/19/2021 20:00	05/20/2021 07:00	**N/A**	Salmon smolt passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	05/20/2021 07:00	05/20/2021 20:00	**N/A**	Reserve Shutdown
Unit 2	05/20/2021 16:15	05/20/2021 20:04	11.1	Winding Temp Alarm
Unit 1	05/20/2021 20:00	05/21/2021 07:00	34.7	Salmon smolt passage
Unit 3	05/20/2021 20:00	05/21/2021 07:00	**N/A**	Salmon smolt passage
Unit 2	05/20/2021 20:09	05/21/2021 10:26	**N/A**	High winding temp
Unit 1	05/21/2021 10:00	05/21/2021 20:00	**N/A**	Reserve Shutdown
Unit 1	05/21/2021 20:00	05/22/2021 07:00	34.7	Salmon smolt passage
Unit 3	05/21/2021 20:00	05/22/2021 07:00	**N/A**	Salmon smolt passage
Unit 3	05/22/2021 07:00	05/22/2021 10:50	11.2	Failed to start
Unit 1	05/22/2021 07:00	05/22/2021 20:00	**N/A**	Reserve Shutdown
Unit 2	05/22/2021 15:37	05/22/2021 18:17	5.6	Winding temperature alarm
Unit 1	05/22/2021 20:00	05/23/2021 07:00	23.1	Salmon smolt passage
Unit 3	05/22/2021 20:00	05/23/2021 07:00	**N/A**	Salmon smolt passage
Unit 1	05/23/2021 07:00	05/23/2021 20:00	**N/A**	Reserve Shutdown
Unit 1	05/23/2021 20:00	05/24/2021 07:00	34.7	Salmon smolt passage
Unit 3	05/23/2021 20:00	05/24/2021 07:00	**N/A**	Salmon smolt passage
Unit 1	05/24/2021 20:00	05/25/2021 07:00	**N/A**	Salmon smolt passage
Unit 3	05/24/2021 20:00	05/25/2021 07:00	32.1	Salmon smolt passage
Unit 2	05/25/2021 17:01	05/25/2021 19:03	**N/A**	Turbine bearing temperature
Unit 1	05/25/2021 20:00	05/26/2021 07:00	**N/A**	Salmon smolt passage
Unit 3	05/25/2021 20:00	05/26/2021 07:00	32.1	Salmon smolt passage
Unit 1	05/26/2021 20:00	05/27/2021 07:00	**N/A**	Salmon smolt passage
Unit 3	05/26/2021 20:00	05/27/2021 07:00	32.1	Salmon smolt passage
Unit 2	05/27/2021 11:24	05/27/2021 14:30	**N/A**	Winding Temps

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	05/27/2021 20:00	05/28/2021 07:00	**N/A**	Salmon smolt passage
Unit 3	05/27/2021 20:00	05/28/2021 07:00	32.1	Salmon smolt passage
Unit 1	05/28/2021 20:00	05/29/2021 07:00	**N/A**	Salmon smolt passage
Unit 3	05/28/2021 20:00	05/29/2021 07:00	**N/A**	Salmon smolt passage
Unit 1	05/29/2021 20:00	05/30/2021 07:00	**N/A**	Salmon smolt passage
Unit 3	05/29/2021 20:00	05/30/2021 07:00	11.6	Salmon smolt passage
Unit 1	05/30/2021 20:00	05/31/2021 07:00	**N/A**	Salmon smolt passage
Unit 3	05/30/2021 20:00	05/31/2021 07:00	11.6	Salmon smolt passage
Unit 1	05/31/2021 20:00	05/31/2021 23:59	**N/A**	Salmon smolt passage
Unit 3	05/31/2021 20:00	05/31/2021 23:59	4.2	Salmon smolt passage
Unit 1	05/31/2021 23:59	06/01/2021 07:01	**N/A**	Reserve Shutdown
Unit 2	06/01/2021 00:00	06/01/2021 07:01	7.4	Salmon smolt passage - control room error
Unit 2	06/01/2021 07:01	06/01/2021 10:37	3.8	Exciter alarm
Unit 1	06/01/2021 07:01	06/01/2021 10:37	**N/A**	Exciter alarm
Unit 1	06/01/2021 10:37	06/01/2021 20:33	**N/A**	Reserve Shutdown
Unit 3	06/01/2021 15:35	06/01/2021 17:52	6.7	winding temp
Unit 1	06/01/2021 20:33	06/25/2021 13:25	**N/A**	Emergency lockout - exciter alarm
Unit 2	06/02/2021 14:23	06/02/2021 20:19	17.3	winding temp
Unit 2	06/03/2021 07:49	06/03/2021 11:59	8.8	turbine bearing temp
Unit 2	06/06/2021 07:00	06/06/2021 10:53	**N/A**	Reserve Shutdown
Unit 2	06/06/2021 10:53	06/06/2021 14:35	3.9	Exciter alarm
Unit 2	06/06/2021 18:12	06/07/2021 09:25	16.0	Exciter Fault
Unit 2	06/07/2021 11:26	06/07/2021 12:36	**N/A**	Exciter testing
Unit 2	06/07/2021 17:41	06/07/2021 19:17	4.7	High winding temp alarm

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	06/07/2021 19:19	06/07/2021 23:00	**N/A**	High winding temp alarm
Unit 3	06/08/2021 12:08	06/08/2021 15:09	**N/A**	Local reset required
Unit 3	06/09/2021 10:23	06/09/2021 14:10	4.0	Exciter temperature
Unit 2	06/12/2021 11:54	06/13/2021 06:20	**N/A**	High winding temperature
Unit 3	06/12/2021 21:41	06/13/2021 00:17	7.6	High winding temperature
Unit 3	06/13/2021 02:00	06/13/2021 06:20	12.6	High winding temperature
Unit 3	06/13/2021 11:16	06/13/2021 13:46	**N/A**	High winding temperature
Unit 2	06/13/2021 13:45	06/14/2021 14:19	**N/A**	High winding temperature
Unit 3	06/13/2021 15:20	06/13/2021 18:45	10.0	High winding temperature
Unit 3	06/14/2021 01:30	06/14/2021 02:30	2.9	High winding temperature
Unit 3	06/14/2021 09:41	06/14/2021 11:41	5.8	High winding temperature
Unit 3	06/14/2021 12:48	06/14/2021 17:30	**N/A**	Changing winding temperature sensor
Unit 2	06/20/2021 15:22	06/21/2021 08:00	**N/A**	High winding temp
Unit 1	06/25/2021 13:25	07/01/2021 15:00	**N/A**	Reserve Shutdown
Unit 1	07/02/2021 03:00	07/05/2021 09:17	**N/A**	Negative pricing
Unit 2	07/04/2021 17:59	07/04/2021 22:00	5.1	High winding temp
Unit 2	07/04/2021 22:00	07/05/2021 09:00	13.8	Exciter Fault
Unit 3	07/05/2021 07:01	07/05/2021 09:17	6.6	Negative pricing
Unit 1	07/05/2021 09:18	07/09/2021 16:48	**N/A**	Lack of Water
Unit 2	07/06/2021 15:32	07/06/2021 17:45	**N/A**	High winding temperature
Unit 3	07/06/2021 16:31	07/06/2021 17:45	3.6	High winding temperature
Unit 2	07/06/2021 22:43	07/07/2021 09:22	13.4	High winding temperature
Unit 3	07/07/2021 06:41	07/07/2021 09:07	7.1	High winding temperature
Unit 2	07/07/2021 11:44	07/07/2021 15:47	5.1	High winding temperature

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	07/07/2021 15:50	07/07/2021 21:24	7.0	High winding temperature
Unit 2	07/07/2021 17:20	07/07/2021 19:01	4.9	High winding temperature
Unit 2	07/07/2021 21:27	07/08/2021 18:00	25.9	High winding temperature
Unit 2	07/09/2021 16:43	07/10/2021 08:49	**N/A**	High winding temperature
Unit 2	07/11/2021 10:25	07/11/2021 14:30	8.6	High winding temperature
Unit 1	07/11/2021 10:42	07/12/2021 00:17	**N/A**	Tripped, reset locally
Unit 3	07/11/2021 11:49	07/11/2021 15:00	6.7	High winding temperature
Unit 3	07/11/2021 16:08	07/11/2021 17:04	2.0	Exciter alarm
Unit 2	07/11/2021 18:58	07/12/2021 00:07	10.8	High winding temperature
Unit 3	07/11/2021 19:15	07/11/2021 21:45	5.3	High winding temperature
Unit 3	07/11/2021 21:45	07/12/2021 00:11	5.1	Exciter alarm
Unit 2	07/12/2021 18:32	07/16/2021 12:34	113.4	High winding temperature
Unit 1	07/12/2021 19:10	07/19/2021 12:00	**N/A**	Turbine Alarm; Tech unable to resolve issue locally
Unit 3	07/16/2021 12:36	07/16/2021 17:33	6.2	High winding temperature
Unit 2	07/16/2021 14:00	07/22/2021 18:37	218.5	High winding temperature
Unit 1	07/19/2021 12:00	07/21/2021 13:00	**N/A**	Reserve Shutdown
Unit 1	07/21/2021 14:00	09/26/2021 15:00	**N/A**	Reserve Shutdown
Unit 3	07/22/2021 18:41	07/22/2021 20:37	2.4	High winding temperature
Unit 2	07/22/2021 20:41	07/27/2021 08:17	135.6	High winding temperature
Unit 3	07/27/2021 10:51	07/27/2021 11:20	0.6	High winding temperature
Unit 2	07/27/2021 11:27	07/27/2021 14:06	**N/A**	High winding temperature
Unit 2	07/27/2021 14:06	07/27/2021 16:07	2.5	High winding temperature
Unit 2	07/27/2021 16:07	07/27/2021 18:16	2.7	High winding temperature
Unit 2	07/27/2021 20:19	07/27/2021 23:46	**N/A**	High winding temperature

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	07/28/2021 02:16	07/28/2021 05:30	**N/A**	High winding temperature
Unit 2	07/28/2021 17:18	07/28/2021 20:18	**N/A**	Exciter Fault
Unit 2	07/28/2021 23:55	07/29/2021 02:24	**N/A**	High winding temperature
Unit 2	07/29/2021 04:37	07/29/2021 08:13	**N/A**	High winding temperature
Unit 3	07/30/2021 14:36	07/30/2021 15:29	**N/A**	High winding temperature
Unit 2	07/30/2021 15:34	07/30/2021 18:48	4.1	High winding temperature
Unit 2	07/30/2021 21:06	07/30/2021 23:08	**N/A**	High winding temperature
Unit 3	07/30/2021 23:08	07/31/2021 01:09	2.5	High winding temperature
Unit 2	07/31/2021 01:12	07/31/2021 03:15	2.2	High winding temperature
Unit 3	07/31/2021 03:18	07/31/2021 05:18	2.1	High winding temperature
Unit 2	08/01/2021 04:44	08/01/2021 06:43	**N/A**	High winding temperature
Unit 2	08/01/2021 10:30	08/02/2021 10:32	25.2	High winding temperature
Unit 2	08/06/2021 14:21	08/06/2021 15:51	1.6	Exciter fault
Unit 3	08/06/2021 14:59	08/06/2021 15:11	0.6	High winding temperature
Unit 2	08/07/2021 04:50	08/07/2021 09:47	5.2	Exciter fault
Unit 2	08/07/2021 19:55	08/07/2021 23:40	3.9	Exciter fault
Unit 2	08/08/2021 16:00	08/08/2021 17:33	1.6	Exciter fault
Unit 3	08/09/2021 07:43	08/10/2021 10:34	28.2	High winding temperature
Unit 3	08/12/2021 09:41	08/12/2021 11:43	**N/A**	High winding temperature
Unit 2	08/12/2021 11:24	08/12/2021 13:33	2.3	High winding temperature
Unit 3	08/12/2021 13:37	08/13/2021 04:02	15.1	High winding temperature
Unit 2	08/12/2021 14:03	08/12/2021 14:48	2.2	High winding temperature
Unit 2	08/13/2021 10:50	08/13/2021 12:05	1.3	High winding temperature
Unit 3	08/13/2021 12:12	08/13/2021 14:27	2.4	High winding temperature

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	08/13/2021 12:49	08/15/2021 00:37	37.6	High winding temperature
Unit 2	08/16/2021 02:22	08/16/2021 09:08	7.1	Exciter fault
Unit 3	08/17/2021 16:00	08/17/2021 17:19	**N/A**	Reserve Shutdown
Unit 2	08/17/2021 16:58	08/17/2021 20:30	2.2	High winding temperature
Unit 3	08/17/2021 17:19	08/17/2021 20:15	8.6	Exciter alarm
Unit 2	08/19/2021 12:00	08/19/2021 19:50	**N/A**	Reserve Shutdown
Unit 2	08/19/2021 19:50	08/20/2021 08:33	5.3	Exciter alarm
Unit 3	08/20/2021 07:44	08/20/2021 10:11	1.5	High winding temperature
Unit 2	08/27/2021 05:11	08/27/2021 12:38	7.8	Exciter fault
Unit 3	08/31/2021 15:00	08/31/2021 16:00	**N/A**	Reserve Shutdown
Unit 3	08/31/2021 16:00	08/31/2021 16:22	**N/A**	Exciter alarm
Unit 2	09/04/2021 09:00	09/04/2021 13:03	**N/A**	Reserve Shutdown
Unit 2	09/04/2021 13:03	09/05/2021 12:10	24.3	Exciter fault
Unit 2	09/12/2021 06:00	09/12/2021 08:12	**N/A**	Reserve Shutdown
Unit 2	09/12/2021 08:12	09/12/2021 09:14	1.1	Exciter Fault Alarm
Unit 2	09/17/2021 21:00	09/17/2021 22:56	**N/A**	Reserve Shutdown
Unit 2	09/17/2021 22:56	09/18/2021 08:24	9.9	Exciter Fault
Unit 1	09/27/2021 01:28	09/27/2021 13:09	24.5	Negative pricing, unit could not re-start remotely
Unit 1	09/28/2021 09:00	10/10/2021 07:00	**N/A**	Reserve Shutdown
Unit 2	10/08/2021 19:00	10/09/2021 07:00	23.9	Alewife passage
Unit 3	10/08/2021 19:00	10/09/2021 07:00	23.9	Alewife passage
Unit 2	10/09/2021 19:00	10/10/2021 07:00	23.9	Alewife passage
Unit 3	10/09/2021 19:00	10/10/2021 07:00	23.9	Alewife passage
Unit 1	10/10/2021 08:00	10/19/2021 07:00	**N/A**	Reserve Shutdown

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	10/10/2021 19:00	10/11/2021 07:00	23.9	Alewife passage
Unit 3	10/10/2021 19:00	10/11/2021 07:00	23.9	Alewife passage
Unit 2	10/11/2021 19:00	10/12/2021 07:05	24.1	Alewife passage
Unit 3	10/11/2021 19:00	10/12/2021 07:05	24.1	Alewife passage
Unit 2	10/12/2021 19:00	10/13/2021 07:00	**N/A**	Alewife passage
Unit 3	10/12/2021 19:00	10/13/2021 07:00	35.0	Alewife passage
Unit 2	10/13/2021 19:00	10/14/2021 07:00	**N/A**	Alewife passage
Unit 3	10/13/2021 19:00	10/14/2021 07:00	35.0	Alewife passage
Unit 2	10/14/2021 19:00	10/15/2021 07:00	**N/A**	Alewife passage
Unit 3	10/14/2021 19:00	10/15/2021 07:00	35.0	Alewife passage
Unit 2	10/15/2021 19:00	10/16/2021 07:00	**N/A**	Alewife passage
Unit 3	10/15/2021 19:00	10/16/2021 07:00	35.0	Alewife passage
Unit 2	10/16/2021 19:00	10/17/2021 07:00	**N/A**	Alewife passage
Unit 3	10/16/2021 19:00	10/17/2021 07:00	35.0	Alewife passage
Unit 2	10/17/2021 19:00	10/18/2021 07:00	**N/A**	Alewife passage
Unit 3	10/17/2021 19:00	10/18/2021 07:00	35.0	Alewife passage
Unit 2	10/18/2021 08:48	10/27/2021 08:38	226.6	Annual inspection
Unit 3	10/18/2021 19:00	10/19/2021 07:00	35.0	Alewife passage
Unit 3	10/19/2021 19:00	10/20/2021 07:00	35.0	Alewife passage
Unit 3	10/20/2021 19:00	10/21/2021 07:00	35.0	Alewife passage
Unit 3	10/21/2021 19:00	10/22/2021 07:00	35.0	Alewife passage
Unit 3	10/22/2021 19:00	10/23/2021 07:00	35.0	Alewife passage
Unit 3	10/23/2021 19:00	10/24/2021 07:00	35.0	Alewife Passage
Unit 3	10/24/2021 18:58	10/25/2021 07:00	35.1	Alewife passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	10/25/2021 19:03	10/26/2021 07:00	34.8	Alewife passage
Unit 1	10/27/2021 09:00	10/30/2021 03:00	**N/A**	Reserve Shutdown
Unit 2	10/31/2021 07:47	10/31/2021 10:00	6.5	High bearing temperature
Unit 1	11/01/2021 09:01	11/01/2021 12:08	33.0	Broken shear pin
Unit 2	11/01/2021 11:17	11/01/2021 12:08	2.5	Trashrack raking
Unit 3	11/01/2021 11:17	11/01/2021 12:08	2.5	Trashrack raking
Unit 1	11/02/2021 05:47	11/02/2021 06:00	2.3	Flushing trashracks
Unit 2	11/02/2021 05:47	11/02/2021 06:00	0.6	Flushing trashracks
Unit 3	11/02/2021 05:47	11/02/2021 06:00	0.6	Flushing trashracks
Unit 1	11/02/2021 08:58	11/02/2021 10:53	20.3	Trashrack raking
Unit 2	11/02/2021 08:58	11/02/2021 10:53	5.6	Trashrack raking
Unit 3	11/02/2021 08:58	11/02/2021 10:53	5.6	Trashrack raking
Unit 3	11/08/2021 07:30	11/19/2021 11:24	196.9	Annual inspection
Unit 1	11/13/2021 08:09	11/13/2021 10:46	16.5	Trashrack raking
Unit 2	11/13/2021 08:14	11/13/2021 10:39	7.0	Trashrack raking
Unit 2	11/13/2021 19:58	11/13/2021 21:54	5.6	Flushing trashracks
Unit 2	11/14/2021 02:43	11/14/2021 04:22	4.8	Flushing trashracks
Unit 2	11/14/2021 05:11	11/14/2021 09:44	13.3	Flushing trashracks
Unit 2	11/15/2021 02:41	11/15/2021 11:08	24.6	Trashrack differential
Unit 1	11/15/2021 03:21	11/15/2021 03:34	2.3	Flushing trashracks
Unit 1	11/15/2021 08:55	11/15/2021 11:08	23.5	Trashrack raking
Unit 1	11/16/2021 07:13	11/16/2021 08:43	15.9	Trashrack raking
Unit 2	11/16/2021 07:24	11/16/2021 08:43	3.8	Trashrack raking
Unit 2	11/17/2021 16:24	11/17/2021 16:47	1.1	Trip - required controls reset

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	11/18/2021 10:28	11/18/2021 11:33	11.5	Trashrack raking
Unit 2	11/19/2021 01:37	11/19/2021 04:23	8.1	turbine bearing temperature
Unit 3	11/25/2021 23:46	11/26/2021 02:21	7.5	High winding temperature alarm
Unit 3	11/27/2021 10:51	11/27/2021 14:00	6.6	High winding temperature alarm
Unit 3	11/28/2021 13:23	11/28/2021 16:58	7.5	High winding temperature alarm
Unit 3	11/29/2021 05:53	11/29/2021 09:07	6.8	High winding temperature alarm
Unit 3	11/29/2021 14:17	11/29/2021 16:05	**N/A**	High winding temperature alarm
Unit 3	12/01/2021 02:28	12/01/2021 06:23	11.4	High winding temperature alarm
Unit 3	12/01/2021 15:22	12/01/2021 19:11	**N/A**	High winding temperature alarm
Unit 3	12/02/2021 04:27	12/02/2021 06:45	**N/A**	High winding temperature alarm
Unit 3	12/02/2021 16:29	12/02/2021 19:43	**N/A**	High winding temperature alarm
Unit 1	12/02/2021 20:00	12/07/2021 09:00	**N/A**	Reserve Shutdown
Unit 3	12/03/2021 04:25	12/03/2021 07:58	5.2	High winding temperature alarm
Unit 3	12/04/2021 09:05	12/04/2021 12:01	4.3	High winding temperature alarm
Unit 3	12/04/2021 15:02	12/04/2021 18:02	4.4	High winding temperature alarm
Unit 3	12/05/2021 09:14	12/05/2021 12:22	4.6	High winding temperature alarm
Unit 3	12/07/2021 10:00	12/10/2021 12:00	**N/A**	Reserve Shutdown
Unit 1	12/10/2021 13:00	12/13/2021 09:00	**N/A**	Reserve Shutdown
Unit 1	12/17/2021 19:00	12/18/2021 20:00	**N/A**	Reserve Shutdown
Unit 2	12/21/2021 01:34	12/21/2021 12:15	**N/A**	High trashrack differential - icing
Unit 3	12/21/2021 06:14	12/21/2021 12:15	**N/A**	High trashrack differential - icing
Unit 2	12/24/2021 00:44	12/24/2021 12:29	**N/A**	High trashrack differential - icing
Unit 1	12/24/2021 01:16	12/24/2021 02:05	8.7	High trashrack differential - icing
Unit 3	12/24/2021 02:09	12/24/2021 12:33	**N/A**	High trashrack differential - icing

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	12/24/2021 02:27	12/24/2021 12:33	74.2	High trashrack differential - icing
Unit 1	12/24/2021 14:37	12/28/2021 14:10	**N/A**	High trashrack differential - icing
Unit 1	12/28/2021 20:00	01/02/2022 18:00	**N/A**	Reserve Shutdown
Unit 1	12/28/2021 20:00	01/02/2022 18:00	**N/A**	Reserve Shutdown
Unit 3	01/01/2022 07:36	01/01/2022 10:42	9.0	High winding temperature alarm
Unit 3	01/01/2022 15:51	01/02/2022 02:47	31.9	High winding temperature alarm
Unit 3	01/02/2022 07:05	01/02/2022 09:10	6.1	High winding temperature alarm
Unit 3	01/02/2022 13:13	01/02/2022 15:45	7.4	High winding temperature alarm
Unit 1	01/03/2022 04:56	01/03/2022 05:04	1.4	Negative pricing
Unit 1	01/03/2022 23:36	01/04/2022 10:10	111.0	Trashrack icing
Unit 2	01/04/2022 00:29	01/04/2022 10:41	**N/A**	Trashrack icing
Unit 3	01/04/2022 01:02	01/04/2022 10:37	**N/A**	Trashrack icing
Unit 1	01/05/2022 06:00	01/07/2022 13:00	**N/A**	Reserve Shutdown
Unit 3	01/07/2022 13:47	01/08/2022 08:50	55.5	Trashrack icing
Unit 1	01/07/2022 16:51	01/10/2022 12:33	**N/A**	exciter issues
Unit 2	01/08/2022 07:46	01/08/2022 11:06	9.7	Trashrack ice cleaning
Unit 3	01/11/2022 03:30	01/11/2022 03:38	0.4	Unit took itself offline. This happens sometimes when the startup sequence takes too long.
Unit 2	01/11/2022 03:45	01/11/2022 03:56	0.5	Unit took itself offline. This happens sometimes when the startup sequence takes too long.
Unit 3	01/11/2022 06:15	01/11/2022 14:43	**N/A**	Trashrack icing
Unit 1	01/11/2022 06:57	01/11/2022 08:14	9.4	Trashrack icing
Unit 2	01/11/2022 06:57	01/11/2022 14:34	**N/A**	Trashrack icing
Unit 1	01/12/2022 01:00	01/27/2022 06:00	**N/A**	Reserve Shutdown
Unit 3	01/15/2022 04:57	01/15/2022 09:34	13.5	Trashrack icing

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	01/15/2022 05:29	01/15/2022 09:28	11.6	Trashrack diff/icing
Unit 1	01/29/2022 00:00	01/31/2022 17:00	**N/A**	Reserve Shutdown
Unit 1	01/31/2022 20:00	02/13/2022 10:00	**N/A**	Reserve Shutdown
Unit 3	02/11/2022 15:56	02/11/2022 18:58	4.5	High winding temperature alarm
Unit 3	02/11/2022 22:14	02/12/2022 01:18	4.5	High winding temperature
Unit 3	02/12/2022 04:29	02/12/2022 07:30	4.4	High winding temperature
Unit 3	02/12/2022 09:43	02/12/2022 09:56	0.3	Negative pricing
Unit 3	02/12/2022 11:13	02/12/2022 14:49	5.3	Negative pricing
Unit 3	02/12/2022 19:10	02/12/2022 22:23	4.7	High winding temperature alarm
Unit 3	02/13/2022 01:53	02/13/2022 04:25	3.7	High winding temperature alarm
Unit 3	02/13/2022 07:46	02/13/2022 09:22	2.4	High winding temperature alarm
Unit 3	02/13/2022 21:05	02/14/2022 00:05	**N/A**	High winding temperature alarm
Unit 3	02/14/2022 05:00	02/14/2022 06:44	**N/A**	Reserve Shutdown
Unit 3	02/14/2022 06:44	02/14/2022 07:22	**N/A**	Unit failed to start
Unit 1	02/17/2022 04:00	02/18/2022 04:00	**N/A**	Reserve Shutdown
Unit 3	02/21/2022 10:19	02/21/2022 16:38	**N/A**	Negative pricing
Unit 1	02/21/2022 10:32	02/21/2022 16:37	57.5	Negative pricing
Unit 1	02/23/2022 14:21	02/23/2022 15:05	6.9	Negative pricing
Unit 3	02/23/2022 14:23	02/23/2022 15:07	**N/A**	Negative pricing
Unit 1	02/28/2022 02:48	02/28/2022 04:06	13.8	Negative pricing
Unit 3	02/28/2022 03:09	02/28/2022 03:34	**N/A**	Negative pricing
Unit 1	02/28/2022 13:11	02/28/2022 14:07	9.9	Negative pricing
Unit 2	02/28/2022 13:11	02/28/2022 14:07	**N/A**	Negative pricing
Unit 2	03/01/2022 05:27	03/01/2022 13:25	**N/A**	Trashrack icing

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	03/03/2022 12:43	03/03/2022 13:07	2.1	Negative pricing
Unit 2	03/13/2022 07:40	03/13/2022 10:40	8.7	Trashrack differential
Unit 1	03/13/2022 08:29	03/13/2022 10:32	21.7	Trashrack differential
Unit 3	03/13/2022 08:29	03/13/2022 10:32	6.0	Trashrack differential
Unit 1	03/16/2022 13:20	03/16/2022 17:26	38.8	Negative pricing
Unit 2	03/16/2022 13:20	03/16/2022 17:26	**N/A**	Negative pricing
Unit 2	03/19/2022 21:47	03/20/2022 11:06	38.8	Trashracks differential
Unit 3	03/20/2022 09:03	03/20/2022 10:57	5.5	Trashrack raking
Unit 1	03/20/2022 11:10	03/20/2022 11:18	1.4	Trashrack raking
Unit 1	03/20/2022 19:15	03/20/2022 19:48	5.8	Flushing trashracks
Unit 2	03/20/2022 19:15	03/20/2022 19:48	1.6	Flushing trashracks
Unit 3	03/20/2022 19:15	03/20/2022 19:48	1.6	Flushing trashracks
Unit 3	03/20/2022 21:37	03/20/2022 22:45	3.3	Flushing trashracks
Unit 1	03/21/2022 08:54	03/21/2022 10:56	21.6	Trashrack raking
Unit 2	03/21/2022 10:03	03/21/2022 10:16	0.6	Trashrack raking
Unit 3	03/21/2022 10:03	03/21/2022 10:21	0.9	Trashrack raking
Unit 1	03/22/2022 12:34	03/22/2022 13:42	12.0	Trashrack raking
Unit 3	03/22/2022 13:18	03/22/2022 14:02	2.1	Trashrack raking
Unit 2	03/22/2022 13:24	03/22/2022 13:56	1.6	Trashrack raking
Unit 1	03/25/2022 12:48	03/25/2022 14:22	16.6	Trashrack raking
Unit 2	03/25/2022 14:10	03/25/2022 14:29	0.9	Trashrack raking
Unit 3	03/25/2022 14:11	03/25/2022 14:37	1.3	Trashrack raking
Unit 1	04/01/2022 12:30	04/01/2022 13:59	15.7	Trashrack raking
Unit 1	04/02/2022 09:51	04/02/2022 11:05	13.1	Negative pricing

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	04/02/2022 09:51	04/02/2022 11:05	3.6	Negative pricing
Unit 1	04/02/2022 15:57	04/02/2022 17:07	12.4	Negative pricing
Unit 3	04/02/2022 15:57	04/02/2022 17:07	3.4	Negative pricing
Unit 1	04/04/2022 14:55	04/04/2022 16:03	12.0	Negative pricing
Unit 3	04/04/2022 14:55	04/04/2022 16:03	3.3	Negative pricing
Unit 1	04/05/2022 17:48	04/05/2022 18:31	7.6	Incomplete sequence alarm, tech needed to reset
Unit 1	04/06/2022 10:05	04/06/2022 10:34	3.1	Trashrack raking
Unit 2	04/06/2022 10:05	04/06/2022 10:34	1.4	Trashrack raking
Unit 3	04/06/2022 10:05	04/06/2022 10:34	1.4	Trashrack raking
Unit 1	04/14/2022 12:31	04/14/2022 13:57	15.2	Trashrack raking
Unit 2	04/14/2022 13:48	04/14/2022 14:02	0.7	Trashrack raking
Unit 3	04/14/2022 13:48	04/14/2022 14:02	0.7	Trashrack raking
Unit 2	04/15/2022 09:59	04/15/2022 10:26	1.3	Trashrack raking
Unit 3	04/15/2022 09:59	04/15/2022 10:26	1.3	Trashrack raking
Unit 1	04/18/2022 12:19	04/18/2022 12:31	2.1	Negative pricing
Unit 1	04/25/2022 09:33	04/25/2022 10:01	5.0	Trashrack raking
Unit 2	04/25/2022 09:33	04/25/2022 10:01	1.4	Trashrack raking
Unit 3	04/25/2022 09:33	04/25/2022 10:01	1.4	Trashrack raking
Unit 1	04/29/2022 12:31	04/29/2022 13:01	5.3	Negative pricing
Unit 3	04/29/2022 12:31	04/29/2022 13:01	1.5	Negative pricing
Unit 1	04/30/2022 10:02	04/30/2022 11:55	20.0	Negative pricing
Unit 3	04/30/2022 10:02	04/30/2022 11:55	5.5	Negative pricing
Unit 1	05/01/2022 00:00	05/01/2022 07:00	74.2	Salmon smolt passage
Unit 1	05/01/2022 20:00	05/02/2022 07:25	121.0	Salmon smolt passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	05/02/2022 20:00	05/03/2022 07:10	118.3	Salmon smolt passage
Unit 3	05/03/2022 20:03	05/04/2022 07:05	32.2	Salmon smolt passage
Unit 1	05/04/2022 05:30	05/04/2022 07:02	16.3	Salmon smolt passage
Unit 1	05/04/2022 20:00	05/05/2022 07:04	117.3	Salmon smolt passage
Unit 1	05/05/2022 19:54	05/06/2022 06:59	117.5	Salmon smolt passage
Unit 1	05/06/2022 20:02	05/07/2022 07:01	**N/A**	Salmon smolt passage
Unit 1	05/07/2022 20:05	05/08/2022 07:01	**N/A**	Salmon smolt passage
Unit 1	05/08/2022 20:01	05/09/2022 07:12	118.5	Salmon smolt passage
Unit 2	05/08/2022 20:30	05/09/2022 07:06	30.9	Salmon smolt passage
Unit 1	05/09/2022 20:03	05/10/2022 07:06	117.1	Salmon smolt passage
Unit 2	05/09/2022 20:03	05/10/2022 07:01	32.0	Salmon smolt passage
Unit 1	05/10/2022 19:59	05/11/2022 07:05	117.6	Salmon smolt passage
Unit 2	05/10/2022 20:04	05/11/2022 07:04	32.1	Salmon smolt passage
Unit 2	05/11/2022 20:01	05/11/2022 20:43	2.0	Salmon smolt passage
Unit 1	05/11/2022 20:44	05/12/2022 07:04	109.5	Salmon smolt passage
Unit 3	05/11/2022 20:46	05/12/2022 08:17	33.6	Winding temp alarm
Unit 1	05/12/2022 19:59	05/13/2022 07:05	117.6	Salmon smolt passage
Unit 2	05/12/2022 19:59	05/13/2022 07:05	**N/A**	Salmon smolt passage
Unit 1	05/13/2022 09:06	05/13/2022 10:21	13.3	Trip for wicket gate position
Unit 1	05/13/2022 19:56	05/14/2022 07:01	117.5	Salmon smolt passage
Unit 2	05/13/2022 19:56	05/14/2022 07:01	**N/A**	Salmon smolt passage
Unit 1	05/14/2022 19:58	05/15/2022 07:00	116.9	Salmon smolt passage
Unit 2	05/14/2022 19:58	05/15/2022 07:00	**N/A**	Salmon smolt passage
Unit 1	05/15/2022 19:56	05/16/2022 06:57	92.5	Salmon smolt passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	05/15/2022 20:00	05/16/2022 07:00	**N/A**	Salmon smolt passage / failed to start
Unit 1	05/16/2022 20:04	05/17/2022 06:59	115.7	Salmon smolt passage
Unit 2	05/16/2022 20:04	05/17/2022 06:59	**N/A**	Salmon smolt passage
Unit 1	05/17/2022 20:03	05/18/2022 07:04	116.7	Salmon smolt passage
Unit 3	05/17/2022 20:03	05/18/2022 07:07	**N/A**	Salmon smolt passage
Unit 2	05/18/2022 12:40	05/18/2022 13:05	1.2	Trashrack raking
Unit 3	05/18/2022 12:43	05/18/2022 13:09	1.3	Trashrack raking
Unit 1	05/18/2022 20:00	05/19/2022 07:13	118.9	Salmon smolt passage
Unit 2	05/19/2022 05:39	05/19/2022 07:11	4.5	Salmon smolt passage
Unit 1	05/19/2022 20:04	05/20/2022 07:03	116.4	Salmon smolt passage
Unit 2	05/19/2022 20:04	05/20/2022 07:03	32.0	Salmon smolt passage
Unit 1	05/20/2022 19:57	05/21/2022 07:02	117.5	Salmon smolt passage
Unit 2	05/20/2022 19:57	05/21/2022 07:02	**N/A**	Salmon smolt passage
Unit 1	05/21/2022 10:15	05/21/2022 10:46	5.5	Negative pricing
Unit 2	05/21/2022 10:15	05/21/2022 10:46	**N/A**	Negative pricing
Unit 1	05/21/2022 11:00	05/21/2022 13:36	27.6	Negative pricing
Unit 2	05/21/2022 11:00	05/21/2022 13:36	**N/A**	Negative pricing
Unit 3	05/21/2022 12:05	05/21/2022 14:10	6.1	Negative pricing
Unit 1	05/21/2022 19:53	05/22/2022 07:03	118.3	Salmon smolt passage
Unit 2	05/21/2022 19:53	05/22/2022 07:03	32.6	Salmon smolt passage
Unit 1	05/22/2022 19:54	05/23/2022 07:00	117.6	Salmon smolt passage
Unit 2	05/22/2022 19:54	05/23/2022 07:00	9.0	Salmon smolt passage
Unit 1	05/23/2022 19:52	05/24/2022 07:00	118.0	Salmon smolt passage
Unit 2	05/24/2022 05:09	05/24/2022 07:00	5.4	Salmon smolt passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	05/24/2022 19:50	05/25/2022 07:00	118.3	Salmon smolt passage
Unit 2	05/24/2022 19:50	05/25/2022 07:00	**N/A**	Salmon smolt passage
Unit 3	05/24/2022 19:50	05/25/2022 07:00	23.5	Salmon smolt passage
Unit 1	05/25/2022 19:56	05/26/2022 07:00	117.3	Salmon smolt passage
Unit 2	05/25/2022 19:56	05/26/2022 07:00	**N/A**	Salmon smolt passage
Unit 1	05/26/2022 19:56	05/27/2022 07:03	70.0	Salmon smolt passage
Unit 2	05/26/2022 19:56	05/27/2022 07:03	**N/A**	Salmon smolt passage
Unit 1	05/27/2022 20:00	05/28/2022 07:01	69.4	Salmon smolt passage
Unit 2	05/27/2022 20:00	05/28/2022 07:01	**N/A**	Salmon smolt passage
Unit 1	05/28/2022 20:02	05/29/2022 07:02	69.3	Salmon smolt passage
Unit 2	05/28/2022 20:02	05/29/2022 07:02	**N/A**	Salmon smolt passage
Unit 1	05/29/2022 20:03	05/30/2022 07:03	69.3	Salmon smolt passage
Unit 2	05/29/2022 20:03	05/30/2022 07:03	**N/A**	Salmon smolt passage
Unit 1	05/30/2022 20:00	05/31/2022 07:04	69.7	Salmon smolt passage
Unit 2	05/30/2022 20:00	05/31/2022 07:04	**N/A**	Salmon smolt passage
Unit 1	05/31/2022 19:58	05/31/2022 23:59	25.3	Salmon smolt passage
Unit 2	05/31/2022 19:58	05/31/2022 23:59	**N/A**	Salmon smolt passage
Unit 1	06/01/2022 08:00	06/09/2022 17:00	**N/A**	Reserve Shutdown
Unit 1	06/10/2022 18:28	06/10/2022 20:58	7.9	PLC tripped unit while in pond control
Unit 1	06/12/2022 14:00	07/14/2022 18:00	**N/A**	Reserve Shutdown
Unit 3	06/27/2022 20:00	06/27/2022 23:08	**N/A**	Reserve Shutdown
Unit 3	06/27/2022 23:08	06/28/2022 09:30	10.9	overspeeding at start up, unable to sync to bus
Unit 1	07/15/2022 00:00	07/21/2022 16:00	**N/A**	Reserve Shutdown
Unit 3	07/21/2022 13:31	07/21/2022 16:30	**N/A**	Winding Temps

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	07/21/2022 19:00	07/23/2022 18:00	**N/A**	Reserve Shutdown
Unit 3	07/22/2022 16:07	07/22/2022 16:52	2.2	High winding temps
Unit 1	07/23/2022 20:00	08/08/2022 00:00	**N/A**	Reserve Shutdown
Unit 3	07/30/2022 21:43	07/31/2022 01:01	3.5	Winding Temps
Unit 2	07/31/2022 09:13	07/31/2022 10:16	1.1	Negative pricing
Unit 3	07/31/2022 11:24	07/31/2022 13:02	**N/A**	Winding Temps
Unit 3	08/02/2022 12:06	08/02/2022 22:46	4.5	High winding temperature alarm
Unit 3	08/20/2022 22:00	08/21/2022 03:37	**N/A**	Reserve Shutdown
Unit 3	08/21/2022 03:37	08/21/2022 07:30	4.1	fail to start/excitation issues
Unit 1	08/24/2022 20:00	08/25/2022 04:00	58.8	Unit 1 not started due to Unit 3 starting issues.
Unit 3	08/25/2022 08:06	08/25/2022 12:09	8.5	Winding Temp
Unit 1	09/01/2022 00:00	09/21/2022 06:00	**N/A**	Reserve Shutdown
Unit 1	09/21/2022 06:00	09/21/2022 11:00	**N/A**	Relay testing
Unit 2	09/21/2022 11:01	09/21/2022 14:51	**N/A**	Relay testing
Unit 1	09/22/2022 01:33	09/22/2022 09:11	64.1	High packing box temperature
Unit 3	09/22/2022 06:00	09/22/2022 11:00	**N/A**	Relay testing
Unit 1	09/22/2022 12:37	09/22/2022 14:54	20.1	Intertie trip testing
Unit 2	09/22/2022 12:37	09/22/2022 14:54	**N/A**	Intertie trip testing
Unit 3	09/22/2022 12:37	09/22/2022 14:54	**N/A**	Intertie trip testing
Unit 1	09/23/2022 14:36	09/24/2022 14:26	100.1	Packing box cooling water
Unit 1	09/28/2022 12:00	10/03/2022 08:54	**N/A**	Reserve Shutdown
Unit 1	10/03/2022 08:54	10/07/2022 10:39	**N/A**	Dewatered inspection
Unit 3	10/03/2022 08:54	10/03/2022 09:36	1.6	Station outage to rack out unit 1 breaker
Unit 2	10/03/2022 08:56	10/03/2022 09:37	1.6	Station outage to rack out unit 1 breaker

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	10/07/2022 10:06	10/07/2022 10:39	1.4	Station outage to rack in unit 1 breaker
Unit 3	10/07/2022 10:06	10/07/2022 10:39	1.4	Station outage to rack in unit 1 breaker
Unit 1	10/07/2022 11:00	10/14/2022 17:00	**N/A**	Reserve Shutdown
Unit 3	10/11/2022 10:33	10/11/2022 11:03	1.5	Trashrack raking
Unit 2	10/15/2022 07:05	10/15/2022 08:02	2.8	Trashrack differential
Unit 3	10/15/2022 08:20	10/15/2022 09:08	2.3	Trashrack differential
Unit 2	10/15/2022 11:20	10/15/2022 11:49	1.4	Trashrack differential
Unit 3	10/15/2022 11:41	10/15/2022 12:51	3.4	Trashrack differential
Unit 1	10/15/2022 12:13	10/15/2022 13:38	15.0	Trashrack differential
Unit 3	10/15/2022 12:54	10/15/2022 13:31	1.8	Trashrack differential
Unit 2	10/15/2022 13:38	10/15/2022 15:25	5.2	Trashrack differential
Unit 3	10/15/2022 16:32	10/15/2022 17:14	2.0	Trashrack differential
Unit 1	10/15/2022 17:11	10/15/2022 18:49	17.3	Trashrack differential
Unit 3	10/15/2022 17:37	10/15/2022 18:58	3.9	Trashrack differential
Unit 2	10/15/2022 17:45	10/15/2022 18:53	3.3	Trashrack differential
Unit 3	10/15/2022 19:15	10/15/2022 22:08	8.4	Trashrack differential
Unit 1	10/15/2022 20:06	10/15/2022 22:01	20.3	Trashrack differential
Unit 2	10/15/2022 21:10	10/15/2022 22:05	2.7	Trashrack differential
Unit 1	10/16/2022 00:35	10/16/2022 04:18	39.4	Trashrack differential
Unit 2	10/16/2022 00:49	10/16/2022 04:23	10.4	Trashrack differential
Unit 3	10/16/2022 03:18	10/16/2022 04:23	3.2	Trashrack differential
Unit 2	10/16/2022 05:42	10/16/2022 06:49	3.3	Trashrack differential
Unit 3	10/16/2022 07:24	10/16/2022 07:39	0.7	Trashrack differential
Unit 1	10/16/2022 20:21	10/16/2022 20:38	3.0	Sluice debris

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	10/17/2022 00:46	10/17/2022 01:03	3.0	Sluice debris
Unit 2	10/17/2022 10:16	10/17/2022 10:58	2.0	Trashrack raking
Unit 3	10/17/2022 10:16	10/17/2022 10:58	2.0	Trashrack raking
Unit 1	10/18/2022 09:13	10/18/2022 10:07	9.5	Trashrack raking
Unit 2	10/18/2022 22:08	10/18/2022 23:03	2.7	Trashrack raking
Unit 3	10/19/2022 05:04	10/19/2022 12:38	22.1	Trashrack raking
Unit 2	10/19/2022 10:46	10/19/2022 10:53	0.3	Negative pricing
Unit 1	10/19/2022 11:32	10/19/2022 12:33	10.8	Trashrack raking
Unit 2	10/19/2022 11:32	10/19/2022 12:33	3.0	Trashrack raking
Unit 1	10/20/2022 09:26	10/20/2022 10:32	11.7	Trashrack raking
Unit 2	10/20/2022 09:26	10/20/2022 10:32	3.2	Trashrack raking
Unit 3	10/20/2022 09:26	10/20/2022 10:32	3.2	Trashrack raking
Unit 1	10/20/2022 11:29	10/20/2022 12:05	6.4	Negative pricing
Unit 2	10/20/2022 11:29	10/20/2022 12:05	1.8	Negative pricing
Unit 2	10/20/2022 19:01	10/21/2022 07:40	36.9	Alewife Passage
Unit 3	10/20/2022 19:01	10/21/2022 07:40	36.9	Alewife Passage
Unit 3	10/21/2022 07:41	10/24/2022 08:52	**N/A**	Voltage regulator - overvoltage relay
Unit 2	10/21/2022 09:37	10/21/2022 12:01	7.0	Trashrack raking
Unit 1	10/21/2022 09:40	10/21/2022 11:54	23.7	Trashrack raking
Unit 2	10/21/2022 18:54	10/22/2022 07:03	35.4	Alewife passage
Unit 2	10/22/2022 18:54	10/23/2022 07:05	35.5	Alewife passage
Unit 2	10/23/2022 18:54	10/24/2022 07:16	36.1	Alewife Passage
Unit 2	10/24/2022 18:54	10/25/2022 07:01	25.5	Alewife passage
Unit 3	10/24/2022 18:54	10/25/2022 07:01	25.5	Alewife passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	10/25/2022 19:02	10/26/2022 07:01	25.2	Alewife passage
Unit 3	10/25/2022 19:02	10/26/2022 07:01	25.2	Alewife passage
Unit 1	10/26/2022 07:31	10/26/2022 08:21	8.8	Trashrack raking
Unit 2	10/26/2022 19:04	10/27/2022 07:05	25.2	Alewife passage
Unit 3	10/26/2022 19:04	10/27/2022 07:05	25.2	Alewife passage
Unit 1	10/27/2022 09:30	10/27/2022 11:07	17.1	Rack raking
Unit 2	10/27/2022 19:00	10/28/2022 07:07	25.5	Alewife passage
Unit 3	10/27/2022 19:03	10/28/2022 07:11	25.5	Alewife passage
Unit 1	10/28/2022 13:40	10/28/2022 14:51	7.5	Trashrack raking
Unit 2	10/28/2022 19:33	10/29/2022 07:34	12.6	Alewife passage
Unit 3	10/28/2022 19:33	10/29/2022 07:34	12.6	Alewife passage
Unit 2	10/29/2022 18:54	10/30/2022 07:04	12.8	Alewife passage
Unit 3	10/29/2022 18:54	10/30/2022 07:04	12.8	Alewife passage
Unit 2	10/30/2022 18:55	10/31/2022 07:00	12.7	Alewife passage
Unit 3	10/30/2022 18:55	10/31/2022 07:00	12.7	Alewife passage
Unit 1	10/31/2022 13:34	10/31/2022 14:29	9.7	Raking Racks
Unit 2	10/31/2022 19:00	11/01/2022 07:16	25.8	Alewife passage
Unit 3	10/31/2022 19:00	11/01/2022 07:16	25.8	Alewife passage
Unit 2	11/01/2022 18:56	11/02/2022 07:00	25.3	Alewife Passage
Unit 3	11/01/2022 18:56	11/02/2022 07:00	**N/A**	Alewife passage
Unit 1	11/15/2022 12:10	11/15/2022 13:32	14.5	Trashrack raking
Unit 1	11/16/2022 07:14	11/16/2022 08:32	13.8	Trashrack raking
Unit 3	11/16/2022 08:07	11/16/2022 08:37	1.5	Trashrack raking
Unit 2	11/16/2022 08:08	11/16/2022 08:33	1.2	Trashrack raking

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	11/18/2022 10:22	11/18/2022 11:27	4.6	low elevation trip
Unit 1	12/01/2022 08:50	12/01/2022 09:30	7.1	Trashrack raking
Unit 1	12/01/2022 13:59	12/01/2022 14:16	3.0	Trashrack raking
Unit 1	12/02/2022 07:29	12/02/2022 08:42	12.9	Trashrack raking
Unit 2	12/02/2022 07:35	12/02/2022 09:07	4.5	Trashrack raking
Unit 3	12/02/2022 08:45	12/02/2022 09:01	0.8	Trashrack raking
Unit 1	12/02/2022 13:20	12/02/2022 13:55	6.2	Trashrack raking
Unit 2	12/02/2022 14:01	12/02/2022 14:31	1.5	Trashrack raking
Unit 3	12/02/2022 14:01	12/02/2022 14:31	1.5	Trashrack raking
Unit 1	12/03/2022 08:26	12/03/2022 08:41	2.7	Trashrack raking
Unit 1	12/03/2022 08:44	12/03/2022 09:21	6.5	Trashrack raking
Unit 2	12/03/2022 08:44	12/03/2022 09:21	1.8	Trashrack raking
Unit 3	12/03/2022 08:44	12/03/2022 09:21	1.8	Trashrack raking
Unit 1	12/05/2022 08:52	12/05/2022 09:37	8.0	Trashrack raking
Unit 2	12/05/2022 09:42	12/05/2022 10:07	1.2	Trashrack raking
Unit 3	12/05/2022 09:46	12/05/2022 10:11	1.2	Trashrack raking
Unit 2	12/10/2022 12:52	12/10/2022 13:02	0.5	Negative pricing
Unit 3	12/10/2022 12:56	12/10/2022 13:05	0.4	Negative pricing
Unit 1	12/24/2022 11:37	12/24/2022 12:13	6.4	Trashrack icing / raking
Unit 2	12/24/2022 12:19	12/24/2022 12:29	0.5	Trashrack icing / raking
Unit 3	12/24/2022 12:19	12/24/2022 12:29	0.5	Trashrack icing / raking
Unit 1	12/24/2022 18:02	12/24/2022 18:30	5.0	Trashrack icing / raking
Unit 2	12/25/2022 00:24	12/25/2022 01:40	3.7	Trashrack icing / raking
Unit 3	12/25/2022 00:36	12/27/2022 10:33	168.9	Trashrack icing / raking

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	12/25/2022 01:46	12/25/2022 02:53	11.8	Trashrack icing / raking
Unit 2	12/25/2022 04:49	12/27/2022 10:40	157.0	Trashrack icing / raking
Unit 1	12/26/2022 09:07	12/26/2022 09:43	6.4	Trashrack icing / raking
Unit 1	12/26/2022 11:02	12/26/2022 11:18	2.8	Negative pricing
Unit 2	12/28/2022 06:51	12/28/2022 09:56	9.0	Trashrack icing
Unit 3	12/28/2022 08:32	12/28/2022 18:13	28.2	Trashrack icing
Unit 1	12/28/2022 12:00	12/28/2022 12:34	6.0	Trashrack icing
Unit 1	12/28/2022 18:09	12/28/2022 19:15	11.7	Trashrack icing
Unit 2	12/28/2022 20:16	12/28/2022 21:22	3.2	Trashrack icing
Unit 2	12/28/2022 21:26	12/29/2022 07:27	29.2	Trashrack icing
Unit 1	01/01/2023 10:10	01/01/2023 11:16	11.7	Negative pricing
Unit 1	01/03/2023 13:29	01/03/2023 14:09	7.1	Trashrack raking
Unit 2	01/03/2023 14:10	01/03/2023 14:51	2.0	Trashrack raking
Unit 3	01/03/2023 14:10	01/03/2023 14:51	2.0	Trashrack raking
Unit 1	01/04/2023 22:44	01/04/2023 23:05	3.7	Negative pricing
Unit 2	01/04/2023 22:49	01/04/2023 23:03	0.7	Negative pricing
Unit 1	01/16/2023 03:30	01/16/2023 07:26	41.7	Trashrack differential - frazzle ice
Unit 2	01/16/2023 03:46	01/16/2023 11:18	22.0	Trashrack differential - frazzle ice
Unit 3	01/16/2023 03:46	01/16/2023 11:18	22.0	Trashrack differential - frazzle ice
Unit 1	01/22/2023 08:49	01/23/2023 06:09	226.1	Trashrack differential
Unit 2	01/22/2023 08:49	01/23/2023 06:09	62.2	Trashrack differential
Unit 3	01/22/2023 08:49	01/23/2023 06:09	62.2	Trashrack differential
Unit 2	01/23/2023 23:40	01/24/2023 10:53	32.7	Trashrack differential - frazzle ice
Unit 3	01/24/2023 00:45	01/24/2023 10:49	29.3	Trashrack differential - frazzle ice

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	01/25/2023 00:23	01/25/2023 00:48	1.2	Trashrack ice
Unit 2	01/25/2023 02:29	01/25/2023 11:04	25.0	Trashrack icing
Unit 3	01/25/2023 02:29	01/25/2023 11:04	25.0	Trashrack icing
Unit 1	01/27/2023 01:44	01/27/2023 07:20	59.3	Trashrack icing
Unit 2	01/27/2023 01:44	01/27/2023 07:20	16.3	Trashrack icing
Unit 3	01/27/2023 01:44	01/27/2023 07:20	16.3	Trashrack icing
Unit 2	01/27/2023 21:40	01/28/2023 09:40	35.0	Trashrack icing
Unit 3	01/28/2023 01:20	01/28/2023 09:29	23.8	Trashrack icing
Unit 2	01/28/2023 23:30	01/29/2023 09:38	29.5	Trashrack icing
Unit 3	01/29/2023 02:41	01/29/2023 09:32	20.0	Trashrack icing
Unit 2	01/31/2023 19:59	02/01/2023 11:59	46.6	Trashrack icing
Unit 3	01/31/2023 21:33	02/01/2023 11:54	41.8	Trashrack icing
Unit 1	01/31/2023 22:12	02/01/2023 06:21	68.5	Trashrack icing
Unit 2	02/02/2023 07:10	02/03/2023 10:32	**N/A**	Trashrack icing
Unit 3	02/03/2023 00:03	02/05/2023 12:42	176.8	Trashrack icing
Unit 1	02/03/2023 01:04	02/03/2023 05:53	51.0	Trashrack icing
Unit 3	02/18/2023 08:12	02/18/2023 11:37	10.0	Trashrack icing
Unit 1	02/22/2023 07:43	02/22/2023 07:59	2.2	Backflushing racks
Unit 1	02/24/2023 20:01	02/25/2023 10:00	117.5	Trashrack icing
Unit 2	02/24/2023 20:55	02/25/2023 10:00	38.1	Trashrack icing
Unit 3	02/24/2023 21:17	02/25/2023 10:00	37.1	Trashrack icing
Unit 3	02/26/2023 03:25	02/26/2023 10:07	19.5	Trashrack icing
Unit 2	02/26/2023 03:54	02/26/2023 10:07	18.1	Trashrack icing
Unit 1	02/26/2023 05:00	02/26/2023 10:07	43.0	Trashrack icing

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	02/27/2023 06:10	02/27/2023 09:49	10.6	Trashrack icing
Unit 1	03/03/2023 09:35	03/03/2023 09:41	**N/A**	Governor trip
Unit 1	03/06/2023 10:44	03/06/2023 11:24	4.2	Negative pricing
Unit 1	03/13/2023 09:08	03/13/2023 09:58	7.0	Trashrack raking
Unit 2	03/13/2023 09:08	03/13/2023 09:58	**N/A**	Trashrack raking
Unit 3	03/13/2023 09:08	03/13/2023 09:58	**N/A**	Trashrack raking
Unit 2	03/15/2023 13:15	03/15/2023 13:24	**N/A**	Brush inspection
Unit 2	03/16/2023 08:35	03/16/2023 13:10	**N/A**	Brush change
Unit 1	03/29/2023 12:35	03/29/2023 13:16	7.2	Trashrack raking
Unit 3	03/30/2023 15:15	03/30/2023 15:27	0.6	Negative pricing
Unit 1	04/06/2023 12:48	04/06/2023 13:51	11.1	Trashrack raking
Unit 2	04/06/2023 13:58	04/06/2023 15:28	4.4	Trashrack raking
Unit 3	04/06/2023 13:58	04/06/2023 15:28	4.4	Trashrack raking
Unit 2	04/12/2023 15:50	04/13/2023 11:01	55.9	Heat sensor
Unit 1	04/14/2023 07:47	04/14/2023 08:20	5.8	Trashrack raking
Unit 2	04/14/2023 08:24	04/14/2023 08:47	1.1	Trashrack raking
Unit 3	04/14/2023 08:27	04/14/2023 08:50	1.1	Trashrack raking
Unit 2	04/16/2023 05:56	04/16/2023 06:18	1.1	Trashrack debris sluicing
Unit 3	04/16/2023 05:58	04/16/2023 06:22	1.2	Trashrack debris sluicing
Unit 1	04/16/2023 06:23	04/16/2023 06:49	4.6	Trashrack debris sluicing
Unit 1	04/16/2023 14:00	04/16/2023 14:42	7.4	Stuck open taintor gates
Unit 2	04/16/2023 14:06	04/16/2023 14:12	0.3	Stuck open taintor gates
Unit 3	04/17/2023 11:12	04/17/2023 12:22	3.4	Rack raking
Unit 2	04/17/2023 11:20	04/17/2023 12:18	2.8	Rack raking

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	04/19/2023 07:59	04/19/2023 08:27	5.0	Rack Raking
Unit 2	04/21/2023 08:17	04/21/2023 09:00	2.1	Rack raking
Unit 3	04/21/2023 08:17	04/21/2023 09:00	2.1	Rack Raking
Unit 1	04/25/2023 10:16	04/25/2023 10:24	1.4	Log in fish passage
Unit 1	05/01/2023 00:00	05/01/2023 07:00	74.2	Salmon smolt passage
Unit 1	05/01/2023 12:12	05/01/2023 12:24	2.1	Trashrack flush
Unit 2	05/01/2023 12:43	05/01/2023 12:56	0.6	Trashrack raking
Unit 2	05/01/2023 13:54	05/01/2023 14:30	1.8	Trashrack debris sluicing
Unit 3	05/01/2023 14:07	05/01/2023 14:26	0.9	Trashrack debris sluicing
Unit 1	05/01/2023 14:23	05/01/2023 14:31	1.4	Trashrack debris sluicing
Unit 1	05/01/2023 17:03	05/02/2023 06:12	139.4	Trashrack differential
Unit 2	05/01/2023 17:44	05/03/2023 11:26	121.6	Trashrack differential
Unit 3	05/01/2023 17:57	05/03/2023 11:34	121.3	Trashrack differential
Unit 1	05/02/2023 12:04	05/02/2023 12:12	1.4	Backflushing
Unit 1	05/03/2023 01:31	05/03/2023 05:59	47.3	Trashrack differential
Unit 1	05/03/2023 12:56	05/03/2023 14:22	15.2	Clogged cooling - overheating bearing
Unit 3	05/04/2023 11:18	05/04/2023 11:28	0.5	Tripped while cleaning strainers
Unit 2	05/04/2023 11:20	05/04/2023 11:26	0.3	Tripped while cleaning strainers
Unit 1	05/04/2023 12:49	05/04/2023 13:06	3.0	attempting to clear alarm
Unit 1	05/07/2023 19:50	05/08/2023 07:00	118.3	Salmon smolt passage
Unit 1	05/08/2023 19:55	05/09/2023 07:00	117.5	Salmon smolt passage
Unit 1	05/09/2023 19:51	05/10/2023 07:08	119.6	Salmon smolt passage
Unit 1	05/10/2023 19:47	05/11/2023 07:06	119.9	Salmon smolt passage
Unit 1	05/11/2023 11:04	05/11/2023 15:25	46.1	Remove debris from tailrace fro fish passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	05/11/2023 20:00	05/12/2023 07:01	116.7	Salmon smolt passage
Unit 1	05/12/2023 20:12	05/13/2023 07:17	117.5	Salmon Smolt Passage
Unit 2	05/13/2023 06:32	05/13/2023 07:22	2.4	Rack raking
Unit 3	05/13/2023 06:32	05/13/2023 07:22	2.4	Rack raking
Unit 1	05/13/2023 19:58	05/14/2023 07:01	117.1	Salmon Smolt Passage
Unit 2	05/13/2023 19:58	05/14/2023 07:01	32.2	Salmon Smolt Passage
Unit 1	05/14/2023 19:59	05/15/2023 07:00	116.7	Salmon smolt passage
Unit 2	05/14/2023 19:59	05/15/2023 07:00	32.1	Salmon smolt passage
Unit 1	05/15/2023 12:36	05/15/2023 13:03	**N/A**	Negative pricing
Unit 1	05/15/2023 19:57	05/16/2023 07:00	117.1	Salmon Smolt Passage
Unit 2	05/15/2023 19:57	05/16/2023 07:00	**N/A**	Salmon Smolt Passage
Unit 1	05/16/2023 20:02	05/17/2023 07:00	116.2	Salmon smolt passage
Unit 3	05/16/2023 20:02	05/17/2023 07:00	**N/A**	Salmon smolt passage
Unit 1	05/17/2023 19:59	05/18/2023 07:00	81.0	Salmon smolt passage
Unit 3	05/17/2023 19:59	05/18/2023 07:00	**N/A**	Salmon smolt passage
Unit 1	05/18/2023 19:58	05/19/2023 07:00	81.1	Salmon smolt passage
Unit 3	05/18/2023 19:58	05/19/2023 07:00	**N/A**	Salmon smolt passage
Unit 1	05/19/2023 19:51	05/20/2023 07:02	58.7	Salmon Smolt Passage
Unit 2	05/19/2023 19:51	05/20/2023 07:02	**N/A**	Salmon Smolt Passage
Unit 1	05/20/2023 19:48	05/21/2023 07:07	119.9	Salmon Smolt Passage
Unit 2	05/20/2023 19:48	05/21/2023 07:07	**N/A**	Salmon Smolt Passage
Unit 1	05/21/2023 19:46	05/22/2023 07:04	119.7	Salmon Smolt Passage
Unit 2	05/22/2023 05:29	05/22/2023 07:04	**N/A**	Salmon Smolt Passage
Unit 1	05/22/2023 19:48	05/23/2023 07:01	118.9	Salmon Smolt Passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	05/23/2023 20:02	05/24/2023 07:02	116.6	Salmon Smolt Passage
Unit 2	05/23/2023 20:02	05/24/2023 07:02	32.1	Salmon Smolt Passage
Unit 1	05/24/2023 19:49	05/25/2023 07:00	118.5	Salmon Smolt Passage
Unit 2	05/24/2023 19:49	05/25/2023 07:00	11.7	Salmon Smolt Passage
Unit 1	05/25/2023 19:53	05/26/2023 07:03	118.3	Salmon smolt passage
Unit 2	05/25/2023 19:53	05/26/2023 07:12	33.0	Salmon smolt passage
Unit 1	05/26/2023 20:57	05/27/2023 07:58	116.7	Salmon smolt passage
Unit 2	05/26/2023 20:57	05/27/2023 07:58	32.1	Salmon smolt passage
Unit 1	05/27/2023 19:48	05/28/2023 07:00	118.7	Salmon smolt passage
Unit 2	05/27/2023 19:48	05/28/2023 07:00	**N/A**	Salmon smolt passage
Unit 1	05/28/2023 20:00	05/29/2023 07:28	96.3	Salmon smolt passage
Unit 3	05/28/2023 20:00	05/29/2023 07:28	**N/A**	Salmon smolt passage
Unit 1	05/29/2023 20:00	05/30/2023 07:00	57.8	Salmon smolt passage
Unit 2	05/29/2023 20:00	05/30/2023 07:00	**N/A**	Salmon smolt passage
Unit 2	05/30/2023 09:04	05/30/2023 11:26	**N/A**	Wiring changes for bearing temperature monitoring system
Unit 3	05/30/2023 11:23	05/30/2023 14:04	**N/A**	Wiring changes for bearing temperature monitoring system
Unit 2	05/30/2023 12:41	05/31/2023 07:23	**N/A**	Salmon smolt passage
Unit 1	05/30/2023 17:50	05/31/2023 07:07	69.7	Salmon smolt passage
Unit 1	05/31/2023 20:00	06/01/2023 00:00	**N/A**	Salmon smolt passage
Unit 2	05/31/2023 20:00	06/01/2023 00:13	12.3	Salmon smolt passage
Unit 1	06/06/2023 19:55	06/06/2023 20:16	3.7	Salmon smolt passage - operator error in shutdown
Unit 2	06/20/2023 07:00	06/22/2023 16:30	167.6	Complete commissioning RTD panel
Unit 3	06/20/2023 07:00	06/22/2023 16:30	167.6	Complete commissioning RTD panel
Unit 1	06/23/2023 08:26	06/23/2023 08:58	5.7	Trashrack debris sluicing

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	06/23/2023 08:31	06/23/2023 09:02	1.5	Trashrack debris sluicing
Unit 3	06/23/2023 08:34	06/23/2023 09:04	1.5	Trashrack debris sluicing
Unit 2	06/23/2023 09:46	06/23/2023 10:56	3.4	High winding temp
Unit 2	06/25/2023 15:18	06/26/2023 05:13	14.6	Auto shut down for temperature
Unit 1	07/03/2023 08:39	07/03/2023 09:41	11.0	Trashrack raking
Unit 2	07/03/2023 09:47	07/03/2023 10:56	3.4	Trashrack raking
Unit 3	07/03/2023 09:49	07/03/2023 11:01	3.5	Trashrack raking
Unit 2	07/06/2023 10:20	07/06/2023 14:10	11.2	High winding temp
Unit 2	07/06/2023 19:56	07/07/2023 00:03	12.0	High winding temp
Unit 2	07/07/2023 10:45	07/07/2023 12:55	6.3	High winding temp
Unit 2	07/08/2023 13:31	07/08/2023 15:36	6.1	High winding temp
Unit 1	07/11/2023 08:34	07/11/2023 08:46	2.1	governor issue
Unit 2	07/11/2023 10:24	07/11/2023 11:41	3.7	connection repair
Unit 2	07/11/2023 15:30	07/11/2023 18:15	8.0	High winding temp
Unit 3	07/12/2023 07:40	07/12/2023 07:51	0.5	Trashrack raking
Unit 2	07/12/2023 07:41	07/12/2023 07:56	0.7	Trashrack raking
Unit 2	07/13/2023 17:28	07/13/2023 19:35	6.2	High winding temps
Unit 2	07/14/2023 17:52	07/14/2023 18:00	0.4	Unit trip - no alarms
Unit 1	07/18/2023 09:04	07/18/2023 09:37	5.8	Trashrack raking
Unit 2	07/18/2023 09:41	07/18/2023 10:23	2.0	Trashrack raking
Unit 3	07/18/2023 09:42	07/18/2023 10:27	2.2	Trashrack raking
Unit 2	07/23/2023 13:40	07/23/2023 15:41	5.9	High winding temp
Unit 2	07/24/2023 07:46	07/24/2023 11:07	9.8	Trashrack raking and temperature troubleshooting
Unit 3	07/24/2023 07:46	07/24/2023 11:07	9.8	Trashrack raking and temperature troubleshooting

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	07/30/2023 02:22	07/30/2023 02:30	1.4	Operator error - opened tainter gate too far, approached low headpond limit
Unit 2	07/30/2023 02:22	07/30/2023 02:30	0.4	Operator error - opened tainter gate too far, approached low headpond limit
Unit 1	07/30/2023 12:27	07/30/2023 13:35	12.0	Negative pricing
Unit 2	07/30/2023 12:43	07/30/2023 14:13	4.4	Negative pricing
Unit 3	07/30/2023 13:07	07/30/2023 14:00	2.6	Negative pricing
Unit 1	07/30/2023 13:45	07/30/2023 14:19	6.0	Negative pricing
Unit 2	08/16/2023 08:17	08/16/2023 10:43	7.1	Clearing trashrack debris
Unit 3	08/16/2023 08:17	08/16/2023 10:43	7.1	Clearing trashrack debris
Unit 3	08/19/2023 16:24	08/19/2023 16:51	**N/A**	Offline due to Topsham station trip / CMP line bump
Unit 1	08/29/2023 10:45	08/29/2023 10:53	**N/A**	Topsham station trip caused severe flow drop
Unit 2	08/29/2023 10:45	08/29/2023 10:53	**N/A**	Topsham station trip caused severe flow drop
Unit 3	08/29/2023 10:45	08/29/2023 10:53	**N/A**	Topsham station trip caused severe flow drop
Unit 1	09/06/2023 16:50	09/06/2023 17:55	4.6	Tripped on governor control
Unit 1	09/20/2023 07:39	09/20/2023 09:11	16.3	Trashrack cleaning / high flow
Unit 3	09/20/2023 08:39	09/20/2023 09:34	2.7	Trashrack cleaning / high flow
Unit 2	09/20/2023 08:40	09/20/2023 09:25	2.2	Trashrack cleaning / high flow
Unit 2	09/24/2023 13:20	09/24/2023 19:00	**N/A**	High bearing temps
Unit 2	10/09/2023 07:30	10/19/2023 15:20	**N/A**	Annual inspection
Unit 1	10/21/2023 08:46	10/21/2023 09:02	2.7	Trashrack raking
Unit 1	10/23/2023 09:21	10/23/2023 10:19	10.2	Trashrack raking
Unit 1	10/24/2023 07:25	10/24/2023 08:36	12.5	Trashrack raking
Unit 3	10/24/2023 08:41	10/24/2023 09:17	1.8	Trashrack raking
Unit 2	10/24/2023 08:42	10/24/2023 09:17	1.7	Trashrack raking
Unit 1	10/25/2023 08:03	10/25/2023 08:42	6.9	Trashrack raking

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	10/27/2023 10:09	10/27/2023 10:40	4.9	Trashrack raking
Unit 1	10/27/2023 14:50	10/27/2023 16:08	8.2	Tripped on governor issue
Unit 3	10/30/2023 07:40	11/07/2023 12:37	**N/A**	Annual inspection
Unit 1	11/02/2023 08:26	11/02/2023 08:33	1.1	Trashrack differential / sluicing
Unit 2	11/02/2023 08:40	11/02/2023 08:45	0.2	Trashrack differential / sluicing
Unit 2	11/02/2023 14:48	11/02/2023 15:22	0.6	Trashrack raking
Unit 2	11/03/2023 06:00	11/03/2023 11:13	11.0	Hydraulic Oil Leak
Unit 1	11/03/2023 12:31	11/03/2023 13:51	12.6	Trashrack raking
Unit 1	11/06/2023 15:55	11/06/2023 17:31	13.4	Unit trip due to loss of dc, tech investigating
Unit 1	11/08/2023 07:18	11/08/2023 09:17	21.0	Trashrack raking
Unit 2	11/08/2023 08:50	11/08/2023 09:17	**N/A**	Trashrack raking
Unit 3	11/08/2023 08:50	11/08/2023 09:17	**N/A**	Trashrack raking
Unit 1	11/09/2023 08:12	11/09/2023 08:57	3.2	Trashrack raking
Unit 3	11/13/2023 09:26	11/13/2023 09:43	**N/A**	Cooling water strainer
Unit 1	11/15/2023 08:12	11/15/2023 10:29	9.6	Trashrack raking
Unit 2	11/20/2023 07:00	11/20/2023 07:05	**N/A**	Cold hydraulic oil temps
Unit 2	11/24/2023 11:17	11/27/2023 09:43	**N/A**	electrical issue
Unit 2	11/29/2023 10:51	11/29/2023 13:00	6.3	HPU pump replacement
Unit 3	11/29/2023 10:51	11/29/2023 13:00	6.3	HPU pump replacement
Unit 1	11/29/2023 13:25	11/29/2023 15:01	17.0	Trashrack raking
Unit 2	11/30/2023 06:07	11/30/2023 09:56	8.0	Taken off for hydraulic pump issue
Unit 3	11/30/2023 06:07	11/30/2023 09:56	8.0	Taken off for hydraulic pump issue
Unit 1	11/30/2023 15:36	12/01/2023 11:20	136.6	Broken linkage in the regulator
Unit 1	12/09/2023 11:00	12/09/2023 11:58	**N/A**	Reserve Shutdown

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	12/09/2023 11:58	12/09/2023 14:04	6.6	Failed to start, local operator reset required
Unit 1	12/12/2023 09:23	12/12/2023 11:05	18.0	replace fan sway for speed control / rake racks
Unit 2	12/12/2023 10:34	12/12/2023 11:16	2.0	Trashrack raking
Unit 3	12/12/2023 10:49	12/12/2023 11:22	1.6	Trashrack raking
Unit 1	12/12/2023 13:56	12/12/2023 14:29	8.2	Trashrack raking
Unit 1	12/13/2023 08:01	12/13/2023 09:45	18.4	Trashrack raking
Unit 2	12/13/2023 09:02	12/13/2023 10:10	3.3	Trashrack raking
Unit 1	12/18/2023 10:51	12/21/2023 07:41	729.4	Flood / high tailwater
Unit 2	12/18/2023 10:51	12/21/2023 07:41	200.6	Flood / high tailwater
Unit 3	12/18/2023 10:51	12/21/2023 07:41	200.6	Flood / high tailwater
Unit 2	12/21/2023 08:20	12/21/2023 14:51	19.0	Flood / high tailwater
Unit 3	12/24/2023 10:42	12/24/2023 10:57	0.7	Trashrack differential
Unit 1	12/26/2023 10:27	12/26/2023 12:40	23.5	Trashrack raking
Unit 2	12/26/2023 11:37	12/26/2023 13:07	4.4	Trashrack raking
Unit 3	12/26/2023 12:44	12/26/2023 13:13	1.4	Trashrack raking
Unit 1	01/01/2024 10:02	01/01/2024 11:16	13.1	Taintor gate not closing
Unit 1	01/03/2024 11:05	01/03/2024 11:32	4.8	Troubleshooting PMG speed switches
Unit 1	01/05/2024 10:29	01/05/2024 13:25	31.1	Troubleshooting PMG speed switches
Unit 3	01/08/2024 06:08	01/12/2024 10:56	293.8	Dewatered annual inspection
Unit 1	01/08/2024 10:58	01/08/2024 11:44	8.1	Taking measurements on speed switch
Unit 2	01/08/2024 22:43	01/10/2024 14:28	115.9	Start / stop relay replacement
Unit 1	01/10/2024 18:17	01/10/2024 19:12	9.7	Trashrack differential
Unit 2	01/10/2024 19:16	01/11/2024 05:59	31.2	Trashrack differential
Unit 1	01/10/2024 21:05	01/11/2024 06:00	94.5	Trashrack differential

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	01/12/2024 21:40	01/12/2024 23:30	5.3	Flushing trashracks
Unit 2	01/13/2024 08:03	01/13/2024 10:02	5.8	Trashrack raking
Unit 2	01/13/2024 10:12	01/13/2024 12:05	5.5	Trashrack raking
Unit 1	01/13/2024 17:34	01/13/2024 18:33	10.4	Backflushing trashracks
Unit 2	01/13/2024 19:14	01/25/2024 13:02	821.4	Trashrack icing
Unit 3	01/14/2024 11:21	01/15/2024 11:36	70.7	Hydraulic pump issue
Unit 3	01/17/2024 00:36	01/17/2024 10:05	27.6	Trashrack icing
Unit 1	01/17/2024 11:12	01/17/2024 11:21	1.6	Trashrack ice trip offline
Unit 1	01/23/2024 10:51	01/23/2024 13:08	24.2	Speed switch maintenance
Unit 3	01/25/2024 12:00	01/25/2024 13:02	3.0	Backflushing racks
Unit 2	01/31/2024 04:33	01/31/2024 11:09	19.2	Icing on racks
Unit 3	01/31/2024 05:19	01/31/2024 11:26	17.8	Icing on racks
Unit 2	02/01/2024 05:58	02/01/2024 14:08	23.8	Tripped on trashrack icing
Unit 3	02/04/2024 01:49	02/04/2024 12:55	23.3	Tripped on trashrack icing
Unit 2	02/04/2024 01:53	02/04/2024 12:49	23.0	Tripped on trashrack icing
Unit 1	02/04/2024 01:55	02/04/2024 12:29	88.8	Tripped on trashrack icing
Unit 2	02/05/2024 00:05	02/05/2024 12:35	26.3	Trashrack icing
Unit 1	02/05/2024 00:16	02/05/2024 11:03	90.6	Trashrack icing
Unit 3	02/05/2024 00:26	02/05/2024 12:04	24.4	Trashrack icing
Unit 2	02/06/2024 08:20	02/06/2024 11:32	9.3	Trashrack icing
Unit 1	02/13/2024 08:04	02/14/2024 13:15	183.9	Governor speed switch repairs
Unit 3	02/14/2024 11:05	02/14/2024 12:26	3.9	Trashrack icing trip
Unit 2	02/14/2024 19:26	02/15/2024 10:58	45.3	Trashrack icing differential
Unit 3	02/14/2024 19:44	02/15/2024 10:39	43.5	Trashrack icing differential

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	02/14/2024 19:47	02/15/2024 10:05	105.1	Trashrack icing differential
Unit 3	02/18/2024 04:24	02/18/2024 12:07	22.5	Trashrack icing
Unit 2	02/18/2024 12:19	02/26/2024 07:41	**N/A**	Trashrack Icing
Unit 3	02/25/2024 15:21	02/25/2024 15:58	1.8	Negative pricing
Unit 2	03/01/2024 11:12	03/01/2024 12:50	4.8	Debris clearing
Unit 1	03/04/2024 09:56	03/04/2024 11:33	17.1	Raking racks
Unit 2	03/04/2024 11:19	03/04/2024 12:24	3.2	Raking racks
Unit 3	03/04/2024 11:19	03/04/2024 12:24	3.2	Raking racks
Unit 1	03/07/2024 08:47	03/07/2024 09:26	6.9	Rack raking
Unit 2	03/07/2024 09:35	03/07/2024 10:06	1.5	Rack raking
Unit 3	03/07/2024 09:39	03/07/2024 10:11	1.6	Rack raking
Unit 1	03/08/2024 10:45	03/08/2024 11:36	9.0	Rack raking
Unit 1	03/10/2024 08:37	03/10/2024 10:13	17.0	rack raking
Unit 2	03/10/2024 09:30	03/10/2024 10:10	1.9	rack raking
Unit 3	03/10/2024 09:30	03/10/2024 10:19	2.4	rack raking
Unit 1	03/11/2024 08:33	03/11/2024 10:15	18.0	Rack Raking
Unit 3	03/11/2024 09:31	03/11/2024 10:24	2.6	Rack Raking
Unit 2	03/11/2024 09:35	03/11/2024 10:12	1.8	Rack Raking
Unit 1	03/15/2024 12:30	03/15/2024 14:13	18.2	Rack raking
Unit 3	03/15/2024 13:25	03/15/2024 13:58	1.6	Rack raking
Unit 2	03/15/2024 13:28	03/15/2024 14:09	2.0	Rack raking
Unit 2	03/19/2024 12:45	03/19/2024 13:48	3.1	Trashrack raking
Unit 1	03/22/2024 07:30	03/22/2024 09:22	19.8	Rack raking
Unit 2	03/22/2024 08:25	03/22/2024 09:13	2.3	Rack raking

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	03/22/2024 08:25	03/22/2024 09:13	2.3	Rack raking
Unit 1	03/25/2024 17:01	03/25/2024 17:12	1.9	Power bumps during ice storm restoration
Unit 1	03/27/2024 12:24	03/27/2024 12:29	0.9	Tripped during headpond refill after fishway maintenance
Unit 1	04/01/2024 13:52	04/01/2024 15:04	12.7	Rack Raking
Unit 2	04/01/2024 13:59	04/01/2024 15:16	3.7	Rack Raking
Unit 3	04/01/2024 14:30	04/01/2024 15:17	2.3	Rack Raking
Unit 1	04/04/2024 08:00	04/04/2024 08:34	6.0	Line bump during snowstorm
Unit 2	04/04/2024 08:00	04/04/2024 08:34	1.7	Line bump during snowstorm
Unit 3	04/04/2024 08:00	04/04/2024 08:34	1.7	Line bump during snowstorm
Unit 1	04/11/2024 10:36	04/11/2024 12:33	20.7	Rack Raking.
Unit 2	04/11/2024 11:35	04/11/2024 12:19	2.1	Rack Raking.
Unit 3	04/11/2024 11:41	04/11/2024 12:26	2.2	Rack Raking.
Unit 1	04/13/2024 07:07	04/13/2024 08:45	17.3	Rack raking
Unit 2	04/13/2024 08:04	04/13/2024 08:50	2.2	Rack raking
Unit 3	04/13/2024 08:32	04/13/2024 08:52	1.0	Rack raking
Unit 1	04/13/2024 17:31	04/14/2024 10:51	183.7	Rack raking
Unit 3	04/13/2024 17:46	04/14/2024 09:40	46.4	Rack raking
Unit 1	04/19/2024 12:48	04/19/2024 16:04	34.6	Raking racks
Unit 1	04/30/2024 23:55	05/01/2024 07:01	75.2	Salmon smolt passage
Unit 2	05/01/2024 07:54	05/01/2024 08:11	0.8	Trashrack raking
Unit 3	05/01/2024 07:54	05/01/2024 08:11	0.8	Trashrack raking
Unit 2	05/01/2024 19:53	05/02/2024 00:20	13.0	Salmon smolt passage
Unit 1	05/01/2024 19:54	05/02/2024 07:00	117.6	Salmon smolt passage
Unit 1	05/02/2024 20:00	05/03/2024 09:10	139.5	Salmon smolt passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	05/03/2024 09:33	05/03/2024 09:43	0.5	Strainer clogged water pressure
Unit 1	05/03/2024 19:48	05/04/2024 07:03	119.2	Salmon smolt passage
Unit 1	05/04/2024 20:00	05/05/2024 07:04	117.3	Salmon smolt passage
Unit 1	05/05/2024 20:00	05/06/2024 07:01	116.7	Salmon smolt passage
Unit 1	05/06/2024 19:48	05/07/2024 07:04	119.4	Salmon smolt passage
Unit 2	05/07/2024 10:19	05/07/2024 11:14	2.7	Rack raking
Unit 3	05/07/2024 10:19	05/07/2024 11:14	2.7	Rack raking
Unit 1	05/07/2024 19:54	05/08/2024 07:06	118.7	Salmon smolt passage
Unit 1	05/08/2024 19:54	05/09/2024 07:02	118.0	Salmon smolt passage
Unit 1	05/09/2024 19:56	05/10/2024 07:08	118.7	Salmon smolt passage
Unit 1	05/10/2024 20:00	05/11/2024 07:00	116.6	Salmon smolt passage
Unit 1	05/11/2024 20:00	05/12/2024 07:01	116.7	Salmon smolt passage
Unit 1	05/12/2024 20:00	05/13/2024 07:01	116.7	Salmon smolt passage
Unit 1	05/13/2024 20:00	05/14/2024 07:06	117.6	Salmon smolt passage
Unit 1	05/14/2024 19:49	05/15/2024 07:07	119.7	Salmon smolt passage
Unit 1	05/15/2024 19:47	05/16/2024 07:03	119.4	Salmon smolt passage
Unit 1	05/16/2024 19:52	05/17/2024 07:02	118.3	Salmon smolt passage
Unit 1	05/17/2024 19:57	05/18/2024 07:01	117.3	Salmon smolt passage
Unit 1	05/18/2024 19:56	05/19/2024 07:02	117.6	Salmon smolt passage
Unit 1	05/19/2024 19:56	05/20/2024 07:05	118.2	Salmon smolt passage
Unit 2	05/19/2024 19:56	05/20/2024 07:05	32.5	Salmon smolt passage
Unit 1	05/20/2024 19:54	05/21/2024 07:00	117.6	Salmon smolt passage
Unit 2	05/20/2024 19:54	05/21/2024 07:00	32.4	Salmon smolt passage
Unit 1	05/21/2024 19:55	05/22/2024 07:00	117.5	Salmon smolt passage

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	05/21/2024 19:55	05/22/2024 07:00	**N/A**	Salmon smolt passage
Unit 1	05/22/2024 19:55	05/23/2024 07:00	117.5	Salmon smolt passage
Unit 2	05/22/2024 19:55	05/23/2024 07:00	**N/A**	Salmon smolt passage
Unit 1	05/23/2024 19:58	05/24/2024 07:14	82.8	Salmon smolt passage
Unit 2	05/23/2024 19:58	05/24/2024 07:14	**N/A**	Salmon smolt passage
Unit 1	05/24/2024 20:00	05/25/2024 07:00	116.6	Salmon smolt passage
Unit 2	05/24/2024 20:00	05/25/2024 07:00	**N/A**	Salmon smolt passage
Unit 1	05/25/2024 19:50	05/26/2024 07:00	118.3	Salmon smolt passage
Unit 2	05/25/2024 19:50	05/26/2024 07:00	**N/A**	Salmon smolt passage
Unit 1	05/26/2024 20:00	05/27/2024 07:00	80.9	Salmon smolt passage
Unit 2	05/26/2024 20:00	05/27/2024 07:00	**N/A**	Salmon smolt passage
Unit 1	05/27/2024 19:57	05/28/2024 07:00	81.2	Salmon smolt passage
Unit 2	05/27/2024 19:57	05/28/2024 07:00	**N/A**	Salmon smolt passage
Unit 1	05/28/2024 19:57	05/29/2024 07:00	117.1	Salmon smolt passage
Unit 2	05/28/2024 19:57	05/29/2024 07:00	**N/A**	Salmon smolt passage
Unit 1	05/29/2024 19:54	05/30/2024 07:00	117.6	Salmon smolt passage
Unit 2	05/29/2024 19:54	05/30/2024 07:00	**N/A**	Salmon smolt passage
Unit 3	05/30/2024 00:58	05/30/2024 07:06	17.9	Salmon smolt passage
Unit 1	05/30/2024 20:05	05/31/2024 07:02	116.0	Salmon smolt passage
Unit 2	05/30/2024 20:05	05/31/2024 07:02	**N/A**	Salmon smolt passage
Unit 1	05/31/2024 20:00	05/31/2024 23:59	29.3	Salmon smolt passage
Unit 2	05/31/2024 20:00	05/31/2024 23:59	**N/A**	Salmon smolt passage
Unit 2	06/07/2024 00:00	06/07/2024 02:27	**N/A**	Reserve Shutdown
Unit 2	06/07/2024 02:27	06/10/2024 11:14	**N/A**	Breaker needs to be replaced, faulty coil

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	06/10/2024 09:42	06/10/2024 11:14	11.3	Exciter/Rectifier Fail Alarm
Unit 2	06/12/2024 10:04	06/13/2024 14:16	**N/A**	Breaker will not open when shutdown command is issued
Unit 1	06/14/2024 06:58	06/14/2024 11:36	**N/A**	Cleaning air coolers
Unit 3	06/18/2024 09:11	06/18/2024 09:18	0.3	Unit tripped offline because of strainers getting cleaned.
Unit 3	07/13/2024 14:43	07/13/2024 23:24	25.3	High stator temperature
Unit 3	07/14/2024 14:14	07/14/2024 21:00	19.7	High stator temperature
Unit 3	07/15/2024 13:53	07/15/2024 16:49	3.1	High stator temperature
Unit 3	07/16/2024 10:09	07/16/2024 14:53	**N/A**	High stator temperature
Unit 3	07/17/2024 07:23	07/17/2024 12:18	**N/A**	High stator temperature
Unit 3	07/17/2024 14:55	07/18/2024 03:12	**N/A**	High stator temperature
Unit 3	07/18/2024 11:53	07/18/2024 17:06	**N/A**	High stator temperature
Unit 1	07/19/2024 08:58	07/19/2024 09:18	3.5	Air compressor caused accumulator to overpressure HPU oil
Unit 2	07/22/2024 08:40	07/24/2024 09:30	**N/A**	Reserve Shutdown
Unit 1	07/24/2024 09:31	07/25/2024 01:45	**N/A**	Reserve Shutdown
Unit 1	08/12/2024 07:49	08/12/2024 08:35	8.1	Rack Raking
Unit 3	08/12/2024 08:17	08/12/2024 08:29	0.6	Rack Raking
Unit 2	08/12/2024 08:18	08/12/2024 08:32	0.7	Rack Raking
Unit 3	09/06/2024 23:29	09/07/2024 02:45	**N/A**	Winding temps
Unit 1	09/10/2024 07:00	09/10/2024 11:39	**N/A**	Intertie trip testing
Unit 2	09/10/2024 11:00	09/10/2024 11:39	**N/A**	Intertie trip testing
Unit 3	09/10/2024 11:00	09/10/2024 11:39	1.9	Intertie trip testing
Unit 3	09/13/2024 15:34	09/14/2024 01:55	**N/A**	Winding temps
Unit 3	09/25/2024 09:00	09/25/2024 09:20	**N/A**	Station Service Swap
Unit 1	10/07/2024 07:00	10/09/2024 11:11	**N/A**	Annual inspection

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	10/09/2024 19:00	10/10/2024 07:04	35.2	Alewife passage
Unit 3	10/09/2024 19:00	10/10/2024 07:04	35.2	Alewife passage
Unit 2	10/10/2024 19:00	10/11/2024 07:00	12.6	Alewife passage
Unit 3	10/10/2024 19:00	10/11/2024 07:00	35.0	Alewife passage
Unit 2	10/11/2024 19:01	10/12/2024 07:00	12.6	Alewife passage
Unit 3	10/11/2024 19:01	10/12/2024 07:00	34.9	Alewife passage
Unit 2	10/12/2024 18:59	10/13/2024 07:00	12.6	Alewife passage
Unit 3	10/12/2024 18:59	10/13/2024 07:00	35.0	Alewife passage
Unit 2	10/13/2024 18:58	10/14/2024 07:13	12.9	Alewife passage
Unit 3	10/13/2024 18:58	10/14/2024 07:05	35.3	Alewife passage
Unit 2	10/14/2024 19:00	10/15/2024 07:00	**N/A**	Alewife passage
Unit 3	10/14/2024 19:00	10/15/2024 07:00	**N/A**	Alewife passage
Unit 2	10/15/2024 19:00	10/16/2024 07:00	17.6	Alewife passage
Unit 3	10/15/2024 19:00	10/16/2024 07:00	16.7	Alewife passage
Unit 1	10/16/2024 08:51	10/16/2024 12:13	**N/A**	Dam toe inspection, offline for diver safety
Unit 2	10/16/2024 08:51	10/16/2024 12:13	9.8	Dam toe inspection, offline for diver safety
Unit 3	10/16/2024 08:51	10/16/2024 12:13	9.8	Dam toe inspection, offline for diver safety
Unit 2	10/16/2024 19:00	10/17/2024 07:00	**N/A**	Alewife passage
Unit 3	10/16/2024 19:00	10/17/2024 07:00	**N/A**	Alewife passage
Unit 1	10/17/2024 08:00	11/12/2024 07:00	**N/A**	Reserve Shutdown
Unit 2	11/12/2024 03:47	11/12/2024 04:16	**N/A**	Hydraulic System Alarm
Unit 1	11/12/2024 08:00	11/20/2024 00:00	**N/A**	Reserve Shutdown
Unit 3	11/27/2024 17:09	11/27/2024 20:04	8.5	High stator winding temperature
Unit 2	11/28/2024 12:11	11/28/2024 13:29	3.8	High stator winding temperature

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	11/28/2024 12:12	11/28/2024 12:24	0.6	High stator winding temperature
Unit 2	11/28/2024 18:42	11/28/2024 21:45	**N/A**	High stator winding temperature
Unit 2	12/02/2024 05:37	12/02/2024 07:00	4.0	High stator winding temperature
Unit 2	12/03/2024 09:26	12/03/2024 11:00	**N/A**	Raking racks
Unit 3	12/03/2024 09:26	12/03/2024 11:00	**N/A**	Raking racks
Unit 3	12/03/2024 14:42	12/03/2024 14:46	**N/A**	Trashrack Trip
Unit 1	12/04/2024 09:01	12/04/2024 10:17	**N/A**	Cleaning coolers
Unit 2	12/04/2024 09:01	12/04/2024 10:17	**N/A**	Cleaning coolers
Unit 3	12/04/2024 09:01	12/04/2024 10:17	**N/A**	Cleaning coolers
Unit 3	12/05/2024 08:57	12/05/2024 09:32	**N/A**	High stator winding temperature
Unit 2	12/05/2024 19:13	12/05/2024 20:07	**N/A**	High stator winding temperature
Unit 3	12/05/2024 22:42	12/06/2024 00:55	**N/A**	High stator winding temperature
Unit 2	12/10/2024 07:27	12/10/2024 11:38	3.6	High stator winding temperature
Unit 1	12/10/2024 10:24	12/10/2024 11:30	**N/A**	Cleaning coolers
Unit 3	12/10/2024 10:24	12/10/2024 11:30	3.2	Cooling water pressure
Unit 1	12/10/2024 11:30	12/11/2024 06:05	**N/A**	Reserve Shutdown
Unit 3	12/10/2024 21:09	12/11/2024 12:25	32.1	High stator winding temperature
Unit 1	12/11/2024 06:05	12/12/2024 10:36	209.6	Failed to start, breaker
Unit 2	12/11/2024 11:52	12/11/2024 12:12	1.0	High stator winding temperature
Unit 3	12/11/2024 18:28	12/11/2024 20:24	5.6	Taken offline due to high stator temperatures
Unit 3	12/12/2024 07:11	12/12/2024 07:40	1.4	Unit 1 breaker maintenance
Unit 2	12/12/2024 07:14	12/12/2024 07:45	1.5	Unit 1 breaker maintenance
Unit 3	12/12/2024 13:13	12/12/2024 13:56	2.1	Trashrack raking
Unit 2	12/12/2024 13:15	12/12/2024 13:49	1.7	Trashrack raking

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	12/13/2024 06:33	12/13/2024 08:04	4.4	Tripped on trashrack icing
Unit 1	12/13/2024 07:19	12/13/2024 08:20	10.8	Tripped on trashrack icing
Unit 2	12/13/2024 08:29	12/13/2024 09:03	1.7	Tripped on trashrack icing
Unit 3	12/13/2024 08:37	12/13/2024 08:57	1.0	Tripped on trashrack icing
Unit 3	12/13/2024 13:04	12/13/2024 13:22	0.9	Tripped on trashrack icing
Unit 2	12/14/2024 03:52	12/14/2024 05:09	3.7	High stator winding temperature
Unit 3	12/14/2024 05:14	12/20/2024 09:50	234.1	Brush replacement required
Unit 2	12/17/2024 09:54	12/17/2024 12:14	6.8	Trashrack drone inspection
Unit 2	12/19/2024 10:16	12/19/2024 10:51	1.7	Trashrack raking
Unit 1	12/21/2024 06:45	12/21/2024 11:39	51.9	Trashrack ice
Unit 2	12/21/2024 07:08	12/21/2024 11:22	**N/A**	Trashrack ice
Unit 3	12/21/2024 07:34	12/21/2024 11:29	11.4	Trashrack ice
Unit 1	12/21/2024 20:15	12/23/2024 06:55	367.4	Trashrack icing
Unit 2	12/21/2024 21:19	12/23/2024 09:27	**N/A**	Trashrack icing
Unit 3	12/21/2024 21:28	12/23/2024 06:33	96.4	Trashrack icing
Unit 3	12/24/2024 21:12	12/30/2024 12:26	**N/A**	Outboard bearing has water in oil. Seal failed.
Unit 2	12/27/2024 23:27	12/28/2024 10:28	**N/A**	High bearing temperature alarm, actually faulty stator RTD
Unit 2	12/28/2024 19:49	12/29/2024 09:00	**N/A**	High bearing temperature alarm, actually faulty stator RTD
Unit 2	01/01/2025 09:22	01/01/2025 09:42	1.0	Trashrack icing
Unit 3	01/01/2025 09:29	01/01/2025 09:48	0.9	Trashrack icing
Unit 2	01/01/2025 10:05	01/01/2025 12:25	6.8	Trashrack icing
Unit 2	01/01/2025 12:55	01/02/2025 10:34	63.1	Trashrack icing
Unit 2	01/02/2025 13:16	01/03/2025 06:17	49.6	Trashrack ice
Unit 3	01/02/2025 13:16	01/02/2025 16:53	10.5	Trashrack ice

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	01/02/2025 14:57	01/02/2025 16:57	21.2	Trashrack backflushing
Unit 1	01/04/2025 05:35	01/04/2025 06:08	5.8	Trashrack ice
Unit 1	01/04/2025 06:10	01/04/2025 10:54	50.2	Trashrack ice
Unit 3	01/04/2025 06:15	01/04/2025 11:29	15.3	Trashrack ice
Unit 2	01/04/2025 09:43	01/04/2025 11:05	4.0	Trashrack ice
Unit 3	01/04/2025 17:35	01/05/2025 10:48	50.2	Trashrack ice
Unit 1	01/04/2025 17:47	01/05/2025 09:46	169.4	Trashrack ice
Unit 2	01/04/2025 17:47	01/05/2025 10:20	48.2	Trashrack ice
Unit 3	01/05/2025 12:09	01/06/2025 10:34	**N/A**	Trashrack icing trip
Unit 2	01/05/2025 16:53	01/06/2025 10:05	50.1	Trashrack icing trip
Unit 1	01/05/2025 16:54	01/06/2025 08:30	165.3	Trashrack icing
Unit 3	01/06/2025 11:16	01/06/2025 11:25	**N/A**	Trashrack icing
Unit 3	01/06/2025 12:09	01/07/2025 11:11	**N/A**	Trashrack icing
Unit 2	01/06/2025 22:10	01/07/2025 10:50	**N/A**	Trashrack icing
Unit 1	01/06/2025 22:23	01/07/2025 08:26	106.5	Trashrack icing
Unit 3	01/07/2025 11:36	01/10/2025 11:04	**N/A**	Trashrack icing
Unit 1	01/07/2025 20:50	01/08/2025 09:55	138.6	Trashrack icing
Unit 2	01/07/2025 21:54	01/08/2025 12:46	**N/A**	Trashrack icing
Unit 1	01/12/2025 12:14	01/13/2025 19:10	**N/A**	CMP insulator failure
Unit 2	01/12/2025 12:14	01/13/2025 19:10	90.2	CMP insulator failure
Unit 3	01/12/2025 12:14	01/14/2025 07:12	125.2	CMP insulator failure
Unit 1	01/14/2025 07:12	01/14/2025 14:39	**N/A**	Transformer oil replenishment
Unit 2	01/14/2025 07:12	01/14/2025 14:39	21.7	Transformer oil replenishment
Unit 3	01/14/2025 07:12	01/14/2025 14:39	21.7	Transformer oil replenishment

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	01/22/2025 05:46	01/22/2025 08:48	**N/A**	Icing on racks
Unit 3	01/25/2025 06:34	01/25/2025 09:50	9.5	Trashrack icing
Unit 3	01/25/2025 14:32	03/07/2025 12:50	2528.9	Bearing oil seal broken
Unit 2	02/05/2025 06:51	02/07/2025 14:27	**N/A**	Taken off to investigate arcing in the brushes
Unit 1	03/17/2025 09:19	03/17/2025 10:20	10.8	Rack raking
Unit 3	03/17/2025 09:40	03/17/2025 10:09	1.4	Rack raking
Unit 2	03/17/2025 09:43	03/17/2025 10:32	2.4	Rack raking
Unit 2	03/18/2025 04:25	03/18/2025 08:35	12.2	Tripped on trashrack differential
Unit 1	03/18/2025 08:38	03/18/2025 09:31	9.4	Rack raking
Unit 3	03/18/2025 09:45	03/18/2025 10:32	2.3	Rack raking / trashrack trip
Unit 1	03/18/2025 12:35	03/18/2025 13:03	5.0	Rack raking
Unit 2	03/18/2025 13:06	03/18/2025 13:33	1.3	Rack raking
Unit 3	03/18/2025 13:06	03/18/2025 13:33	1.3	Rack raking
Unit 3	03/18/2025 13:46	03/19/2025 01:58	35.6	Trashrack differential
Unit 1	03/19/2025 01:54	03/19/2025 02:34	7.1	Trashrack differential
Unit 1	03/19/2025 09:35	03/19/2025 10:14	6.9	Rack raking
Unit 3	03/19/2025 10:18	03/19/2025 11:15	2.8	Rack raking
Unit 2	03/19/2025 10:21	03/19/2025 11:10	2.4	Rack raking
Unit 1	03/20/2025 08:33	03/20/2025 09:35	11.0	Rack raking
Unit 3	03/20/2025 09:19	03/20/2025 09:46	1.3	Rack raking
Unit 2	03/20/2025 09:21	03/20/2025 09:40	0.9	Rack raking
Unit 1	03/21/2025 09:29	03/21/2025 10:44	13.3	Rack raking
Unit 3	03/21/2025 09:43	03/21/2025 10:53	3.4	Shutdown to pass tree over dam
Unit 2	03/21/2025 09:45	03/21/2025 10:49	3.1	Shutdown to pass tree over dam

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	03/24/2025 10:12	03/24/2025 10:51	6.9	Rack raking.
Unit 2	03/24/2025 11:00	03/24/2025 11:14	0.7	Rack raking.
Unit 3	03/24/2025 11:05	03/24/2025 11:21	0.8	Rack raking.
Unit 3	04/01/2025 12:24	04/01/2025 12:58	1.7	Backflushing and raking racks
Unit 2	04/01/2025 12:26	04/01/2025 12:53	1.3	Backflushing and raking racks
Unit 1	04/01/2025 12:28	04/01/2025 12:43	2.7	Backflushing and raking racks
Unit 1	04/06/2025 09:42	04/06/2025 10:26	7.8	Rack raking
Unit 3	04/06/2025 11:26	04/06/2025 11:43	0.8	Trashrack raking
Unit 1	04/07/2025 09:17	04/07/2025 10:00	7.6	rack raking
Unit 2	04/07/2025 09:24	04/07/2025 10:30	3.2	rack raking
Unit 3	04/07/2025 09:28	04/07/2025 10:37	3.4	rack raking
Unit 1	04/08/2025 09:02	04/08/2025 09:32	5.3	Rack raking
Unit 2	04/08/2025 09:13	04/08/2025 09:37	1.2	Rack raking
Unit 3	04/08/2025 09:17	04/08/2025 09:45	1.4	Rack raking
Unit 1	04/17/2025 09:30	04/17/2025 10:09	6.9	Rack raking
Unit 2	04/17/2025 09:37	04/17/2025 10:17	1.9	Rack raking
Unit 3	04/17/2025 09:42	04/17/2025 10:24	2.0	Rack raking
Unit 1	04/24/2025 08:40	04/24/2025 09:26	8.1	Rack raking
Unit 2	04/24/2025 09:14	04/24/2025 09:29	0.7	Rack raking
Unit 3	04/24/2025 09:14	04/24/2025 09:29	0.7	Rack raking
Unit 3	04/25/2025 05:32	04/25/2025 07:39	6.2	Unit trip due to line bump
Unit 2	04/25/2025 05:34	04/25/2025 07:04	4.4	Unit trip due to line bump
Unit 3	04/25/2025 09:44	04/25/2025 10:02	0.9	Trip on low cooling water flow
Unit 2	04/25/2025 09:46	04/25/2025 09:58	0.6	Trip on low cooling water flow

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	04/29/2025 11:07	04/29/2025 16:27	15.6	Trip due to low water - fishway maintenance drawdown
Unit 1	04/29/2025 15:56	04/29/2025 16:23	4.8	Trashrack differential trip
Unit 3	04/30/2025 09:27	04/30/2025 15:31	17.7	Tripped on trashrack differential - fishway maintenance drawdown
Unit 3	04/30/2025 23:45	05/01/2025 00:06	1.0	Took unit offline erroneously
Unit 2	04/30/2025 23:47	05/01/2025 00:03	0.8	Took unit offline erroneously
Unit 1	04/30/2025 23:51	05/01/2025 07:19	79.1	Salmon smolt passage
Unit 1	05/01/2025 12:14	05/01/2025 12:34	3.5	Removal of debris from upstream fishway
Unit 1	05/01/2025 20:01	05/02/2025 07:03	116.9	Salmon smolt passage
Unit 1	05/02/2025 19:56	05/03/2025 07:02	117.6	Salmon smolt passage
Unit 1	05/03/2025 19:54	05/04/2025 07:02	118.0	Salmon smolt passage
Unit 1	05/04/2025 19:58	05/05/2025 07:02	117.3	Salmon smolt passage
Unit 1	05/05/2025 19:56	05/06/2025 07:03	117.8	Salmon smolt passage
Unit 2	05/06/2025 09:46	05/06/2025 10:04	0.9	Sluicing debris
Unit 3	05/06/2025 09:50	05/06/2025 10:09	0.9	Sluicing debris
Unit 1	05/06/2025 19:58	05/07/2025 07:01	117.1	Salmon smolt passage
Unit 2	05/07/2025 10:29	05/07/2025 10:48	0.9	Sluicing debris
Unit 3	05/07/2025 10:32	05/07/2025 10:53	1.0	Sluicing debris
Unit 1	05/07/2025 19:55	05/08/2025 07:02	117.8	Salmon smolt passage
Unit 2	05/08/2025 10:00	05/08/2025 10:32	1.6	Sluicing debris
Unit 3	05/08/2025 10:02	05/08/2025 10:44	2.0	Sluicing debris
Unit 1	05/10/2025 01:15	05/10/2025 07:03	61.5	Salmon smolt passage
Unit 1	05/12/2025 08:33	05/12/2025 09:08	6.2	Trashrack raking
Unit 3	05/12/2025 09:12	05/12/2025 09:46	1.7	Trashrack raking
Unit 2	05/12/2025 09:17	05/12/2025 09:32	0.7	Trashrack raking

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	05/13/2025 01:33	05/13/2025 07:00	57.8	Salmon smolt passage
Unit 1	05/13/2025 09:26	05/13/2025 09:45	3.4	Rack raking
Unit 2	05/13/2025 09:51	05/13/2025 10:25	1.7	Rack raking
Unit 3	05/13/2025 09:54	05/13/2025 10:30	1.8	Rack raking
Unit 1	05/13/2025 19:57	05/14/2025 07:02	117.5	Salmon smolt passage
Unit 2	05/14/2025 10:23	05/14/2025 13:24	8.8	HPU Pump install during negative prices
Unit 3	05/14/2025 10:26	05/14/2025 13:40	9.4	HPU Pump install during negative prices
Unit 1	05/14/2025 19:57	05/15/2025 07:02	117.5	Salmon smolt passage
Unit 3	05/15/2025 09:02	05/15/2025 12:53	11.2	HPU Pump install
Unit 2	05/15/2025 09:06	05/15/2025 12:58	11.3	HPU Pump install
Unit 1	05/15/2025 19:57	05/16/2025 07:05	118.0	Salmon smolt passage
Unit 1	05/16/2025 19:54	05/17/2025 07:03	118.2	Salmon smolt passage
Unit 1	05/17/2025 19:52	05/18/2025 07:01	118.2	Salmon smolt passage
Unit 1	05/18/2025 19:52	05/19/2025 07:04	118.7	Salmon smolt passage
Unit 1	05/19/2025 19:57	05/20/2025 07:00	117.1	Salmon smolt passage
Unit 1	05/20/2025 19:58	05/21/2025 07:00	116.9	Salmon smolt passage
Unit 1	05/21/2025 20:04	05/22/2025 07:02	116.2	Salmon smolt passage
Unit 1	05/22/2025 19:59	05/23/2025 07:07	118.0	Salmon smolt passage
Unit 1	05/23/2025 19:55	05/24/2025 08:23	132.1	Salmon smolt passage
Unit 3	05/24/2025 09:21	05/24/2025 09:36	0.7	Rack raking
Unit 1	05/25/2025 05:19	05/25/2025 08:13	30.7	Salmon smolt passage
Unit 1	05/25/2025 19:55	05/26/2025 07:04	118.2	Salmon smolt passage
Unit 1	05/26/2025 19:56	05/27/2025 07:02	117.6	Salmon smolt passage
Unit 1	05/27/2025 09:48	05/27/2025 10:01	2.3	Incident investigation

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 1	05/27/2025 19:55	05/28/2025 07:05	118.3	Salmon smolt passage
Unit 1	05/28/2025 19:53	05/29/2025 07:08	119.2	Salmon smolt passage
Unit 1	05/29/2025 19:55	05/30/2025 07:06	118.5	Salmon smolt passage
Unit 1	05/30/2025 19:57	05/31/2025 07:08	118.5	Salmon smolt passage
Unit 1	05/31/2025 19:59	06/01/2025 00:10	44.3	Salmon smolt passage
Unit 2	06/10/2025 10:21	06/10/2025 10:51	1.5	Shutdown to pass debris
Unit 3	06/10/2025 10:24	06/10/2025 10:53	1.4	Shutdown to pass debris
Unit 1	06/25/2025 08:10	06/25/2025 13:18	33.4	Relicensing study - staff safety
Unit 2	06/25/2025 08:10	06/25/2025 13:18	**N/A**	Relicensing study - staff safety
Unit 3	06/25/2025 08:10	06/25/2025 13:18	**N/A**	Relicensing study - staff safety
Unit 1	06/25/2025 14:05	06/25/2025 15:13	7.4	Relicensing study - staff safety
Unit 2	06/25/2025 14:05	06/25/2025 15:13	**N/A**	Relicensing study - staff safety
Unit 3	06/25/2025 14:05	06/25/2025 15:13	**N/A**	Relicensing study - staff safety
Unit 1	06/25/2025 16:24	06/25/2025 17:40	8.3	Relicensing study - staff safety
Unit 2	06/25/2025 16:24	06/25/2025 17:40	**N/A**	Relicensing study - staff safety
Unit 3	06/25/2025 16:24	06/25/2025 17:40	**N/A**	Relicensing study - staff safety
Unit 1	06/27/2025 07:51	06/27/2025 09:26	**N/A**	Relicensing study - staff safety
Unit 2	06/27/2025 07:51	06/27/2025 09:26	4.6	Relicensing study - staff safety
Unit 3	06/27/2025 07:51	06/27/2025 09:26	4.6	Relicensing study - staff safety
Unit 3	07/06/2025 16:07	07/06/2025 18:10	6.0	Unit trip on temperature
Unit 3	07/29/2025 16:14	07/29/2025 22:31	7.9	High stator temperature
Unit 1	08/01/2025 00:00	09/09/2025 00:00	**N/A**	Reserve Shutdown
Unit 1	10/01/2025 10:01	10/02/2025 17:41	**N/A**	Downstream fishway - drawdown for cleanout
Unit 2	10/01/2025 10:01	10/02/2025 17:41	**N/A**	Downstream fishway - drawdown for cleanout

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 3	10/01/2025 10:01	10/02/2025 17:41	92.3	Downstream fishway - drawdown for cleanout
Unit 2	10/06/2025 08:04	10/24/2025 10:45	**N/A**	Annual inspection
Unit 3	10/23/2025 08:16	10/23/2025 08:35	0.7	Tripped on trashrack differential
Unit 3	10/23/2025 08:39	10/23/2025 10:00	2.8	Rack Raking
Unit 1	10/23/2025 10:02	10/23/2025 11:27	15.0	Rack Raking
Unit 3	10/23/2025 11:33	10/23/2025 12:11	1.3	Rack Raking
Unit 1	10/24/2025 09:20	10/24/2025 10:03	5.3	Rack raking
Unit 3	10/24/2025 10:08	10/24/2025 10:45	**N/A**	Rack raking
Unit 1	10/30/2025 18:52	10/31/2025 07:00	**N/A**	River herring outmigration passage
Unit 2	10/30/2025 18:52	10/31/2025 07:02	35.5	River herring outmigration passage
Unit 3	10/30/2025 18:52	10/31/2025 07:07	35.7	River herring outmigration passage
Unit 3	10/31/2025 19:03	11/01/2025 07:30	36.3	River herring outmigration passage
Unit 1	10/31/2025 19:05	11/01/2025 07:00	**N/A**	River herring outmigration passage
Unit 2	10/31/2025 19:05	11/01/2025 07:04	34.9	River herring outmigration passage
Unit 3	11/01/2025 18:39	11/02/2025 07:12	39.5	River herring outmigration passage
Unit 1	11/01/2025 19:05	11/02/2025 07:16	139.7	River herring outmigration passage
Unit 2	11/01/2025 19:05	11/02/2025 07:12	**N/A**	River herring outmigration passage
Unit 1	11/02/2025 19:02	11/03/2025 07:08	128.2	River herring outmigration passage
Unit 2	11/02/2025 19:06	11/03/2025 07:08	**N/A**	River herring outmigration passage
Unit 3	11/02/2025 19:06	11/03/2025 07:08	**N/A**	River herring outmigration passage
Unit 1	11/03/2025 07:40	11/14/2025 16:46	573.5	Exciter upgrade
Unit 2	11/03/2025 08:24	11/03/2025 09:23	2.9	Station outage to rack out breaker 1
Unit 3	11/03/2025 08:28	11/03/2025 09:30	3.0	Station outage to rack out breaker 1
Unit 3	11/05/2025 10:21	11/05/2025 11:31	3.4	Rack raking

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	11/05/2025 10:32	11/05/2025 11:20	2.3	Rack raking
Unit 3	11/07/2025 08:53	11/07/2025 10:33	4.9	Raking racks
Unit 2	11/07/2025 08:55	11/07/2025 10:27	4.5	Raking racks
Unit 2	11/13/2025 07:30	11/13/2025 10:03	7.4	Rack in breaker 1 for testing
Unit 3	11/13/2025 08:44	11/13/2025 10:08	4.1	Rack in breaker 1 for testing
Unit 2	11/14/2025 08:07	11/14/2025 08:42	1.7	Support U1 testing
Unit 3	11/14/2025 08:12	11/14/2025 08:36	1.2	Support U1 testing
Unit 2	11/14/2025 09:45	11/14/2025 16:46	20.5	Support U1 testing
Unit 3	11/14/2025 09:50	11/14/2025 16:46	20.2	Support U1 testing
Unit 3	11/19/2025 12:47	11/19/2025 13:18	1.5	Rack raking
Unit 3	12/08/2025 10:00	12/08/2025 10:40	1.9	Rack raking
Unit 2	12/08/2025 10:12	12/08/2025 10:34	1.1	Rack raking
Unit 3	12/14/2025 14:58	12/14/2025 18:22	9.9	High stator winding temperature
Unit 3	12/15/2025 04:18	12/15/2025 05:31	3.6	Trashrack icing
Unit 3	12/15/2025 05:53	12/15/2025 11:04	15.1	Trashrack icing
Unit 2	12/15/2025 07:17	12/15/2025 11:12	11.4	Trashrack icing
Unit 2	12/21/2025 06:58	12/21/2025 09:24	7.1	Trashrack ice
Unit 3	12/21/2025 10:04	12/21/2025 10:52	2.3	Trashrack ice
Unit 2	12/21/2025 10:50	12/21/2025 12:10	3.9	Negative pricing
Unit 2	12/21/2025 13:57	12/21/2025 14:52	2.7	Trashrack ice
Unit 2	12/22/2025 06:45	12/22/2025 12:41	17.3	Trashrack ice
Unit 1	12/22/2025 06:54	12/22/2025 12:36	60.4	Trashrack ice
Unit 3	12/22/2025 07:41	12/22/2025 12:47	14.9	Trashrack ice
Unit 3	12/22/2025 21:15	12/23/2025 11:10	**N/A**	Trashrack ice

Unit	Date / Time Unavailable	Date / Time Available	Estimated MWh lost	Reason for Unit Unavailability
Unit 2	12/23/2025 01:21	12/23/2025 10:48	**N/A**	Trashrack ice

APPENDIX H-1: SINGLE LINE DIAGRAM
(FILED SEPARATELY AS CEII)