February 21, 2024

VIA E-FILING

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

Brunswick Hydroelectric Project (FERC No. 2284)
Notice of Intent to File License Application and Pre-Application Document

Dear Secretary Reese:

Pursuant to Section 15(b)(1) of the Federal Power Act, 16 U.S.C. § 808(b)(1), Brookfield White Pine Hydro LLC (BWPH) is electronically filing with the Federal Energy Regulatory Commission (FERC or Commission), the Notice of Intent to File an Application for New License (NOI) and the Pre-Application Document (PAD) for the relicensing of the Brunswick Hydroelectric Project (FERC No. 2284) (the Project).

BWPH is the licensee for the Project, which is located on the Androscoggin River in the towns of Brunswick and Topsham, Maine (ME). The Project straddles the border between Cumberland and Sagadahoc counties. The Project's existing license was issued on February 9, 1979, and expires on February 28, 2029.

In accordance with the Commission's regulations, 18 C.F.R. Sections 5.5(c) and 5.6(a)(1), BWPH is providing a copy of the NOI and PAD via email to appropriate federal and state agencies, Indian tribes, local governments, non-governmental organizations, and members of the public likely to be interested in the proceeding, as set forth on the attached distribution list. BWPH also published notice of this filing in the Brunswick Times, a newspaper in general circulation of the Project.

BWPH understands that FERC will public notice the filing of the NOI and PAD within 60 days of the filing date. FERC will then hold a public scoping meeting and site visit of the Project within 90 days of the filing date. Interested parties' written comments on the PAD must be filed with FERC, with a copy to BWPH, within 30 days of the public scoping meeting.

In accordance with the Commission's regulations, 18 C.F.R. § 5.5(e), BWPH requests that the Commission authorize BWPH to conduct Project consultation with the Maine State Historic Preservation Office, pursuant to Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470f, and the NHPA implementing regulations at 36 C.F.R. Part 800.

BWPH also requests that the Commission designate BWPH as its non-federal representative for the Project for the purpose of consultation with the U.S. Fish and Wildlife Service and National Marine Fisheries Service, pursuant to Section 7 of the ESA and the joint agency ESA implementing regulations at 50 C.F.R. Part 402.

If you have any questions regarding this filing or require additional information, please contact me by phone at (315) 566-0197 or by email at Michael.Scarzello@brookfieldrenewable.com.

Respectfully submitted,

Michael Scarzello
Manager, Licensing
Brookfield Renewable

Attachment: Distribution List, NOI and PAD for the Brunswick Hydroelectric Project

cc: Distribution List

DISTRIBUTION LIST
BRUNSWICK HYDROELECTRIC PROJECT (FERC No. 2284)

Federal Agencies	
Ryan Hansen Federal Energy Regulatory Commission 888 First Street, NE Washington, DC 20426 ryan.hansen@ferc.gov	John Spain Regional Engineer Federal Energy Regulatory Commission New York Regional Office Division of Dam Safety and Inspections 19 W 34th Street, Suite 400 New York, NY 10001 John.Spain@ferc.gov
Matt Buhyoff Atlantic Salmon Recovery Coordinator Merrymeeting Bay NOAA-National Marine Fisheries Service 17 Godfrey Drive Orono, ME 04473 matt.buhyoff@noaa.gov	Donald Dow Hydro/Fish Passage Engineer NOAA-National Marine Fisheries Service 17 Godfrey Drive Orono, ME 04473 donald.dow@noaa.gov
Julie Crocker Endangered Fish Recovery Branch Chief NOAA-National Marine Fisheries Service Greater Atlantic Regional Fisheries Office 55 Great Republic Drive Gloucester, MA 01930 julie.crocker@noaa.gov	Chris Boelke Chief, New England Branch, Habitat and Ecosystem Services NOAA-National Marine Fisheries Service Greater Atlantic Regional Fisheries Office 55 Great Republic Drive Gloucester, MA 01930 christopher.boelke@noaa.gov
Bill McDavitt Environmental Specialist NOAA-Northeast Fisheries Science Center Greater Atlantic Regional Fisheries Office 55 Great Republic Drive Gloucester, MA 01930 william.mcdavitt@noaa.gov	Jon Hare Director, Northeast Region NOAA-Northeast Fisheries Science Center 166 Water Street Woods Hole, MA 02543-1026 jon.hare@noaa.gov
Andrew Raddant Regional Environmental Officer U.S. Department of Interior 15 State Street, Suite 400 Boston, MA 02109 andrew_raddant@ios.doi.gov	Kyle Olcott Hydropower Coordinator, Maine Field Office U.S. Fish and Wildlife Service 306 Hatchery Road East Orland, ME 04431 dudley_olcott@fws.gov
Kenneth Hogan North Atlantic-Appalachian Region Hydropower Program Coordinator United States Fish and Wildlife Service New England Field Office 70 Commercial Street, Suite 300 Concord, New Hampshire 03301 kenneth_hogan@fws.gov	Peter Lamothe United States Fish and Wildlife Service Maine Field Office 306 Hatchery Way East Orland, ME 04431 peter_lamothe@fws.gov

David Cash Regional Administrator U.S. Environmental Protection Agency Region 1: New England 5 Post Office Square, Suite 100 Boston, MA 02109-3912 Cash.David@epa.gov	John T. Eddins Program Analyst Advisory Council on Historic Preservation 401 F Street NW, Suite 308 Washington, DC 20001-2637 jeddins@achp.gov
Jay Clement U.S. Army Corps of Engineers 675 Western Avenue #3 Manchester, ME 04351 jay.l.clement@usace.army.mil	Kevin Mendik NPS Hydro Program Manager U.S. National Park Service Department of Interior 15 State Street, 10th Floor Boston, MA 02109-3572 kevin_mendik@nps.gov
Darryl LaCounte, Director Bureau of Indian Affairs U.S. Department of the Interior, MS 4606 MIB 1849 C Street NW Washington, DC 20240 darryl.lacounte@bia.gov	Harold Peterson Natural Resources Officer Bureau of Indian Affairs 545 Marriott Drive, Suite 700 Nashville, TN 37214 Harold.Peterson@bia.gov
Nicholas Stasulis Chief, Maine SW/GW Networks U.S. Geological Survey New England Water Science Center 196 Whitten Road Augusta, ME 04333 nstasuli@usgs.gov	
State Agencies	
Laura Paye Maine Department of Environmental Protection Bureau of Land Resources 17 State house Station Augusta, ME 04330-0017 Laura.paye@maine.gov	John Perry Environmental Coordinator Maine Department of Inland Fisheries & Wildlife 284 State Street, State House Station 41 Augusta, ME 04333 John.Perry@maine.gov
Rob Wood, Director Maine Department of Environmental Protection Bureau of Land Resource Regulation 17 State House Station Augusta, ME 04330-0017 robert.wood@maine.gov	Nick Kalejs Assistant Regional Fisheries Biologist Sebago Lake Region Maine Department of Inland Fisheries & Wildlife 15 Game Farm Rd. Gray, ME 04039 Nicholas.Kalejs@maine.gov
James Pellerin Regional Fisheries Biologist Maine Department of Inland Fisheries & Wildlife 15 Game Farm Rd Gray, ME 04039 James.Pellerin@maine.gov	Casey Clark Maine Department of Marine Resources 21 State House Station Augusta, ME 04333-0021 casey.clark@maine.gov

Sean Ledwin Director, Bureau Sea Run Fisheries and Habitat Maine Department of Marine Resources 21 State House Station Augusta, ME 04333-0021 sean.m.ledwin@maine.gov	Lars Hammer Marine Resource Scientist Maine Department of Marine Resources 21 State House Station Augusta, ME 04333-0021 lars.hammer@maine.gov
Kathleen Leyden Maine Coastal Program Maine Department of Agriculture, Conservation and Forestry 22 State House Station 18 Elkins Lane Augusta, ME 04333-0022 kathleen.leyden@maine.gov	Jim Vogel Senior Planner Maine Bureau of Parks and Lands 22 State House Station Augusta, ME 04333 Jim.Vogel@maine.gov
Kirk Mohney, Director Maine Historic Preservation Commission 55 Capitol Street, 65 State House Station Augusta, ME 04333 kirk.mohney@maine.gov	Arthur Spiess Review & Compliance/CLG Coordinator Maine Historic Preservation Commission 55 Capitol Street, 65 State House Station Augusta, ME 04333 arthur.spiess@maine.gov
Megan Rideout Review & Compliance/CLG Coordinator Maine Historic Preservation Commission 55 Capitol Street, 65 State House Station Augusta, ME 04333 Megan.M.Rideout@maine.gov	Kristen Chamberlin NEPA Coordination & Permits Manger MaineDOT Environmental Office 16 State House Station Augusta, ME 04344 kristen.chamberlain@maine.gov
Dalton Thompson, P.E. Frank J. Wood Bridge Replacement - Resident Engineer MaineDOT Bridge Program 24 Child St Augusta, ME 04330 dalton.j.thompson@maine.gov	
Municipal Government	
Derek Scrapchansky Town Manager Town of Topsham 100 Main Street Topsham, ME 04086 dscrapchansky@topshammaine.com	John Eldridge Town Manager Town of Brunswick 85 Union Street Brunswick, ME 04011 jeldridge@brunswickme.org
Phillip L. Crowell, Jr. City Manager City of Auburn 60 Court Street Auburn, ME 04210 pcrowell@auburnmaine.gov	Thomas Farrell, Director Parks and Recreation Dept Town of Brunswick 220 Neptune Drive Brunswick | ME 04011 tfarrell@brunswickme.org

William R. Shane, P.E. Town Manager Town of Cumberland 290 Tuttle Road Cumberland, ME 04021 info@cumberlandmaine.com	Marc Meyers City Manager City of Bath 55 Front Street Bath, ME 04530 mmeyers@cityofbath.com
Nathaniel Rudy Town Manager Town of Gray Henry Pennell Municipal Complex 24 Main Street Gray, Maine 04039 nrudy@graymaine.org	Caroline Pelletier Interim Town Manager Town of Freeport 30 Main Street Freeport, ME 04032 cpelletier@freeportmaine.com
Glenn Michalowski Town Manager Town of Lisbon 300 Lisbon Street Lisbon, ME 04250 gmichalowski@lisbonme.org	Heather A. Hunter City Administrator City of Lewiston 27 Pine Street Lewiston, ME 04240 hhunter@lewistonmaine.gov
Amy Duquette Town Manager Town of Sabattus 190 Middle Road Sabattus, ME 04280 aduquette@sabattus.org	Christine M. Landes Town Manager Town of New Gloucester 385 Intervale Road New Glocester, ME 04260 townmanager@newgloucester.com
Kristi K. Eiane Town Administrator Town of Harpswell P.O. Box 39 Harpswell, Maine 04079 keiane@town.harpswell.me.us	Nathaniel J. Tupper Town Manager Town of Yarmouth 200 Main Street Yarmouth, ME 04096 ntupper@yarmouth.me.us
Non-Government Organizations	
Robert Nasdor Northeast Stewardship Director American Whitewater 65 Blueberry Hill Lane Sudbury, MA 01776 bob@americanwhitewater.org	Kevin Colburn National Stewardship Director American Whitewater 1035 Van Buren Street Missoula, MT 59802 kevin@americanwhitewater.org
Ed Friedman Chair Friends of Merrymeeting Bay PO Box 233 Richmond, ME 04357 edfomb@comcast.net	John R. J. Burrows Director of New England Programs Atlantic Salmon Federation Fort Andross, Suite 406, 14 Maine Street Brunswick, ME 04011 jburrows@asfmaine.org

Landis Hudson Executive Director Maine Rivers PO Box 782 Yarmouth, ME 04096 landis@mainerivers.org	Steve Heinz Trout Unlimited Sebago Lake Chapter 3 Spruce Lane Cumberland Foreside, ME 04110 heinz@maine.rr.com
Fergus P. Lea, Jr. Androscoggin River Watershed Council c/o AVCOG 125 Manley Rd. Auburn, ME 04210 flea.arwc@gmail.com	Andrew Beahm Executive Director Maine Audubon Society 20 Gilsland Farm Road Falmouth, ME 04105-2100 abeahm@maineaudubon.org
Mark Zakutansky Director of Conservation Policy Engagement Appalachian Mountain Club 100 Illick's Mill Rd. Bethlehem, PA 18017 mzakutansky@outdoors.org	Eliza Townsend Appalachian Mountain Club etownsend@outdoors.org
Cory King Executive Director Bath-Brunswick Regional Chamber 8 Venture Ave. Brunswick, ME 04011 executivedirector@midcoastmaine.com	Andrew Fisk NE Regional Director American Rivers 118 Madison Ave Holyoke, MA 01040 afisk@americanrivers.org
Charles Spies Board Member and member of the Conservation Committee Merrymeeting Bay Chapter of Trout Unlimited 64 Water Street Brunswick, Maine 04011 chipspies@gmail.com	
Native American Tribes	
Christopher Sockalexis Tribal Historic Preservation Officer Penobscot Indian Nation Cultural and Historic Preservation Program 12 Wabanaki Way Indian Island, ME 04468 chris.sockalexis@penobscotnation.org	Chief Kirk Francis Penobscot Indian Nation 12 Wabanaki Way Indian Island, ME 04468 Kirk.Francis@penobscotnation.org
Chief Clarisa Sabattis Houlton Band of Maliseet Indians 88 Bell Road Littleton, ME 04730 csabattis@maliseets.com	Isaac St. John Tribal Historic Preservation Officer Houlton Band of Maliseet Indians 88 Bell Road Littleton, ME 04730 istjohn@maliseets.com

Donald Soctomah Tribal Historic Preservation Officer Passamaquoddy Tribe PO Box 159 Princeton, ME 04668 Soctomah@gmail.com	Chief William J. Nicholas, Sr. Passamaquoddy Tribe - Indian Township PO Box 301 Princeton, ME 04668 chief.wnicholas@gmail.com
Jenny Gaenzle THPO Mi'kmaq Nation 7 Northern Rd. Presque Isle, ME 04769 jgaenzle@micmac-nsn.gov	Chief Edward Peter Paul Aroostook Band of Micmacs 7 Northern Road Presque Isle, ME 04769 epeterpaul@micmac-nsn.gov
Additional Parties	
Jody Smet Eagle Creek Renewable Energy 7315 Wisconsin Avenue, Suite 1100W Bethesda, MD 20814 jody.smet@eaglecreekre.com	David Fox Eagle Creek Renewable Energy 7315 Wisconsin Avenue, Suite 1100W Bethesda, MD 20814 David.Fox@eaglecreekre.com
Licensee	
Michael Scarzello Brookfield White Pine Hydro LLC Brookfield Renewable Group 150 Main Street Lewiston, ME 04240 Michael.Scarzello@brookfieldrenewable.com	Kirk Smith Director of Regulatory & Environmental Gomez and Sullivan Engineers, DPC P.O. Box 2179 Henniker, NH 03242 ksmith@gomezandsullivan.com

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Brookfield White Pine Hydro LLC	)))	**Project No. 2284**

NOTICE OF INTENT TO FILE AN APPLICATION FOR A NEW LICENSE FOR THE BRUNSWICK HYDROELECTRIC PROJECT (FERC NO. 2284)

In accordance with Section 15(b)(1) of the Federal Power Act, 15 U.S.C. § 808(b)(1), and Section 5.5 of the regulations of the Federal Energy Regulatory Commission (FERC or Commission), 18 C.F.R. § 5.5, Brookfield White Pine Hydro LLC (BWPH), a Brookfield Renewable company, the Licensee, owner, and operator of the Brunswick Hydroelectric Project (Project), hereby declares its unequivocal intent to file an application for a new license, as described below.

1. **The existing licensee's name and address:**
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

2. **Project Number:**
Brunswick Hydroelectric Project, FERC No. 2284

3. **License expiration date:**
FERC issued a license to operate the Brunswick Hydroelectric Project by Order dated February 9, 1979 (6 FERC ¶ 61,122). The effective date of the license was March 1, 1979. The term of the license is 50 years, and it expires on February 28, 2029.

4. **Applicant's statement of intention to file an application for a new license:**
BWPH hereby unequivocally declares its intent to apply for a new license for the Brunswick Hydroelectric Project, FERC Project No. 2284, on or before February 28,

2027. BWPH requests that FERC conduct the relicensing using the Integrated Licensing Process (ILP).

5. **Principal Project Works:**

The Project consists of:) a 4.5 mile long 300-acre impoundment; 2) a 830-foot long and 40-foot-high concrete gravity dam; 3) a gate section containing two (2) Taintor gates and an emergency spillway; 3) a powerhouse containing three (3) propeller style turbine-generators with a combined rated capacity of 19.0 MW, 4) a 570-foot long vertical slot fishway, 5) a downstream fish passage facility consisting of a surface sluice and associated 18-inch pipe that discharges to the tailrace, 6) a 21-foot-high fish barrier wall between the dam and Shad Island, 7) and a three-foot high by 20-foot-long concrete fish barrier weir across Granney Hole Stream, and 8) appurtenant facilities.

6. **Project Location:**

State or Territory:	Maine
County:	Cumberland and Sagadahoc counties
Township or nearby town:	The towns of Brunswick and Topsham
Waterway:	Androscoggin River

7. **Installed plant capacity:**

The Project has a total authorized installed capacity of 19.0 MW.

8. **The names and mailing addresses of:**

   i. **Every county in which any part of the project is located, and in which any Federal facility that is used or to be used by the project is located:**

   The Project is located in Cumberland and Sagadahoc counties, Maine.

Cumberland County Government 142 Federal Street Portland, Maine 04101
Sagadahoc County Government 752 High Street Bath, Maine 04530

There are no Federal facilities used by the Project.

ii. **Every city, town, or similar political subdivision in which any part of the project is or is to be located and any Federal facility that is or is to be used by the project is located:**

The Project is in the towns of Brunswick and Topsham:

Town of Brunswick 85 Union Street Brunswick, Maine 04011
Town of Topsham 100 Main Street Topsham, Maine 04086

There are no Federal facilities used by the Project.

Every city, town or similar political subdivision that has a population of 5,000 or more people and is located within 15 miles of the existing or proposed project dam:

Town of Topsham 100 Main Street Topsham, ME 04086	Town of Brunswick 85 Union Street Brunswick, ME 04011
City of Auburn 60 Court Street Auburn, ME 04210	City of Bath 55 Front Street Bath, ME 04530
Town of Cumberland 290 Tuttle Road Cumberland, ME 04021	Town of Freeport 30 Main Street Freeport, ME 04032
Town of Gray Henry Pennell Municipal Complex 24 Main Street Gray, Maine 04039	City of Lewiston 27 Pine Street Lewiston, ME 04240

Town of Lisbon 300 Lisbon Street Lisbon, ME 04250	Town of New Gloucester 385 Intervale Road New Glocester, ME 04260
Town of Sabattus 190 Middle Road Sabattus, ME 04280	Town of Yarmouth 200 Main Street Yarmouth, ME 04096
Town of Harpswell P.O. Box 39 Harpswell, Maine 04079	

iii. Every irrigation district, drainage district, or similar special purpose political subdivision:

There are no irrigation, drainage, or special purpose political subdivisions associated with the Project.

iv. Every other political subdivision in the general area of the Project or proposed Project that there is reason to believe would likely to be interested in, or affected by, the notification:

There are no other political districts or subdivisions that are likely to be interested in or affected by the notification.

v. Affected Indian Tribes:

BWPH is not aware that the Project affects any Native American tribe. The following is a listing of Native American tribes that may have some level of interest in the area surrounding the Project:

Penobscot Indian Nation 12 Wabanaki Way Indian Island, ME 04468	Houlton Band of Maliseet Indians 88 Bell Road Littleton, ME 04730

Passamaquoddy Tribe PO Box 159 Princeton, ME 04668	Aroostook Band of Micmacs 7 Northern Road Presque Isle, ME 04769

Furthermore, in accordance with 18 C.F.R. Section 5.5, BWPH must distribute this notification of intent to appropriate Federal, state, and interstate agencies, Indian tribes, local governments, and members of the public likely to be interested in the proceeding. A complete listing of agencies, tribes, local governments, non-governmental organizations (NGOs), and individuals who are receiving this NOI is provided with the transmittal letter for this NOI.

The information required to be made available to the public pursuant to 18 C.F.R. Section 16.7 is located at the office of Brookfield Renewable at 150 Main Street, Lewiston, Maine 04240.

SUBSCRIPTION

This Notice of Intent to File a License Application for the Brunswick Hydroelectric Project, FERC No. 2284, is executed in the State of Maine, County of Androscoggin, by Nate Stevens, Vice President, Brookfield White Pine Hydro LLC, 150 Main Street, Lewiston, ME, who, being duly sworn, deposes and says that the contents of this Notice of Intent are true to the best of his knowledge or belief and that he is authorized to execute this document on behalf of Brookfield White Pine Hydro LLC. The undersigned has signed this Notice of Intent this 21st day of February 2024.

Brookfield White Pine Hydro LLC

By ______________________

Nate Stevens

Vice President, Operations

VERIFICATION

Subscribed and sworn to before me, a Notary Public of the State of Maine this 21st day of February 2024.

____

(Notary Public)

(My Commission Expires May 29, 2030) / seal

JASON M. SEYFRIED
NOTARY PUBLIC
EXP. MAY 29, 2030
STATE OF MAINE

PRE-APPLICATION DOCUMENT

VOLUME 1 OF 2: PUBLIC

BRUNSWICK HYDROELECTRIC PROJECT
FERC NO. 2284

Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Brookfield

February 2024

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TABLE OF CONTENTS

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LIST OF FIGURES

LIST OF ABBREVIATIONS AND DEFINITIONS

Applicant	Brookfield White Pine Hydro LLC
ASMFC	Atlantic States Marine Fisheries Commission
ASRP	Atlantic Salmon Recovery Project
BA	Biological Assessment
BiOP	Biological Opinion
Brookfield	Brookfield Renewable
BSD	Brunswick Sewer District
BTLT	Brunswick-Topsham Land Trust
BWPH	Brookfield White Pine Hydro LLC
C	Celsius
CARMA	Cultural & Architectural Resource Management Archive
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	Cubic feet per second
Commission	Federal Energy Regulatory Commission
CSO	Combined Sewer Overflows
CWA	Clean Water Act
DLA	Draft License Application
DO	Dissolved Oxygen
DSSMR	Dam Safety Surveillance and Monitoring Report
EFH	Essential Fish Habitat
EJ	Environmental Justice
EPA	Environmental Protection Agency
EPT	Ephemeroptera, Plecoptera, and Trichoptera
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FHA	Federal Highway Administration
FLA	Final License Application
FOIA	Freedom of Information Act
FOMB	Friends of Merrymeeting Bay
FOMP	Fishway Operations and Maintenance Plan
Form 80	Licensed Hydropower Development Recreation Report
FPA	Federal Power Act
Ft.	Foot
GOM DPS	Gulf of Maine Distinct Population Segment
GIS	Geographic Information System
HAPC	Habitats of Particular Concern
HBI	Hilsenhoff Biotic Index
HCP	Habitat Conservation Plan
Hp	horsepower
Hz	Hertz
ILP	Integrated Licensing Process
Installed Capacity	Lesser nameplate rating of a turbine and generator set

IPaC	Information for Planning and Consultation
ISPP	Interim Species Protection Plan
ISR	Initial Study Report
ITP	Incidental Take Permit
ITS	Incidental Take Statement
K factor	Erosion factor
Kf factor	Fine earth erosion factor
kV	Kilovolts
KVA	Kilovolt amps
kW	Kilowatt
Licensee	Brookfield White Pine Hydro, LLC
m	Meter
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
MDDS	Maine Damselfly and Dragonfly Survey
MDMR	Maine Department of Marine Resources
MDOT	Maine Department of Transportation
ME	Maine
MEDAFS	Maine Department of Administration and Financial Services State Economist
MEPDES	Maine Pollution Discharge Elimination System
mg/l	Milligrams per liter
mgd	Million gallons per day
MGS	Maine Geological Survey
MHPC	Maine Historic Preservation Commission
MISN	Maine Invasive Species Network
ml	Milliliter
MNAP	Maine Natural Areas Program
MRSA	Maine Revised Statutes Annotated
MSL	Mean Sea Level
MW	Megawatt
MWh	Megawatt hour
NEPA	National Environmental Policy Act
NGO	Non-Government Organization
NH	New Hampshire
NHDES	New Hampshire Department of Environmental Services
NLCD	National Land Cover Database
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service

NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NSCC	National System Control Center
NWI	National Wetlands Inventory
NWSRS	National Wild and Scenic River System
PAD	Pre-Application Document
PCB	Polychlorinated Biphenyls
PLP	Preliminary Licensing Proposal
PM&E	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
rpm	Revolutions per minute
RSP	Revised Study Plan
TE	Threatened and Endangered
TMDL	Total Maximum Daily Loads
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SD1	Scoping Document 1
SHPO	State Historic Preservation Officer
SHRU	Salmon Habitat Recovery Unit
SPD	Study Plan Determination
sqm	Square mile
SWAT	Surface Water Ambient Toxics Program
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
USASAC	U.S. Atlantic Salmon Assessment Committee
USDA	United States Department of Agriculture
USDHS	United States Department of Homeland Security, Geospatial Management Office
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
V	Volt
VRMP	Volunteer River Monitoring Program
WQC	Water Quality Certificate

1 INTRODUCTION

Brookfield White Pine Hydro LLC (BWPH or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the 19-megawatt (MW) Brunswick Hydroelectric Project (Project) (FERC No. 2284). The 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 original license was issued on February 9, 1979, and expires on February 28, 2029.

BWPH is filing with FERC a Notice of Intent (NOI) to relicense the Project, which generally consists of a 4.5-mile-long, 175-acre impoundment; a 830-foot-long and 40-foot-high concrete gravity dam; a gate section containing two Tainter gates and an emergency spillway; and a powerhouse and intake. The Project also has a vertical slot fishway, 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. The FERC-authorized installed capacity of the Project is 19.0 MW. As required by law, BWPH will be applying for a new license for the Project on or before February 28, 2027.

1.1 Purpose of the Pre-Application Document (PAD)

The Commission's relicensing regulations (18 CFR § 5.6 and 18 CFR § 16.8) require that, as an initial step in officially commencing the licensing process, a Licensee must prepare and distribute a Pre-Application Document (PAD). In accordance with the Commission's regulations, the PAD is being filed simultaneously with the NOI and will be distributed to federal and state resource agencies, local governments, Native American tribes, non-governmental organizations, and members of the public that may have an interest in the relicensing of the Project. Appendix A provides the distribution list for the NOI and PAD, as well as documentation of consultation with interested parties to date.

The PAD is a tool to supply information to help interested parties understand the Project and identify information that may be needed to support the issuance of a new license. As specified in 18 CFR § 5.6, information provided in the PAD typically pertains to relevant economic, engineering, environmental, and operational information that is reasonably available at the time the NOI is filed. The information presented in this PAD provides participants in this relicensing the information necessary to identify issues and related information needs; to develop study requests and study plans; and to prepare documents analyzing BWPH's Application for New License (License Application) that will be filed with FERC on or before February 28, 2027. The PAD is also a precursor to FERC's Scoping Documents, the environmental analysis section of the License Application, and to the Commission's National Environmental Policy Act (NEPA) document.

In compliance with FERC's regulations governing the content of the PAD, BWPH contacted appropriate federal and state resource agencies and parties who may be interested in the relicensing of the Project (Appendix A). BWPH requested that parties provide any relevant studies, data, and information on topics such as geology, water quality, fisheries, recreation, wildlife, wetlands, aesthetics, and cultural resources. BWPH also exercised due diligence in preparation of this PAD by conducting searches of publicly available databases and its own records. Data sources are available upon request in electronic or hardcopy format pursuant to 18 CFR 5.6.

1.2 Overview of the Integrated Licensing Process

BWPH will use the Integrated Licensing Process (ILP) as set forth in FERC's Final Rule and Tribal Policy Statement issued on July 23, 2003 (Final Rule, Order No. 2002). The ILP was developed to integrate the applicant's pre-filing consultation with the Commission's scoping pursuant to NEPA. The primary activities that are undertaken in the ILP include: the filing of the NOI and PAD; FERC's public scoping of issues; the development of study plans to gather information sufficient to assess the effects of continuing

Project operation on power and non-power resources; the execution of studies and development of study reports; and preparation of a license application. These activities will take place over a multi-year period ending with the filing of the application for new license by February 28, 2027. FERC will then conduct its environmental analysis and processing of the license application.

The filing of the NOI and PAD by BWPH initiates the ILP as set forth in Part 5 of the Commission's regulations. As set forth in 18 CFR § 5.7, within 30 days of this filing FERC staff will attempt to meet with each federally recognized Native American tribe that is "likely to be affected by" the Project's relicensing application, if any such tribe agrees to a meeting.

Next, as required in 18 CFR § 5.8, FERC will issue a notice of commencement of the licensing proceeding and Scoping Document 1 (SD1) within 60 days of the filing of this NOI/PAD. SD1 will include a preliminary list of issues to be assessed during the licensing proceeding and will solicit comments on the scope of analysis of issues. FERC will then hold a public scoping meeting and site visit within 30 days of issuing SD1. The site visit will allow interested parties an opportunity to observe the Project layout and the area, understand operations, and participate in a question-and-answer session about the Project. After the scoping meeting and site visit, Commission staff may issue a revised scoping document based on public and agency input.

A proposed Process Plan and Schedule, which depicts all major milestones required in the ILP, along with a timetable for those milestones, is set forth in Section 2 of the PAD.

1.3 Agent for the Licensee

The exact name and business address of each person authorized to act as agent for the applicant is listed below pursuant to 18 CFR § 5.6(d)(2)(i):

Michael Scarzello
Manager, Licensing
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240
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1.4 PAD Content

The information contained in this document was assembled based on the requirements set forth in 18 CFR § 5.6 (c) and (d), with minor format changes for ease of review, and is organized as follows:

Table of Contents; List of Tables; List of Figures; List of Appendices; List of Photographs; and Definitions of Terms, Acronyms, and Abbreviations.

Section 1 – Introduction and PAD Purpose

Section 2 – Plans, Schedule, and Protocols (18 CFR § 5.6(d)(1))

Section 3 – General Description of the River Basin (18 CFR § 5.6(d)(3)(xiii))

Section 4 – Project Location, Facilities, and Operations (18 CFR § 5.6(d)(2))

Section 5 – Description of Existing Environment and Potential Effects on Resources (18 CFR § 5.6(d)(3))

Section 6 – Preliminary Issues and Studies List (18 CFR § 5.6(d)(4))

Appendices

- Appendix A – Distribution List
- Appendix B – Consultation Documentation – PAD Questionnaire; A summary of the contacts made by BWPH, and consultation undertaken in preparing this PAD
- Appendix C – Project Boundary Drawings
- Appendix D – Exhibit F Drawings and Single-Line Diagram (CEII)
- Appendix E – Current License and Amendment Orders

2 PLANS, SCHEDULE, AND PROTOCOLS

As discussed in the previous section, with the filing of the NOI and PAD, BWPH is initiating FERC's ILP (FERC 2023) for the relicensing of the Project. The ILP is driven by specific milestones and requirements as noted in the Commission's regulations (18 CFR Part 5). This section contains an overview of the process plan and schedule (through filing of the license application) as well as the proposed communications protocol to be followed throughout this process.

2.1 Process Plan and Schedule through Filing of the License Application

A proposed Process Plan and Schedule with a timetable for the balance of the licensing process is shown in Table 2.1-1 and outlines actions by FERC, the Licensee, and other participants in the relicensing process through filing of the Final License Application (FLA). The Process Plan and Schedule may reflect deadlines that fall on weekend days (Saturday or Sunday) or holidays. Deadlines falling on a weekend, holiday, or day when FERC is closed due to adverse conditions are deemed to fall on the close of business of the next FERC business day in accordance with Commission guidelines. The proposed Process Plan and Schedule was developed in accordance with, and incorporates the timeframes set forth in, 18 CFR Part 5, and is based upon the License Application filing deadline of February 28, 2027.

Table 2.1-1: Proposed Process Plan and Schedule

Activity	Responsibility	Required Time Frame	Citation	Deadline
File Notice of Intent (NOI) and Pre-Application Document (PAD)	Licensee	At least 5 (but no more than 5 1/2) years before existing license expires	18 CFR § 5.5(d)	February 21, 2024
Hold Initial Tribal Consultation Meeting	FERC	Within 30 days of filing of NOI & PAD	18 CFR § 5.7	March 22, 2024
Notice NOI/PAD and Issue Scoping Document 1 (SD1)	FERC	Within 60 days of filing of NOI & PAD	18 CFR § 5.8(a)	April 21, 2024
Hold Scoping Meeting and Site Visit	FERC	Within 30 days of issuance of SD1	18 CFR § 5.8(b)(3)	May 21, 2024
Comments on PAD and SD1; Submit Study Requests	Stakeholders	Within 60 days of issuance of SD1	18 CFR § 5.9(a)	June 20, 2024
File Proposed Study Plan (PSP)	Licensee	Within 45 days of deadline for filing comments on PAD and SD1	18 CFR § 5.11	August 4, 2024
Hold Study Plan Meeting	Licensee	Within 30 days of deadline for filing PSP	18 CFR § 5.11(e)	September 3, 2024
Comment on Proposed Study Plan	Stakeholders	Within 90 days of filing PSP	18 CFR § 5.12	November 2, 2024
File Revised Study Plan (RSP)	Licensee	Within 30 days of deadline for filing comments on PSP	18 CFR § 5.13(a)	December 2, 2024
Comment on Revised Study Plan	Stakeholders	Within 15 days of filing of RSP	18 CFR § 5.13(b)	December 17, 2024
FERC Issues Study Plan Determination (SPD)	FERC	Within 30 days of filing of RSP	18 CFR § 5.13(c)	January 1, 2025
Initiate Formal Study Dispute Resolution Process (if necessary)	Agencies with mandatory conditioning authority	Within 20 days of issuance of Study Plan Determination	18 CFR § 5.14(a)	January 21, 2025
File Response to Study Dispute(s) (if necessary)	Licensee	Within 25 days of Notice of Study Dispute	18 CFR § 5.14(i)	February 15, 2025
FERC Dispute Panel Issues Finding (if necessary)	Dispute Panel	Within 50 days of Notice of Study Dispute	18 CFR § 5.14(k)	March 12, 2025
FERC Issues Determination on Study Dispute (if necessary)	FERC	Within 70 days of Notice of Study Dispute	18 CFR § 5.14(l)	April 1, 2025
Conduct Field Studies	Licensee	Pursuant to approved SP	18 CFR § 5.15	May - Oct 2025
File Initial Study Report	Licensee	Pursuant to approved SP or no later than 1 year after approval of SP	18 CFR § 5.15(c)(1)	January 1, 2026
Hold Initial Study Report Meeting	Licensee	Within 15 days of filing of initial study report	18 CFR § 5.15(c)(2)	January 16, 2026
File Initial Study Report Meeting Summary	Licensee	Within 15 days of study results meeting	18 CFR § 5.15(c)(3)	January 31, 2026
File Meeting Summary Disagreements (if necessary)	Stakeholders	Within 30 days of filing of study results meeting summary	10 CFR § 5.15(c)(4)	March 2, 2026

Activity	**Responsibility**	**Required Time Frame**	**Citation**	**Deadline**
File Responses to Disagreements (if necessary)	Licensee	Within 30 days of filing of meeting summary disagreements	18 CFR § 5.15(c)(5)	April 1, 2026
Resolve Disagreements (if necessary)	FERC	Within 30 days of filing of responses to disagreements	18 CFR § 5.15(c)(6)	May 1, 2026
Conduct Second Season Field Studies (if necessary)	Licensee	Pursuant to approved Study Plan Determination	18 CFR § 5.15	May - Oct 2026
File Preliminary Licensing Proposal (PLP) or Draft License Application (DLA)	Licensee	No later than 150 days before final application is filed	18 CFR § 5.16(a)	October 1, 2026
Comment on DLA, Additional Information Requests (if necessary)	Stakeholders	Within 90 days of filing of DLA or draft license application	18 CFR § 5.16(e)	December 30, 2026
File Updated Study Report (if applicable)	Licensee	Pursuant to approved SP or no later than 2 years after approval of SP	18 CFR § 5.15(f)	January 1, 2027
Hold Updated Study Report Meeting (if applicable)	Licensee	Within 15 days of Updated Study Report	18 CFR § 5.15(c)(2)	January 16, 2027
File Updated Study Report Meeting Summary (if applicable)	Licensee	Within 15 days of Study Results Meeting	18 CFR § 5.15(c)(3)	January 31, 2027
File License Application	Licensee	No later than 24 months before existing license expires	18 CFR § 5.17(a)	February 28, 2027
File Meeting Summary Disagreements (if necessary)	Stakeholders	Within 30 days of filing of study results meeting summary	18 CFR § 5.15(c)(4)	March 2, 2027
File Responses to Meeting Summary Disagreements (if necessary)	Licensee	Within 30 days of filing of meeting summary disagreements	18 CFR § 5.15(c)(5)	April 1, 2027
Resolve Updated Study Report Meeting Disagreements (if necessary)	FERC	Within 30 days of filing of response to disagreements	18 CFR § 5.15(c)(6)	May 1, 2027

2.2 Proposed Communications Protocol

BWPH is proposing a communication protocol to establish guidelines for effective participation and communication in the Project relicensing process. The proposed communication protocol discussed below pertains to general communications, meetings, and documents.

2.2.1 Parties to the Relicensing

There are two categories of participation in a FERC relicensing – Interested Parties and Relicensing Participants. Each category requires a different notification or frequency and type of communication. Interested Parties are those groups which have an interest in the licensing process and may include governmental organizations, non-governmental organizations (NGOs), tribes, or individuals; this group is generally referred to as "stakeholders". Relicensing Participants are often individuals from the various stakeholder groups who are actively participating in the licensing process.

Mailing Lists

BWPH will maintain a mailing list of all Interested Parties, which will include both standard mailing addresses and available email addresses for distributing notices and documents for public review. An individual from an Interested Party can become a Relicensing Participant by contacting Michael Scarzello (contact information provided in Section 1.3).

Following submittal of the license application to FERC, the Commission will establish an official Service List for parties who formally intervene in the proceeding. Intervention is a formal legal process governed by the Commission's regulations. Once the Commission establishes a Service List, any written documents filed with the Commission must be served to the Service List. Additional information can be found at: https://www.ferc.gov/resources/guides/how-to/intervene.asp.

2.2.2 General Communications

BWPH recognizes that there is a diverse group of stakeholders that may participate in the licensing process for the Project, including resource agencies, tribes, governmental organizations, NGOs, and individuals. To successfully navigate FERC's ILP, communication between the various groups will be vital.

For this process, general communications may include distribution of licensing documents, written correspondence, emails, and notes/records from various meetings and calls.

2.2.2.1 Telephone Communications

In general, routine telephone calls between licensing participants will be considered informal communication, without formal documentation. If FERC participates in a decisional or formal telephone call, it is assumed that the Commission will distribute a summary to the Mailing or Service Lists (Section 2.2.3).

2.2.2.2 Electronic Communications

BWPH anticipates distribution of relevant documents and submittal of comments, correspondence, and study requests from agencies and stakeholders will be conducted primarily electronically (either by electronic filing of documents with the FERC and/or via email distribution). In addition, some formal agency consultation proceedings and correspondence may, as a matter of convenience and expediency, occur electronically or via email. BWPH will maintain documentation of all correspondence as part of formal agency consultation proceedings.

The Commission makes information available to the public via the Internet through eLibrary, a records information system that contains documents submitted to and issued by the FERC. Documents filed with the FERC as part of the Project's licensing process are available for viewing and printing via eLibrary, accessed through the Commission's homepage or directly at https://www.ferc.gov/docs-filing/elibrary.asp (Docket P-2284). Interested Parties and Relicensing Participants can also subscribe to the docket for the Project under eSubscription and be sent notices of issuances and filings by email. Instructions for subscribing to the electronic FERC docket for Project is provided on FERC's website at: https://www.ferc.gov/docs-filing/esubscription.asp.

2.2.2.3 Meetings

Over the course of the licensing process, and in accordance with the ILP regulations, there will be numerous meetings between the Licensee and stakeholders to discuss various aspects of licensing. To the extent possible, BWPH will work with the interested parties to schedule these meetings during times and at locations that are convenient for the majority of participants and will provide adequate advance notice. When possible, BWPH will notify all interested parties at least one week in advance of the meeting and distribute necessary meeting materials (e.g., agendas, support documentation, etc.).

2.2.3 Document Distribution

BWPH will distribute, whenever possible, all documents in PDF or Microsoft Word format but may distribute hard copies of some documents for convenience or by request. BWPH prefers to receive all documents electronically, in an appropriate format. Electronic documents can be emailed to Michael.Scarzello@brookfieldrenewable.com and ksmith@gomezandsullivan.com while hard copy documents may be mailed to Brookfield's Lewiston, ME office (contact information provided in Section 1.3). All documents issued and received will become part of the consultation record and will be available for distribution to the public or for review as part of the Public Reference Files discussed below.

Documents submitted to and issued by the FERC for the Project are available through eLibrary under Docket P-2284 (https://www.ferc.gov/docs-filing/elibrary.asp). In addition, all materials filed with or issued by the FERC will be available for review and copying at the FERC offices in Washington, D.C.: Federal Energy Regulatory Commission Public Reference Room, Room 2-A Attn: Secretary 888 First Street, N.E. Washington, D.C. 20426.

Sensitive Information

Certain Project-related documents are Critical Energy Infrastructure Information (CEII) and restricted from public viewing in accordance with the Commission's regulations, 18 CFR § 388.113. This information relates to the design and safety of the dam and appurtenant facilities. Anyone seeking information protected as CEII from the Commission must file a CEII request. FERC's website (https://www.ferc.gov/legal/ceii-foia/ceii/eceii.asp) contains additional details related to CEII.

BWPH will allow limited access to documents containing sensitive information regarding specific cultural (restricted under Section 106 of the National Historic Preservation Act) and/or protected environmental resources (under Section 7 of the Endangered Species Act) to authorized entities. Members of the public seeking this information from FERC must file a Freedom of Information Act (FOIA) request. Instructions for FOIA are available on FERC's website at https://www.ferc.gov/legal/ceii-foia/ceii/eceii.asp.

2.3 Study Requests

BWPH has identified areas where there is little or no information relevant to potential Project effects to the human and natural environments and has preliminarily identified potential study efforts to address these deficiencies in Section 6 of this PAD. Per the ILP regulations, however, stakeholders may file study requests with FERC to supplement existing information or fill information gaps. All requests must satisfy FERC's study plan requirements as noted in the ILP regulations (18 CFR § 5.9(b)). As part of these requirements, the study request must:

- Describe the goals and objectives of each study proposal and the information to be obtained.
- If applicable, explain the relevant resource management goals of the agencies or Native American tribes with jurisdiction over the resource to be studied.
- If the requestor is a not resource agency, explain any relevant public interest considerations in regard to the proposed study.
- Describe existing information concerning the subject of the study proposal, and the need for additional information.
- Explain any nexus between Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.
- Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate filed season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.
- Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs. The requestor should also describe any available cost-share funds or in-kind services that the sponsor of the request may contribute towards the study effort.

Additional information on study request requirements and format can be found at: https://www.ferc.gov/industries/hydropower/gen-info/licensing/ilp/ilp-tutorial/prepare/scoping/study-request.asp. Per the ILP regulations, study requests must be filed with FERC within 60 days of FERC's issuance of SD1 (Table 2.1-1). FERC will ultimately issue a Study Plan Determination (SPD) that approves a study plan with any needed modifications determined to be necessary considering the record. Pursuant to 18 CFR § 5.14, study plan disputes may only be filed with the FERC by a mandatory conditioning authority under Section 4(e) and Section 18 of the Federal Power Act (FPA) and Section 401 of the Clean Water Act.

2.4 References

Federal Energy Regulatory Commission (FERC). 2023. Integrated Licensing Process. [Online] URL: https://ferc.gov/industries-data/hydropower/licensing/licensing-processes/integrated-licensing-process-ilp [Accessed August 10, 2023].

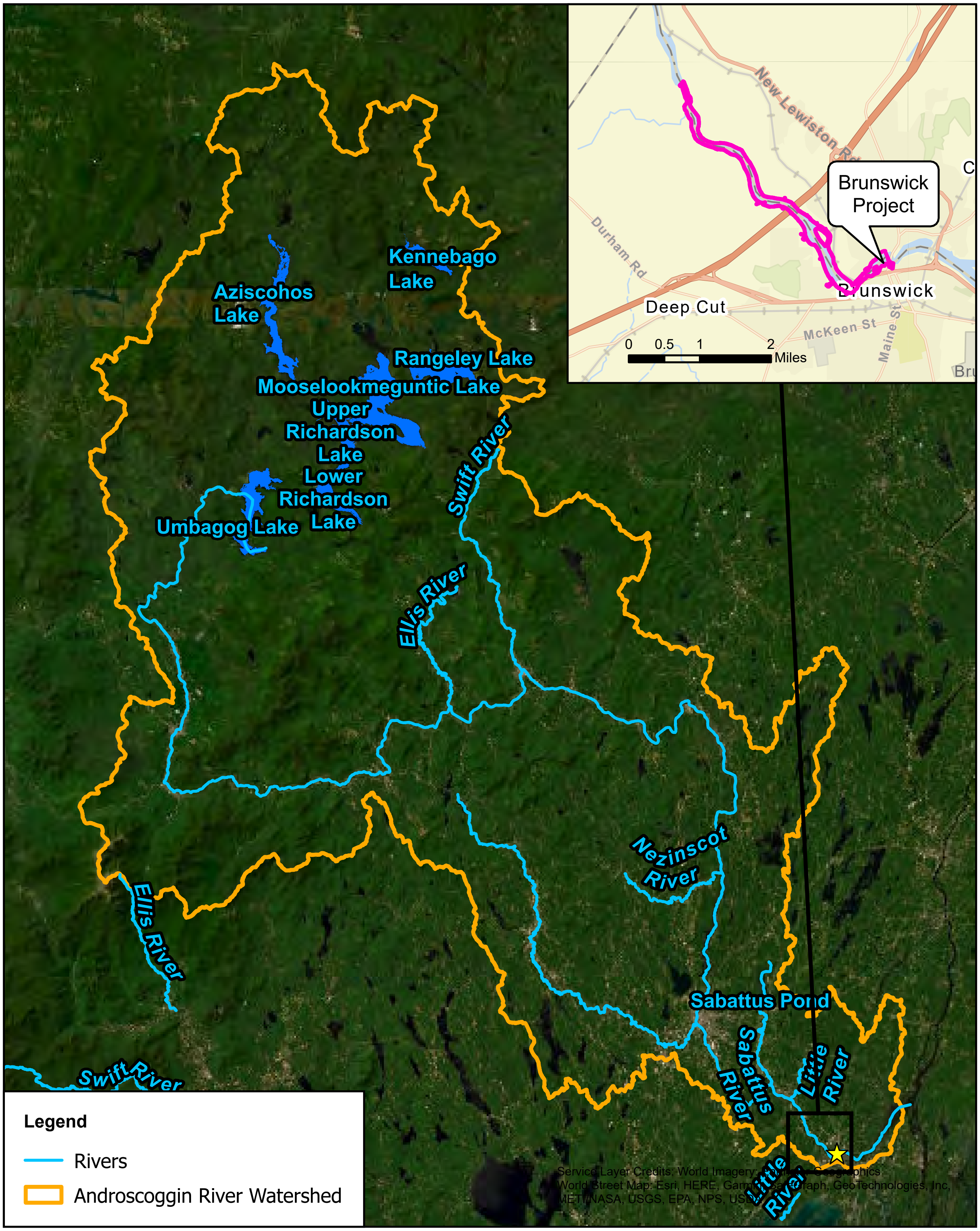
3 PROJECT LOCATION, FACILITIES, AND OPERATIONS

3.1 Project Location

The Project is located on the Androscoggin River at the head-of-tide at approximately river mile (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 (Figure 3.1-1). 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).

3.2 Project Boundary

The Project boundary follows the contour level of 42.0 feet above mean sea level (msl) 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 is follows the contour level of 46.0 feet, msl. 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 depicts the Project boundary, while Appendix C contains the Project's Exhibit G drawings.



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

Figure 3.1-1: Project Location Map

0 7.5 15 30 Miles

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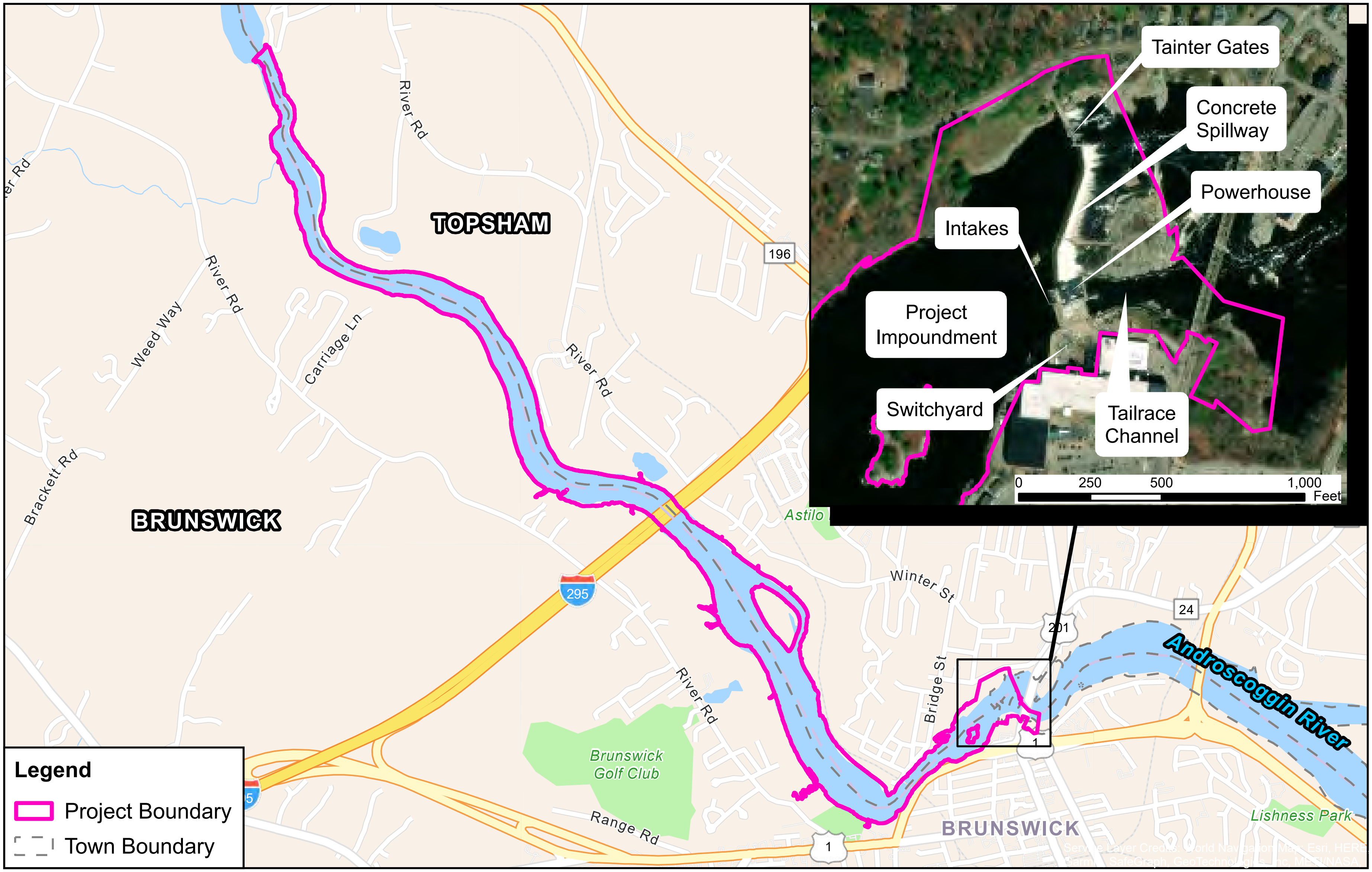

Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

Figure 3.2-1: Project Boundary Map

0 1,250 2,500 5,000 Feet

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3.3 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. Appendix D contains general design drawings (Exhibit F[1]) of the Project.

3.3.1 Impoundment

The Project impoundment (Photo 3-1) extends approximately 4.5 miles upstream from the Brunswick Dam to the tailwater area of the Pejepscot Dam. At elevation 39.4 feet, msl, the impoundment has a surface area of 175 acres, a gross storage capacity of 125 acre-feet (Figure 3.3.1-1), and approximately 11.5 miles of shoreline.

Photo 3-1: Project Impoundment

3.3.2 Dam & Spillway

The Project dam (Photos 3-2 and 3-3) is a concrete gravity structure with a total length of 830 feet. The dam consists of a 135-foot-long intake/powerhouse section with a top elevation of 55 feet, msl, a 510-foot-long uncontrolled spillway section with a crest elevation of 39.4 feet, msl, 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, msl, a 48-foot-wide

[1] The current FERC-approved Exhibit F drawings are provided in Appendix D; however, BWPH is further reviewing these drawings to determine if updates are needed to depict the current Project facilities. Updated drawings will be provided in the Final License Application, as necessary.

emergency spillway section with a crest elevation of 39.4 feet, msl, and 57-foot-long, non-overflow section with a top elevation of 55 feet, msl.

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 3.3.2-1 provides a spillway rating curve for the Project.

Photo 3-2: Project Dam

Photo 3-3: Project Tainter Gates and Emergency Spillway Sections

3.3.3 Intake Structure

The concrete intake structure (Photo 3-4) 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, msl.

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, msl and extend down to an elevation of -12.38 feet, msl. Each panel is approximately 12 feet wide. The upstream fish passage facility (Section 3.3.7) 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, msl, and the bottom elevation is 32.75 feet, msl.

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, msl and extend down to an elevation of 20.0 feet, msl. Each panel is approximately 17 feet wide. The sluice opening for the downstream fish passage facility (Section 3.3.7) is located near the Units 2 and 3 intake. The trashrack over the opening is approximately 3.5-feet-wide with a top elevation of 55.0 feet, msl and a bottom elevation of 33.0 feet, msl.

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

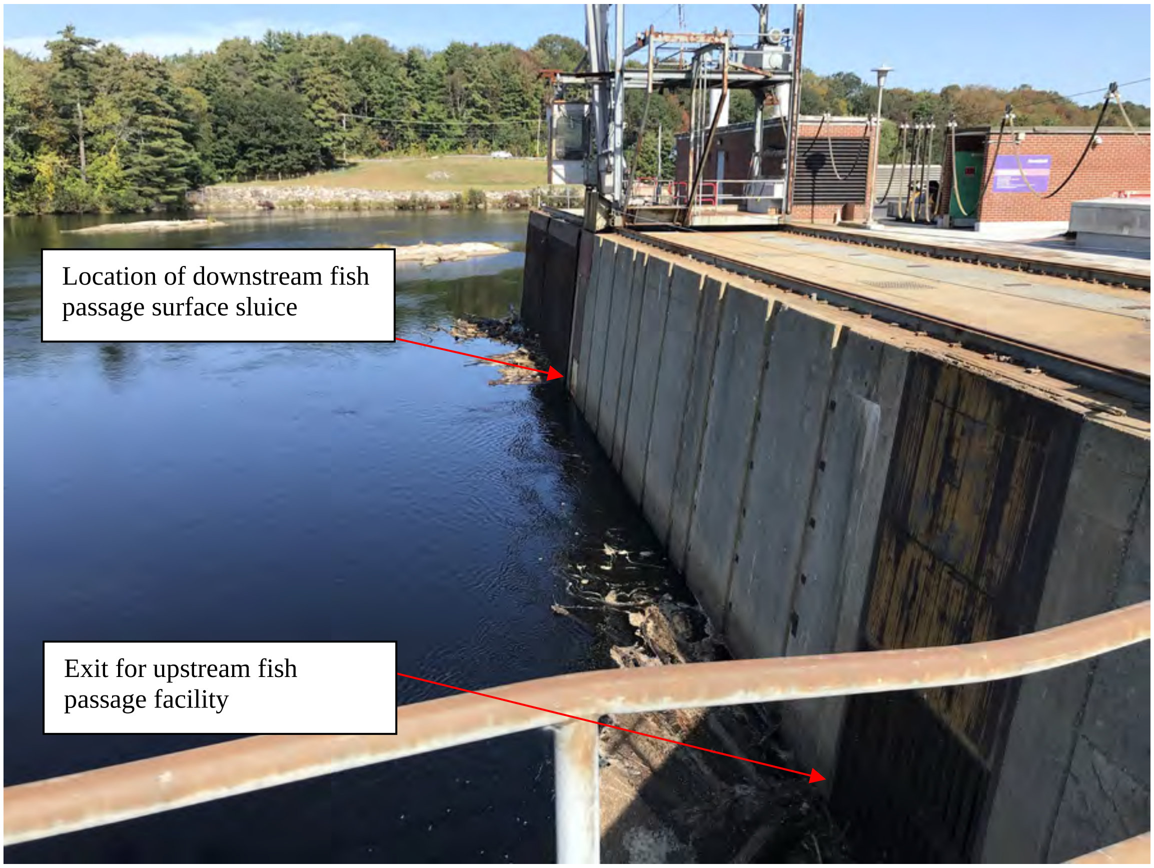

Photo 3-4: Project Turbine Intake Structure and Fishway Openings

3.3.4 Powerhouse

The powerhouse, constructed in 1983, (Photo 3-5) 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.

Photo 3-5: Project Powerhouse

3.3.5 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 3.3.5-1).

Table 3.3.5-1: 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 3.3.5-2).

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 3.3.5-2: 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

3.3.6 Tailrace

Water discharges through the powerhouse into a tailrace (Photo 3-6) 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, msl. Figure 3.3.6-1 contains the tailwater rating curve for the Project.

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[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.

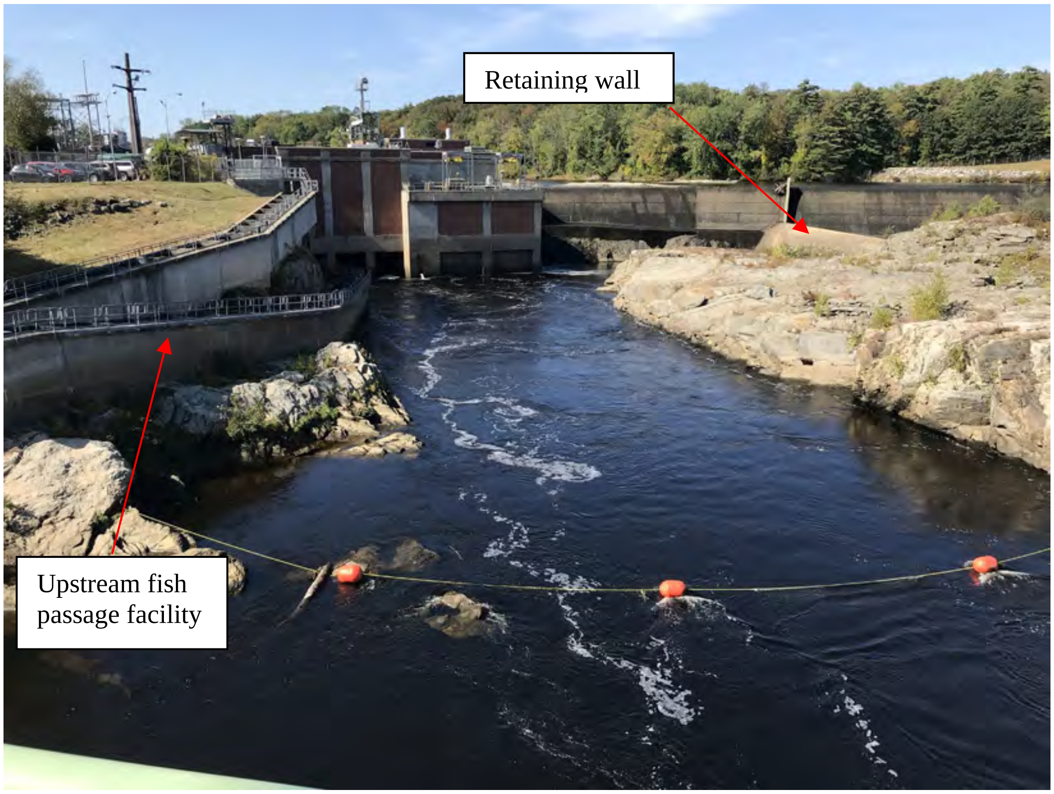


Photo 3-6: Project Tailrace

3.3.7 Fish Passage Facilities

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 (Photo 3-6). 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 manor 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 (Photo 3-2). 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.

Downstream Fish Passage Facilities

Downstream fish passage is provided at the Project via a surface sluice (Photo 3-4) and associated 18-inch diameter pipe (Photo 3-7) 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, msl and a bottom elevation of 33.0 feet, msl. The facility is operated from April 1 through December 31, as river conditions allow.

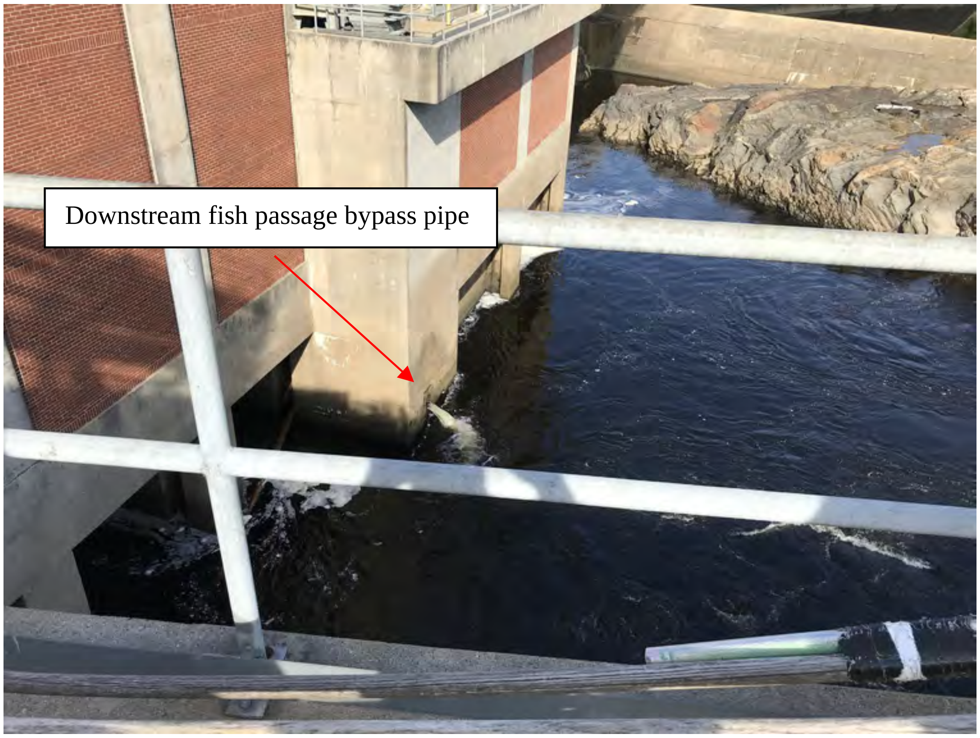


Photo 3-7: Downstream Fish Passage Discharge Pipe

3.3.8 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 (Photo 3-8), 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. A single line diagram is included in Appendix D.

Photo 3-8: Project Interconnection Point

3.3.9 Proposed Project Facilities

No changes to the Project facilities or structures are being proposed.

3.4 Project Operations

3.4.1 Existing Project Operations

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 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.

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

Figures 3.4.1-1 thru 3.4.1-5 show annual plots of hourly Project outflow and impoundment levels for 2018-2022.

3.4.2 Proposed Project Operations

No changes to the Project operations are being proposed.

3.5 Other Project Information

3.5.1 Current License Requirements

On February 9, 1979, the Commission issued a license for the Project for a period of 50 years. The current license is set to expire on February 28, 2029. The FERC license contained multiple articles governing how the Project is operated. The articles refer to issues such as power production, public safety, streamflows, and recreation, among others. The current license can be found in Appendix E. Articles 1 through 28 of the license are "standard content" modeled after FERC's 1975 Form L-3. Project specific License Articles included Articles 29-38 (Table 3.5.1-1). In addition, several License Amendments and Orders have been issued since the original Order Issuing License (Major) in 1979. These amendments are summarized in Table 3.5.1-2. The Project is additionally subject to a Water Quality Certificate (WQC) that was issued by the Maine Department of Environmental Quality (MDEP) on August 23, 1978 (Appendix E).

Figure 3.3.1-1: Impoundment Area/Volume Curve

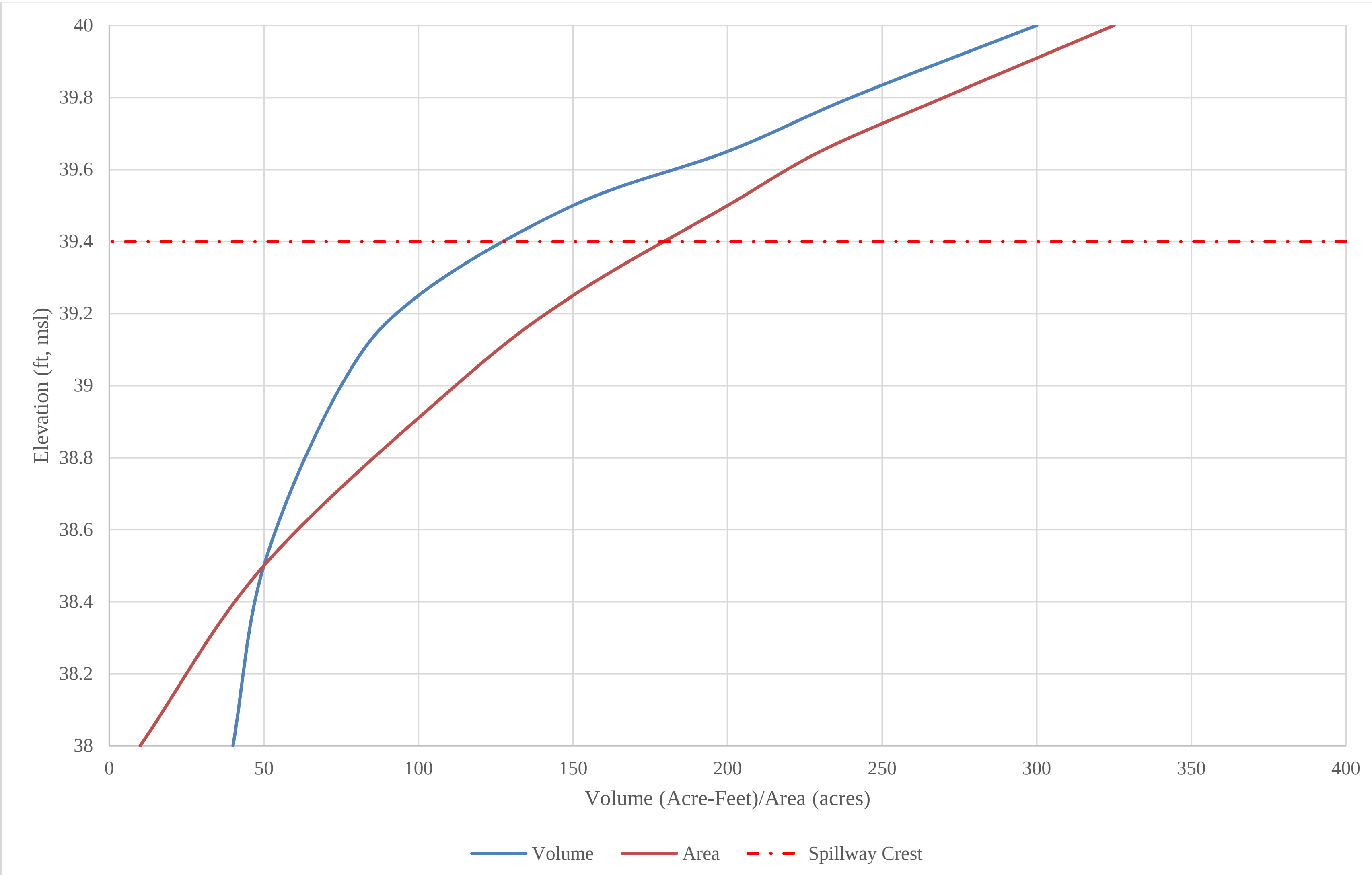


Figure 3.3.2-1: Spillway Discharge Curve

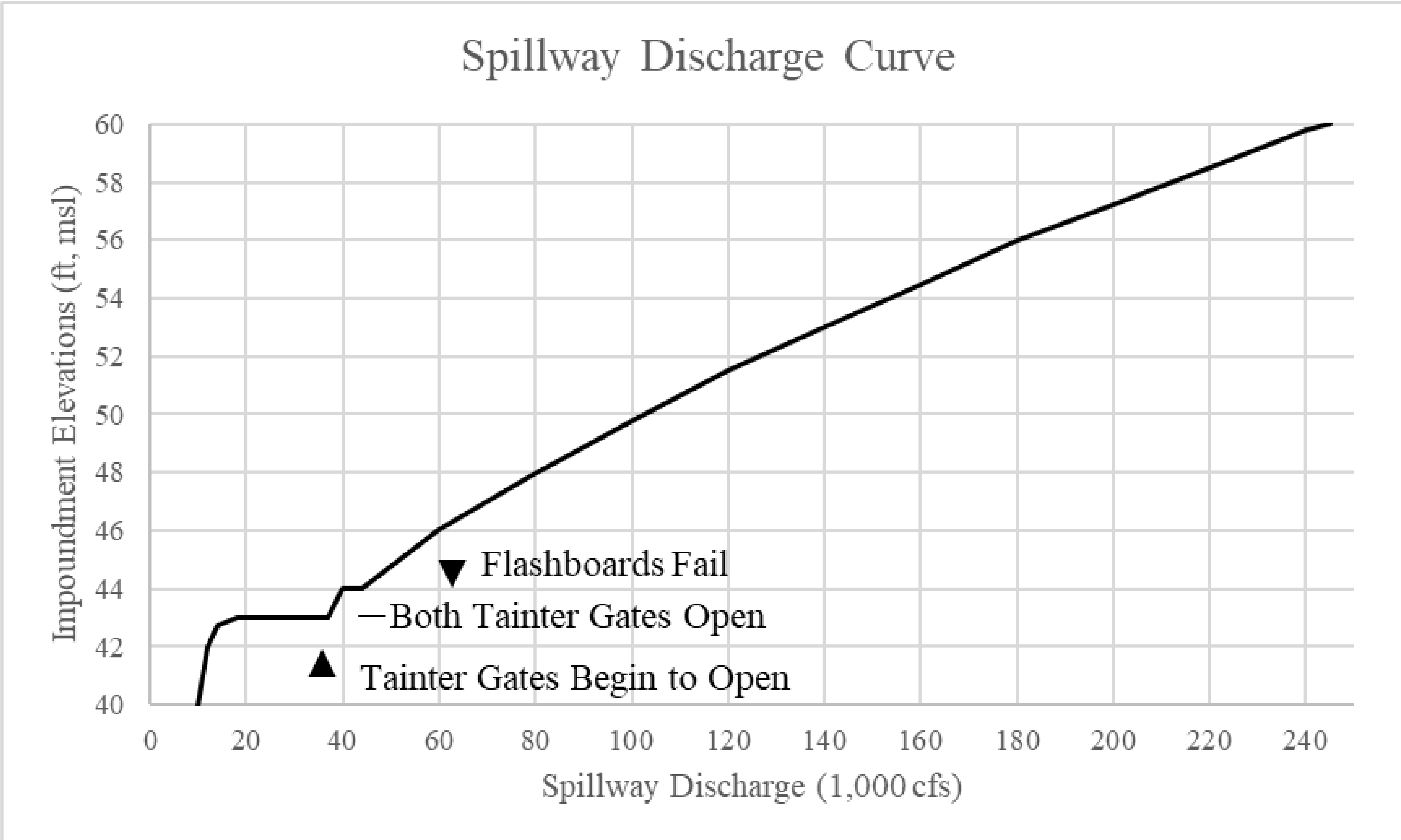


Figure 3.3.6-1: Tailwater Rating Curve

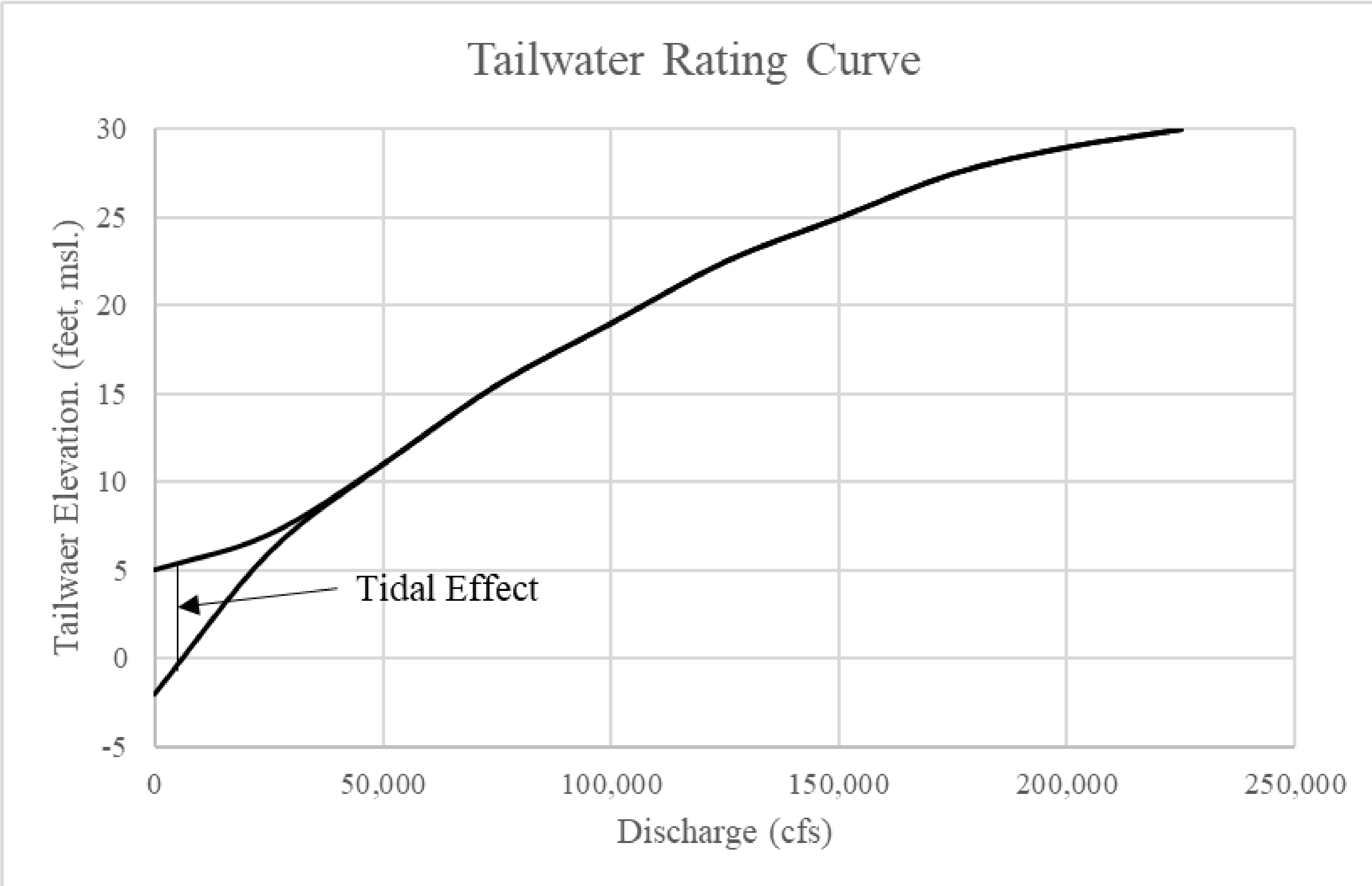
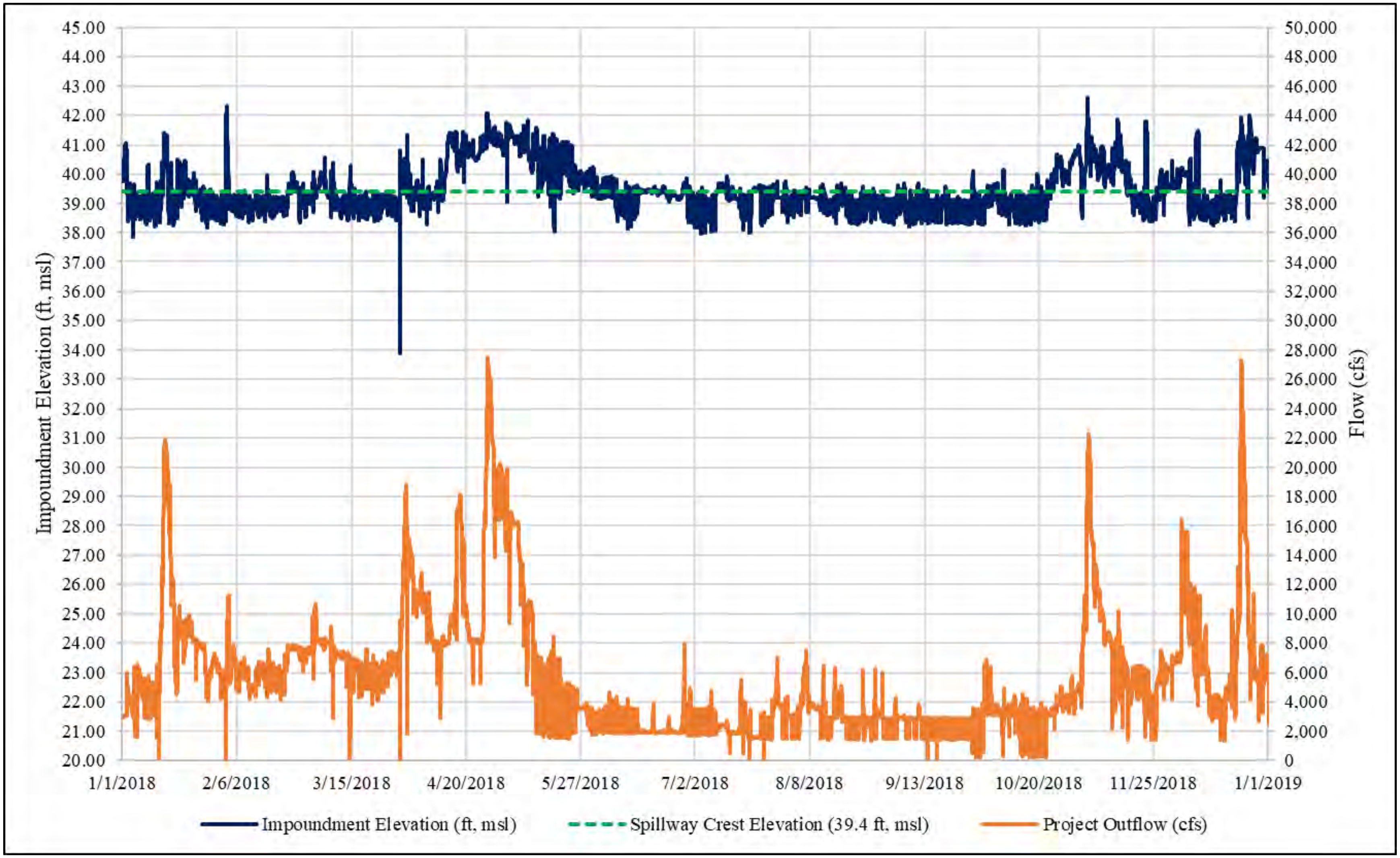


Figure 3.4.1-1: Hourly Project Outflow and Impoundment Levels for 2018[3]



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

Figure 3.4.1-2: Hourly Project Outflow and Impoundment Levels for 2019

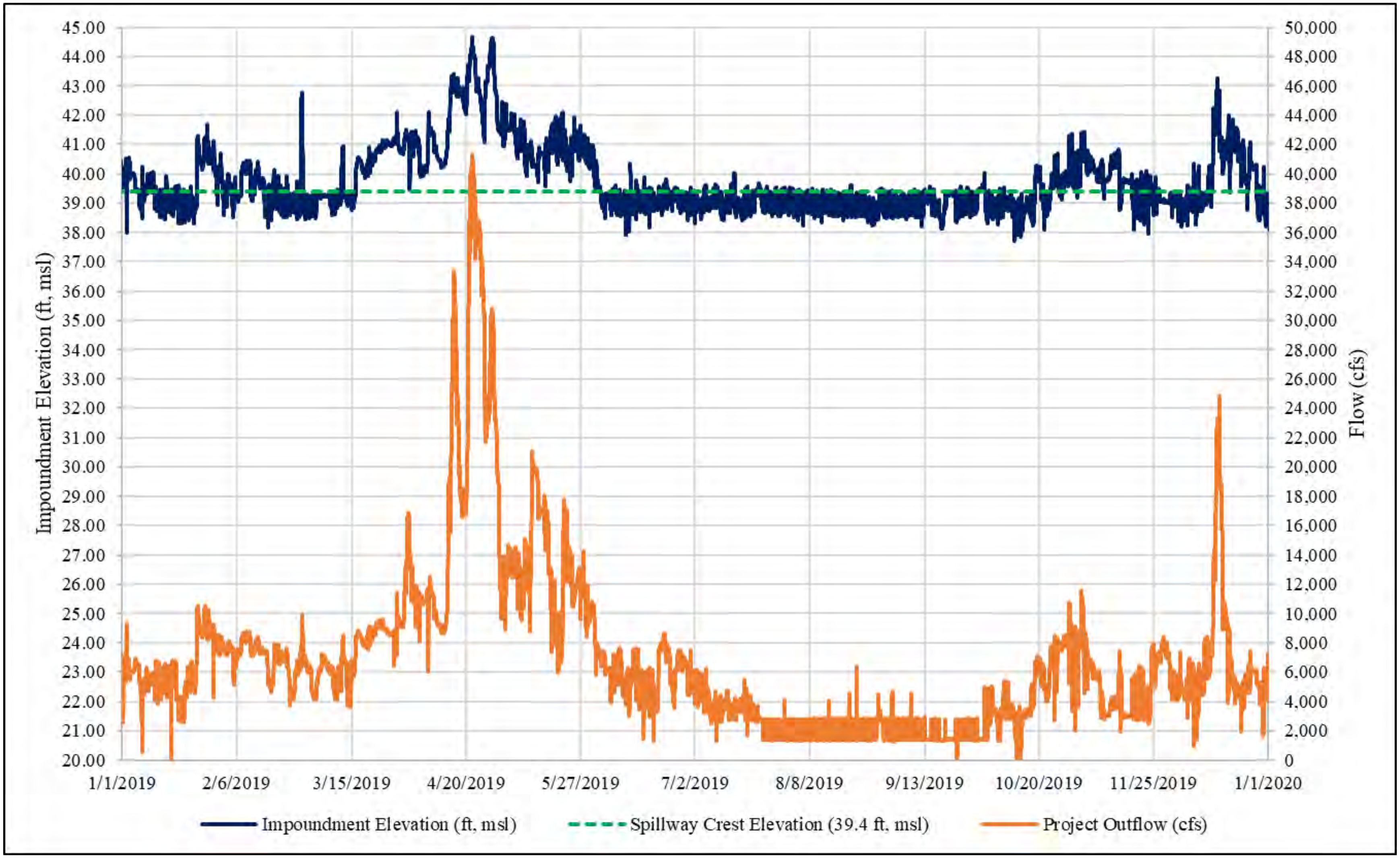


Figure 3.4.1-3: Hourly Project Outflow and Impoundment Levels for 2020

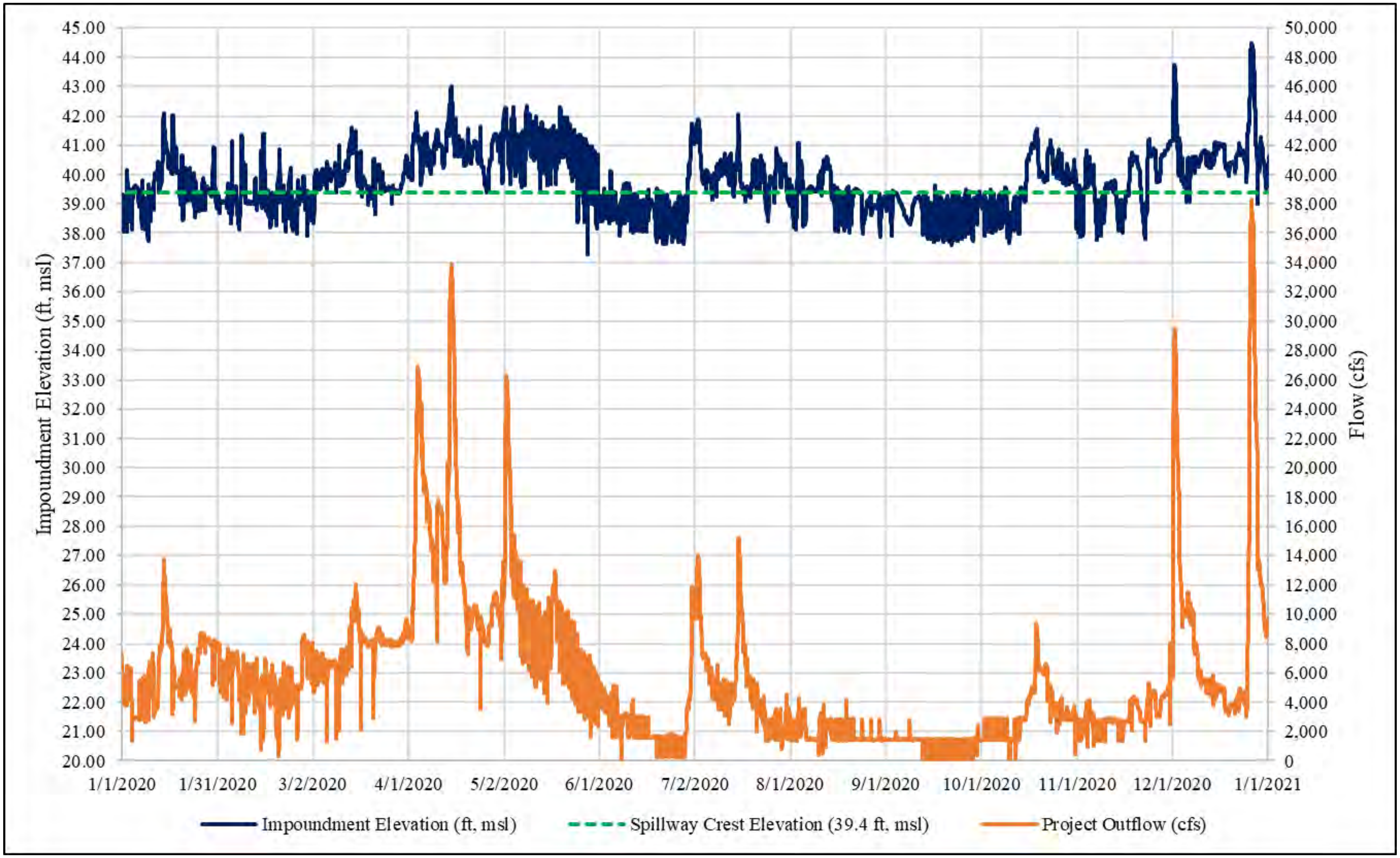


Figure 3.4.1-4: Hourly Project Outflow and Impoundment Levels for 2021

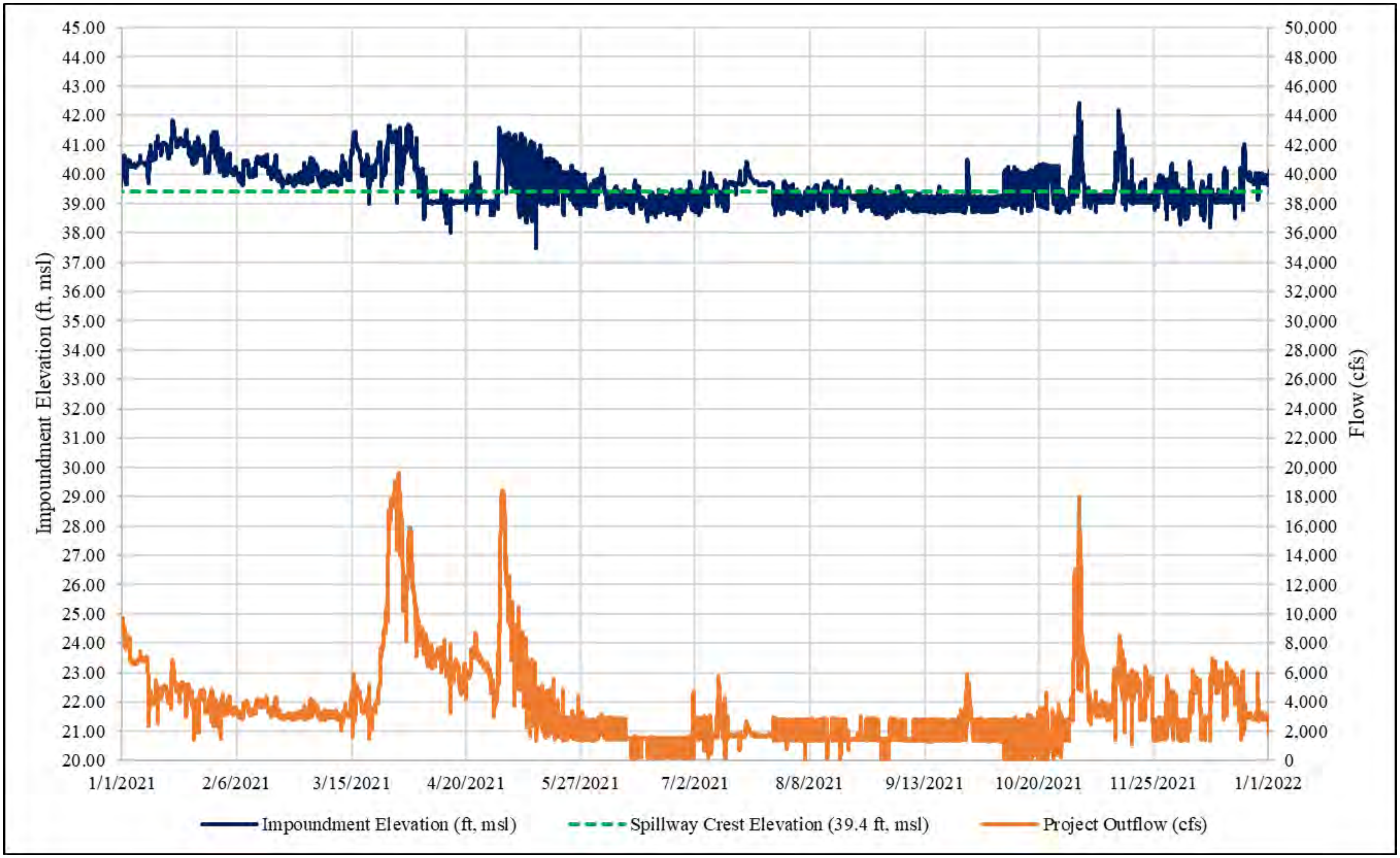
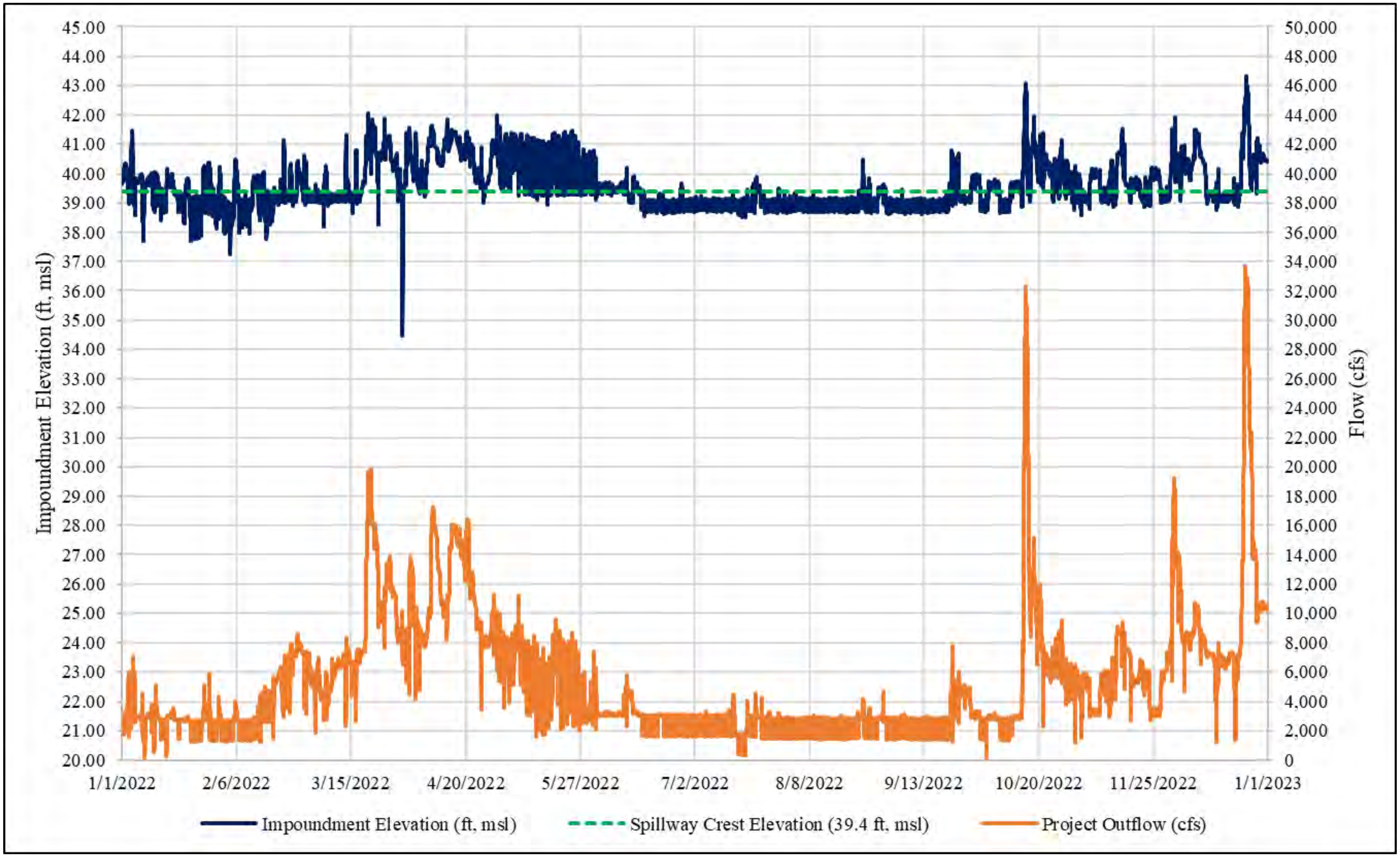


Figure 3.4.1-5: Hourly Project Outflow and Impoundment Levels for 2022[4]



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

Table 3.5.1-1: Project-Specific FERC License Articles

License Article	Description
Article 29	If any previously unrecorded archeological or historic sites are discovered during the course of construction or development of any project works or other facilities at the project, construction activity in the vicinity shall be halted, a qualified archeologist shall be consulted to determine the significance of the sites, and the Licensee shall consult with the State Historic Preservation Officer (SHPO) to develop a mitigation plan for the protection of significant archeological or historic resources. If the Licensee and the SHPO cannot agree on the amount of money to be expended on archeological or historic work related to the project, the Commission reserves the right to require the Licensee to conduct, at its own expense, any such work found necessary.
Article 30	Within six months from the date of the completion of construction of fish passage facilities, the Licensee shall file with the Commission "as built" drawings. The Licensee shall also submit annual reports to the Commission on results of fish passage facilities operation, including the numbers and species of fish counted and an assessment of the effectiveness of the facilities.
Article 31	The Licensee shall, to the satisfaction of the Commission's authorized representative, install and operate any signs, lights, sirens; or other safety devices that may reasonably be needed to warn the public of fluctuations in flow from the project and protect the public in its recreational use of project lands and waters.
Article 32	In the interest of protecting and enhancing the scenic, recreational, and other environmental values of the project, Licensee shall (1) supervise and control the use and occupancy of project lands and waters; (2) shall prohibit, without further Commission approval, the further use and occupancy of project lands and waters other than specifically authorized by this license; (3) may authorize without further Commission approval, the use and occupancy of project lands and waters for landscape plantings and the construction, operation, and maintenance of access roads, power and telephone distribution lines, piers, landings, boat docks, or similar structures and facilities, and embankments, bulkheads, retaining walls, or other similar structures for erosion control to protect the existing shoreline; (4) shall require, where feasible and desirable, the multiple use and occupancy of facilities for access to project lands and waters; and (5) shall ensure to the satisfaction of the Commission's authorized representative that all authorized uses and occupancies of project lands and waters (a) are consistent with shoreline aesthetic values, (b) are maintained in a good state of repair, and (c) comply with State and local health and safety regulations. Under item (3) of this Article, Licensee may, among other things, institute a program for issuing permits to a reasonable extent for the authorized types of use and occupancy of project lands and waters. Under appropriate circumstances, permits may be subject to the payment of a fee in a reasonable amount. Before authorizing construction of bulkheads or retaining walls, Licensee shall: (a) inspect the site of the proposed construction, (b) determine that the proposed construction is needed, and (c consider whether the, planting of vegetation or the use of riprap would be adequate to control erosion at the site. If an authorized use or occupancy fails to comply with the conditions of this Article, or with any reasonable conditions imposed by the Licensee for the protection of the environmental quality of project lands and waters, the Licensee shall take appropriate action to correct the violations, including, if necessary, cancellation of the authorization and removal of any noncomplying structures or facilities. The Licensee's consent to an authorized use or occupancy of project lands and waters shall not, without its express agreement, place upon the Licensee any obligation to construct or maintain any associated facilities.
Article 33	Before beginning construction of the project, the Licensee shall submit and obtain approval from the Director, Office of Electric Power Regulation, of revised Exhibit L drawings conforming to the Commission's regulations and showing the final design to the project darn. The dam shall be designed to be stable, structurally sound, and safe under probable maximum flood conditions.

License Article	Description
Article 34	Pursuant to Section l0(d) of the Act, the rate as computed below shall be the specified rate of return on the net investment in the project for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. One-half of the project surplus earnings, if any, accumulated under the license, in excess of the specified rate of return per annum on the net investment, shall be set aside in a project amortization reserve account as of the end of each fiscal year, with the exception that, if there is a deficiency of project earnings below that specified rate of return per annum for any fiscal year under the license, the amount of any surplus earnings accumulated thereafter until absorbed, and one-half of the remaining surplus earnings, if any, thus cumulatively computed, shall be set aside in the project amortization reserve account; the amounts thus established in the project amortization reserve account shall be maintained until further order of the Commission. The annual specified reasonable rate of return shall be the sum of the weighted cost components of long-term debt, preferred stock, and the cost of common equity, as defined below. The weighted cost component for each element of the reasonable rate of return is the product of its capital ratios and cost rate. The current capital ratios for each of the above elements of the rate of return shall be calculated annually based on an average of 13 monthly balances of amounts properly includable in the Licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rates for such ratios shall be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall be the interest rate on 10-year government bond (reported as the Treasury Department's 10-year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).
Article 35	For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, the Licensee shall pay the United States a reasonable annual charge, effective the first day of the month following the month in which this license is issued, as determined by the Commission in accordance with the provisions of its regulations in effect from time to time. The authorized installed capacity for that purpose is 25,300[5] horsepower.
Article 36	Licensee shall file with the Commission, implement, and modify when appropriate, an emergency_ action plan designed to provide an early warning to upstream and downstream inhabitants and property owners if there should be an impending or actual sudden release of water caused by an accident to, or failure of, project structures. That plan shall be submitted within one year of the date of issuance of this license, and shall include: instructions to be provided on a continuing basis to operators and attendants for actions they are to take in the event of an emergency; detailed and documented plans for notifying law enforcement agents, appropriate federal, state, and local agencies, operators of water-related facilities, and those residents and owners of properties that could be endangered; actions if possible, by limiting the outflow from upstream dams or control structures; and actions to reduce downstream flows by controlling the outflow from dams located on tributaries to the stream on which the project is located. Licensee shall also submit a summary of the study used as a basis for determining the areas that may be affected by an emergency, including criteria and assumptions used. Licensee shall monitor any changes in upstream or downstream conditions which may influence possible flows or affect areas susceptible to damage and shall promptly make and file with the Commission appropriate changes in such emergency action plan. The Commission reserves the right to require, modifications to the plan.
Article 37	Within five years following the effective date of this license the Licensee shall file a revised Exhibit F and, for Commission approval, an "as built" Exhibit K to show the project as finally constructed and located, and an "as built" Exhibit M revised to include the 34.5-kV transmission line between the Brunswick switchyard and the Topsham substation.

[5] Amended Sept. 21, 1981

License Article	Description
Article 38	The Licensee shall commence construction of the project works within one year of the effective date of this license, and, in good faith and with due diligence, shall prosecute and complete the project works within four years of commencing construction.
Article 39	The Licensee shall clear and keep clear to an adequate width all lands along open conduits and shall dispose of al1 temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which result from maintenance, operation, or alteration of the project works. In addition, all trees along the periphery of the project reservoir which die during operation of the project shall be removed. All clearing of lands and disposal of unnecessary material shall be done with due diligence to the satisfaction of the authorized representative of the Commission and in accordance with appropriate federal, state, and local statutes and regulations.

Table 3.5.1-2: License Amendments and Applications

Date Issued	FERC Order
June 22, 1998	Order Amending License: To remove transmission lines from the Project boundary that are no longer considered primary lines.
July 29, 2013	Order Amending License: To change licensee's name from FPL Energy Maine Hydro, LLC to Brookfield White Pine Hydro LLC.
December 13, 2013	Order Approving Interim Species Protection Plan for Atlantic Salmon and Handling and Protection Plan for Shortnose and Atlantic Sturgeon.
February 16, 2022	Order Modifying and Approving Non-Project Use of Project Lands and Waters to Facilitate Replacement of the Frank J. Wood Bridge.

3.5.2 Compliance History

A review of the FERC record for the Project found that there were three deviations in the previous 5 years that were considered violations of the License by FERC. On May 3-4, 2022, there was a deviation related to the turbine-generator unit operating protocol to facilitate downstream passage of Atlantic salmon smolts.[6] On May 12, 2021, there was a deviation that caused a reduction in the upstream fish passage facility operating flow.[7] And on May 6-7, 2020, there was a deviation related to the turbine-generator unit operating protocol to facilitate downstream passage of Atlantic salmon smolts.[8] All of these incidents were reported by BWPH, fully investigated by FERC, and measures put in place to prevent reoccurrence in the future.

Otherwise, BWPH has operated the Project in accordance with the terms and conditions of the license. The Project has been subject to the Commission's standard operational and environmental inspections. Following these inspections, BWPH has implemented and completed all necessary actions to address any Commission comments and recommendations.

[6] FERC Accession No. 20221013-3012: https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20221013-3012.
[7] FERC Accession No. 20210630-3027: https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20210630-3027.
[8] FERC Accession No. 20200616-3003: https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20200616-3003.

3.5.3 Public Safety

The Project is remotely monitored and operated 24 hours a day, 7 days a week. In addition, Project operating staff visit the site daily. Brookfield's National System Control Center (NSCC) notifies Project personnel of operational problems via cellular telephones. Project staff are generally within 30 minutes of the site during normal work hours and can respond within 3 hours or less during off hours.

The Project is classified as a low hazard dam. Due to the low hazard classification of this dam, no Potential Failure Mode Analysis has been conducted at this site. The Dam Safety Surveillance and Monitoring Program and Report (DSSMR) defines the appropriate monitoring for the water retaining project works. The DSSMR for the Project was last filed with the FERC on March 30, 2023.

In addition, Section 10(c) of the FPA authorizes FERC to establish regulations requiring Licensees to operate and properly maintain their Projects for the protection of life, health, and property. FERC Part 12 regulations include such safety measures as signage and exclusion devices. BWPH was required by FERC to file a public safety plan for the Project, which depicts the public safety devices installed at the Project and their location. The Commission approved the Public Safety Plan on May 31, 2016.[9]

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 approximately 1/2 mile upstream of the dam from June 15 to October 31 as flow 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 flow conditions allow.

3.5.4 Summary of Project Generation and Flow Records

Table 3.5.4-1 provides the annual gross and average monthly gross generated megawatt hours (MWh) at the Project for the past ten years (2013-2022). Annual gross generation ranged from 64,252 to 112,174 MWh in 2021 and 2013, respectively with a mean annual generation of 90,695 MWh during the period examined.

Regarding flow records, Section 5.2.1.2 provides additional information pertaining to streamflow into the Project including annual and monthly flow duration curves.

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 15.995 MW (summer) and 15.848 MW (winter). These are calculated based on a 5-year average (2018-2022) 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.

[9] FERC Accession No. 20160531-5283: https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20160531-5283.

Table 3.5.4-1: Annual and Monthly Gross Generation (MWh) for the Project (2013 - 2022)

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
Mean	**8,180**	**8,024**	**10,205**	**11,928**	**9,165**	**7,096**	**5,990**	**4,942**	**4,146**	**5,351**	**7,298**	**8,368**	**90,695**

3.5.5 Current Net Investment

The current (December 31, 2022) net investment for the Project is approximately $15,226,902.

3.5.6 Proposed New Facilities and/or Changes in Project Operation

BWPH is not proposing to construct new facilities or to alter Project operations as part of this relicensing.

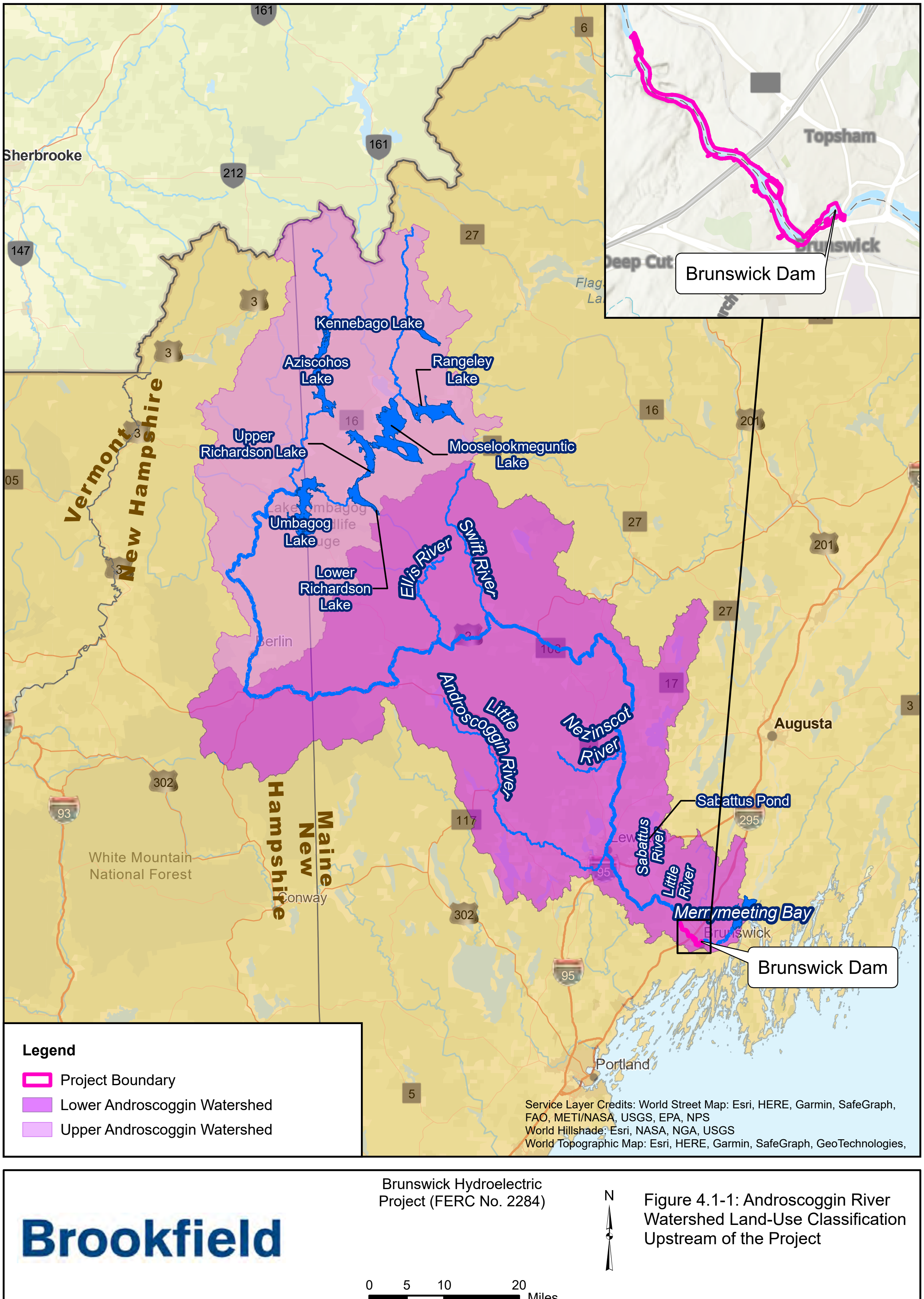
4 GENERAL DESCRIPTION OF THE RIVER BASIN (18 CFR §5.6 (D)(3)(XIII))

4.1 Overview

The Androscoggin River watershed (Figure 4.1-1) 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-feet 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).

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.



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

Figure 4.1-1: Androscoggin River Watershed Land-Use Classification Upstream of the Project

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4.2 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 4.2-1 provides a breakdown of the various land-use classifications found throughout the Androscoggin River watershed upstream of the Project, while Figure 4.2-1 shows the location of the various land-use classifications in relation to the Project.

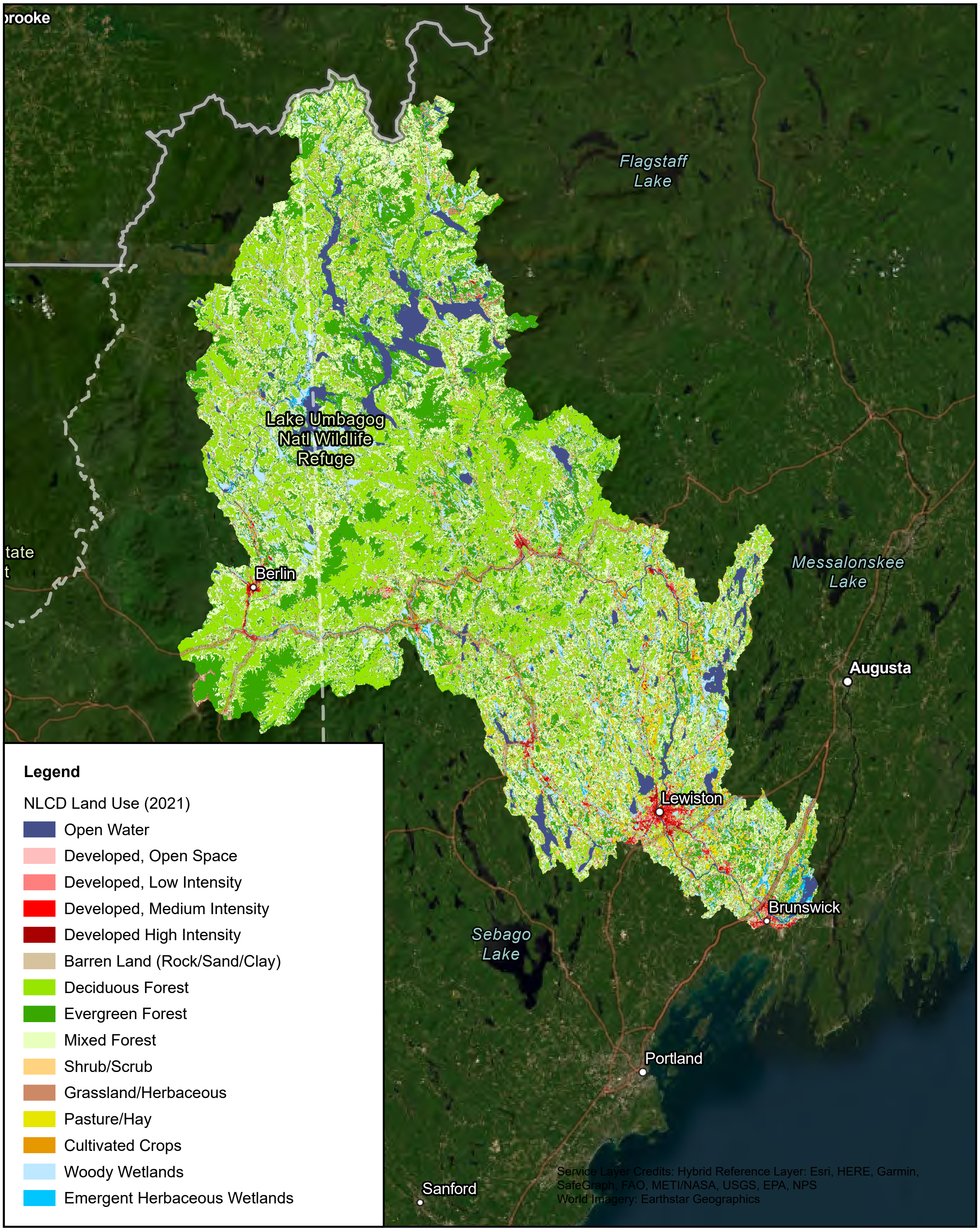
Within 1,000 feet of the Project boundary, the land-use is dominated by open water (19.4%) (i.e., the Project impoundment), and various forest classifications (i.e., mixed (16.4%), evergreen (10%), or deciduous (10%)), barren land composed of rock, sand, or clay (11%), and land with various degrees of development (13%). The remaining land use classifications found within 1,000 feet 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 4.2-2 provides a breakdown of the various land-use classifications found within 1,000 feet of the Project boundary, while Figure 4.2-2 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 5.7.

Table 4.2-1: 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%**

Table 4.2-2: Land-Use within 1,000 feet 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%**



Brookfield

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0 5 10 20 Miles

N

Figure 4.2-1: Androscoggin River Watershed Land-Use Classification Upstream of the Project

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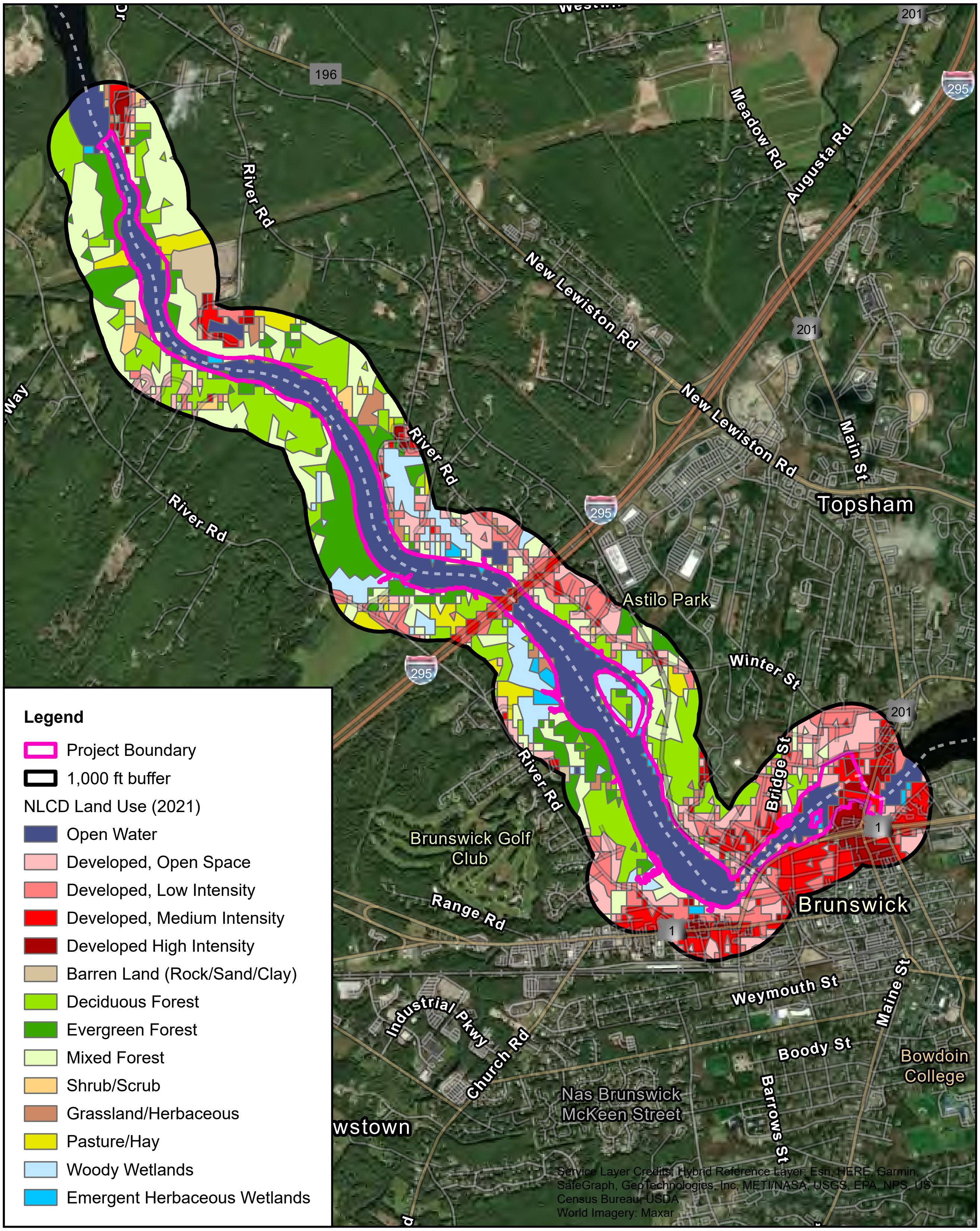

Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

Figure 4.2-2:
Land-Use within 1,000 feet of the Project boundary

N

0 0.25 0.5 1 Miles

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4.3 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 (NPDES) 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, 2023a & 2023b).

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 mean annual daily flow into the Project is approximately 7,018 cfs, pro-rated from the USGS Gage No. 01059000 Androscoggin River near Auburn, ME (USGS, 2023a). The maximum peak flow recorded during the period of record (May 1929 to November 2021), 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, 2023b).

4.4 Basin Dams

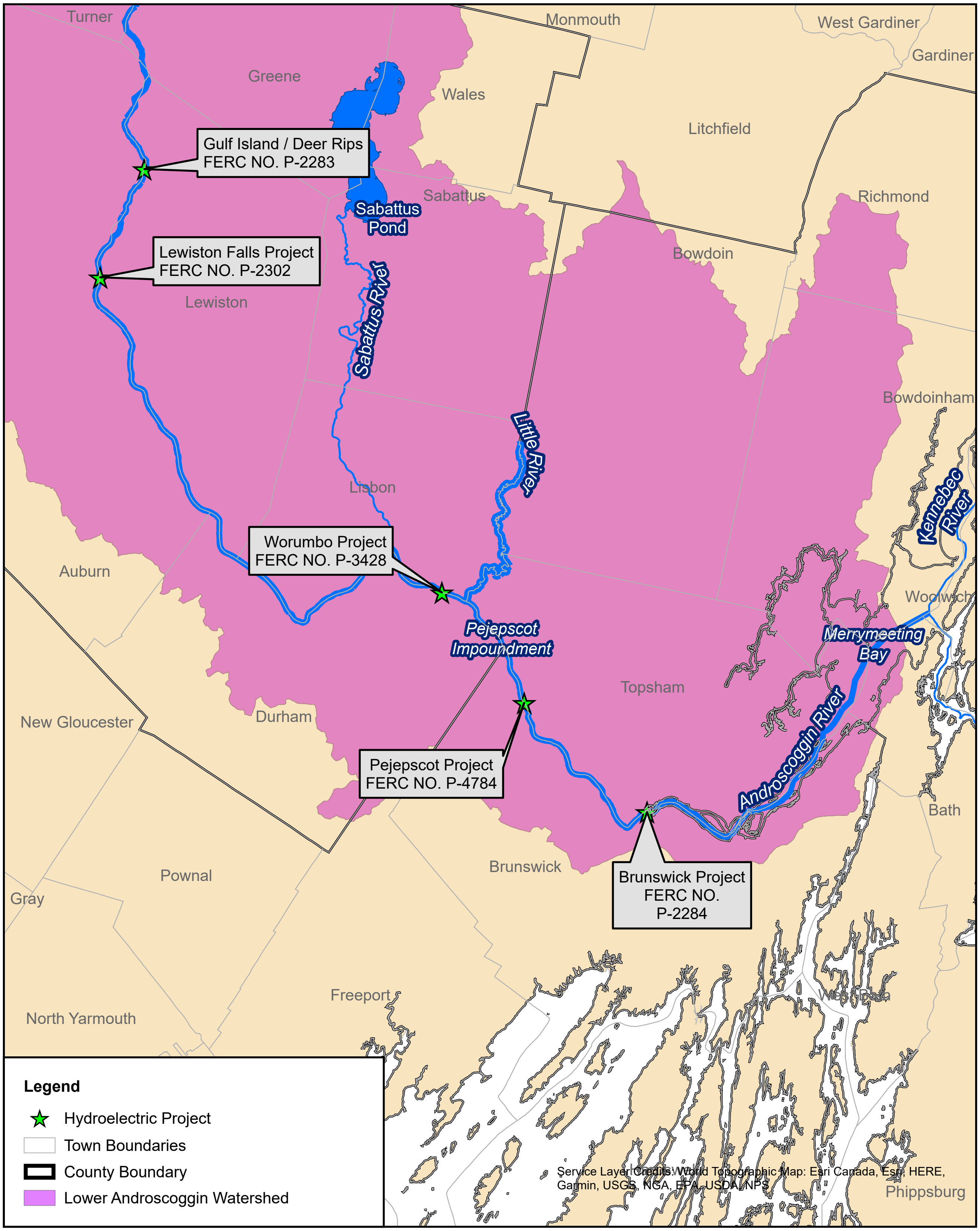
The Androscoggin River basin contains over 200 dams according to a combination of data from the NH Geodata Portal and Maine geographic information systems (GIS) dam layers. While many of these dams are on tributaries, there are 22 dams on the mainstem of the Androscoggin River below Errol, NH.

The Project is the first dam on the Androscoggin River. The FERC licensed hydroelectric projects on the mainstem of the Androscoggin River and the headwater storage dams are provided in Table 4.4-1. 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 4.4-1 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 4.4-1: 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, 2023)



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

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Figure 4.4-1: Mainstem Hydroelectric Projects and Key Features in the Vicinity of the Project

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4.5 Tributary Streams

There are 16 major tributaries that feed into the Androscoggin River, all of which are upstream of the Project. Four of the largest tributaries in the watershed include the Swift, Little Androscoggin, Ellis, and Nezinscot rivers (USGS, 1986). 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 8 other unnamed streams. The only outlet of the impoundment is through the Project itself. Tributaries found throughout the Androscoggin River watershed can be found in Figure 4.1-1.

4.6 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 per season. Annual snowfall in the northern part of the watershed exceeds 110 inches (NOAA, 2023).

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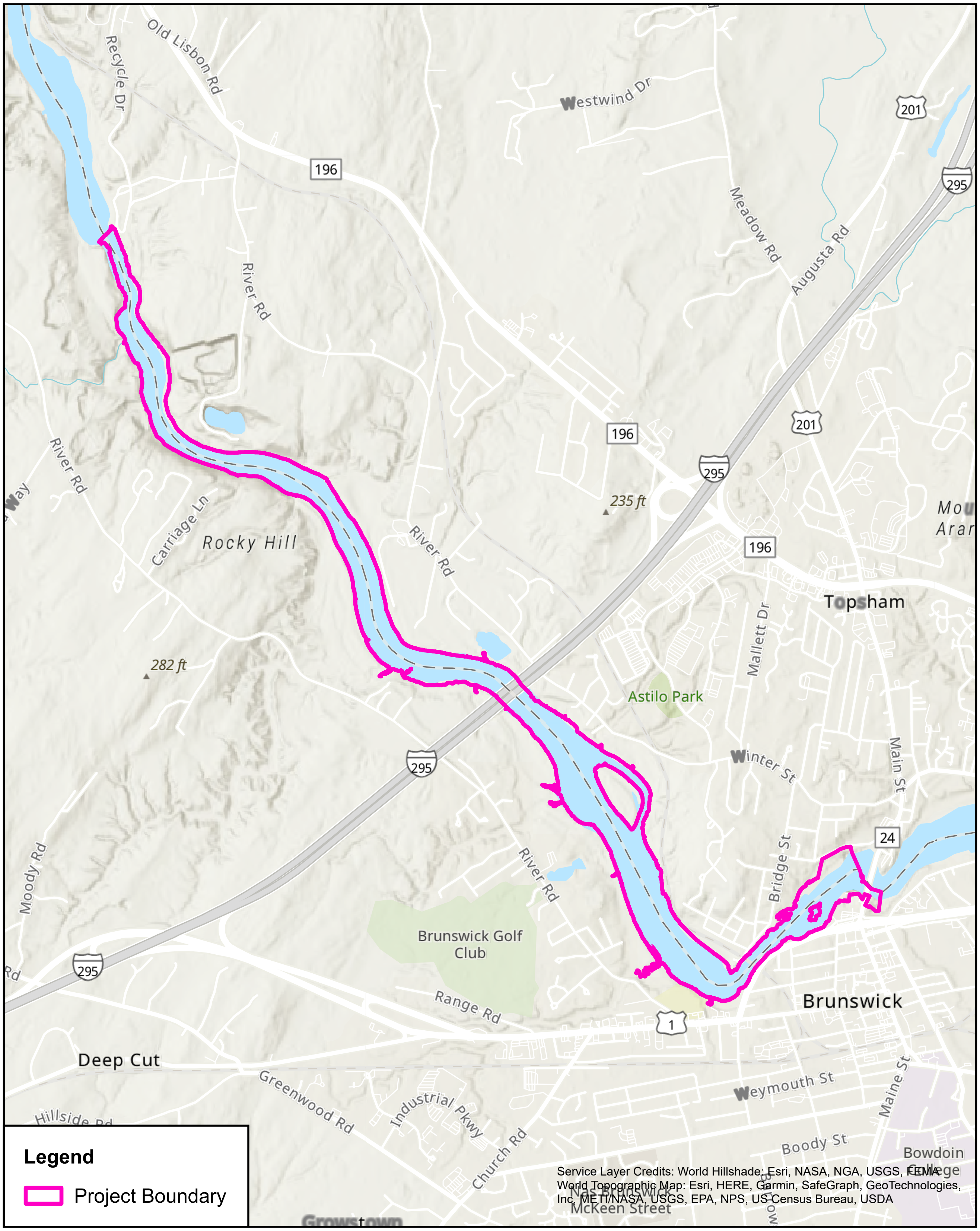
5 DESCRIPTION OF EXISTING ENVIRONMENT AND POTENTIAL EFFECTS ON RESOURCES (18 CFR §5.6 (D)(3))

5.1 Geology and Soils (18 CFR §5.6(d)(3)(ii))

5.1.1 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 physiographic 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 feet; however, topographic relief is limited to less than approximately 200 feet 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 feet, msl) to the Project (39.4 feet msl) 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 feet, msl and decrease gradually to the impoundment shoreline (normal pool elevation 39.4 feet, msl). The general topography of the Androscoggin River watershed in the vicinity of the Project is shown in Figure 5.1.1-1.



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

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Figure 5.1.1-1: Topography in the Vicinity of the Project

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5.1.2 Geology

5.1.2.1 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, 2023a and USGS, 2023b).

5.1.2.2 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 5.1.2.2-1 depicts the surficial characteristics which exist near the Project and surrounding area.

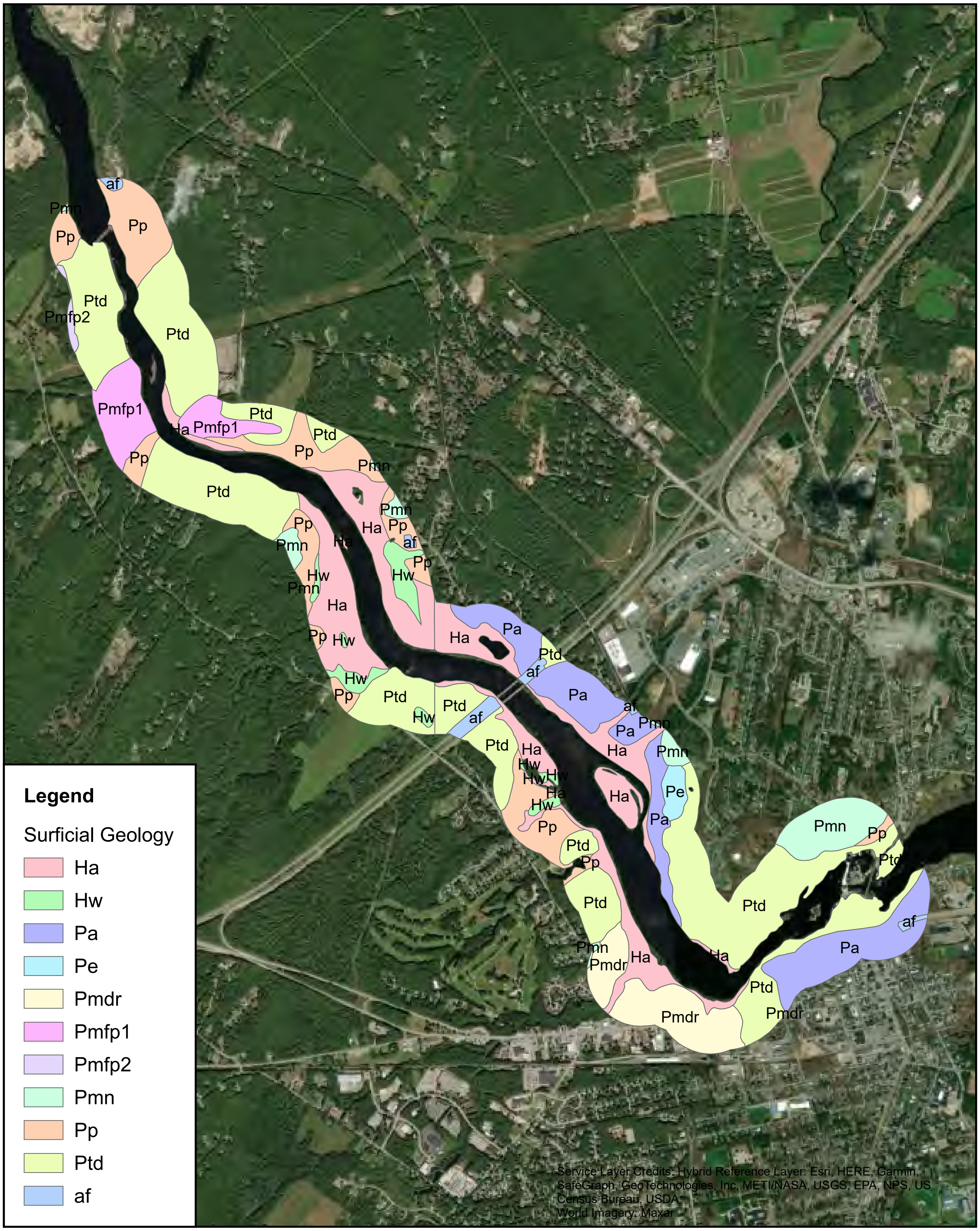
- Thin-drift areas (Ptd): 39%
- Stream alluvium (Ha): 18%
- Presumpscot foundation (Pp): 13%
- Braided-stream alluvium (Pa): 12%
- Regressive marine delta (Pmdr): 6%
- Pejepscot fan (Pmfp): 5%
- Marine nearshore deposits (Pmn): 4%
- Freshwater wetlands (Hw): 2%
- Artificial fill (af): 1%
- Eolian deposits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

Thin-drift areas: Thin drift areas generally have less than 10 feet 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).



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Brunswick Hydroelectric Project (FERC No. 2284)

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Figure 5.1.2-1:
Surficial Geology within 1,000 feet of the Project boundary

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Miles

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5.1.3 Soils

Windsor loamy sand, 0 to 35 percent 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 5.1.3-1 depicts the soil types near the Project.

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

Windsor: The Windsor series slopes between 0 and 35 percent within the vicinity of the Project but may slope up to 60 percent 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, 2023). Depth to bedrock is 5 feet or more (USDA et. al, 1974).

Adams: The Adams series slopes between 0 and 30 percent within the vicinity of the Project but may slope up to 70 percent 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 percent within the vicinity of the Project but may slope up to 80 percent 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 percent within the vicinity of the Project and, in general, does not slope more than 3 percent 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).

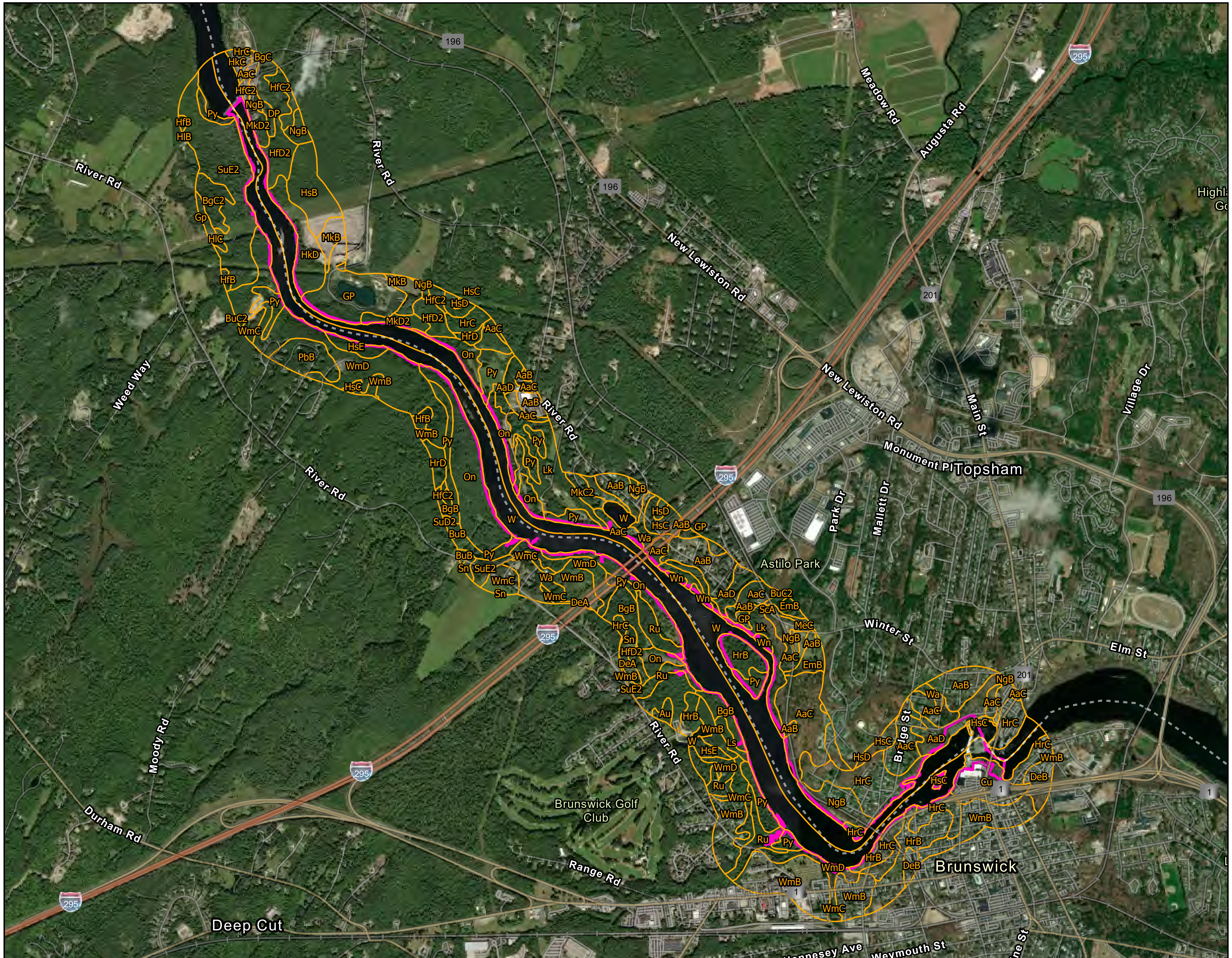
<u>Soil Erodibility</u>

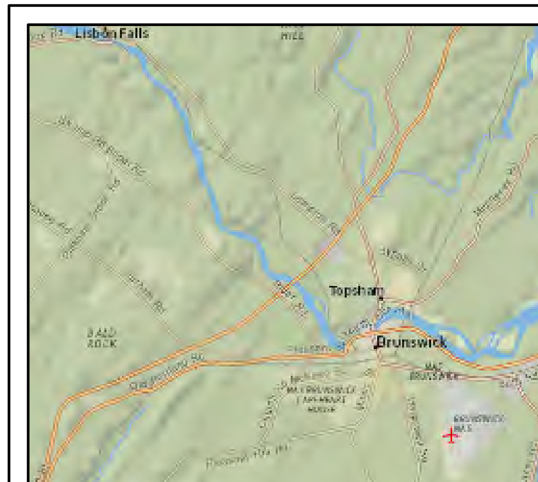
Erosion factors for the soils identified above were gathered from the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS, 2023). The erosion factor, or K factor, indicates the susceptibility of a soil to sheet and rill erosion by water and is one of several 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, 2023). Table 5.1.3-1 shows the K factor for the fine-earth fraction of the prominent soils found in the vicinity of the Project (also referred to as the Kf factor). 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.

Table 5.1.3-1: 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, 2023 and NRCS, 2014.





Brunswick Hydroelectric
Project (FERC No. 2284)

Figure 5.1.3-1:
Soils in the Vicinity of the Project

Legend

Major Soil Units

Project Boundary

Service Layer Credits: National Geographic World Map: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
Hybrid Reference Layer: Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US

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5.1.4 Impoundment Shoreline and Streambanks

The Project impoundment extends approximately 4.5 miles upstream of the Brunswick Dam and includes approximately 11.5 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 a combination of Ondawa, Hinkley, Suffield, Windsor, and Hartland series, which have low to moderate erodibility factors. Shoreline soils found throughout the middle and lower portions of the impoundment are primarily a combination of the Adams, Lyman-Tunbridge complex, Windsor, and Ondawa series, which also have low to moderate erodibility factors.

The area from the Brunswick Dam to the downstream extent of the Project boundary includes approximately 1,000 feet of shoreline, which consists primarily of rock outcrops, with stone masonry and concrete walls.

5.1.5 References

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5.2 Water Resources (18 CFR §5.6 (d)(3)(iii))

5.2.1 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 (NHDES, 2008). 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.

5.2.1.1 Drainage Area

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

5.2.1.2 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 5.2.1.2-1 thru 5.2.1.2-5. 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 2023 was analyzed to reflect current hydrological conditions as affected by upstream hydroelectric project operations (Figure 5.2.1.2-6). Table 5.2.1.2-1 shows an annual and monthly summary of this data. The mean annual daily inflow for this period is about 7,037 cfs. The peak streamflow at the Project during this period was approximately 103,000 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.

Table 5.2.1.2-1: Daily Average Streamflow (cfs) at Brunswick Dam January 1987 – December 2023

	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	41,606	104,911	65,201	61,514	31,073	40,869	48,137	48,348	42,660	74,681
Median	4,982	4,750	6,710	12,956	8,890	5,019	3,434	2,876	2,707	3,845	5,635	5,646
Average	5,744	5,139	8,003	16,233	10,696	6,650	4,865	3,869	3,347	5,535	6,998	7,363

5.2.1.3 Reservoir Bathymetry and Downstream Hydraulic Gradient

There is no readily available information to describe the bathymetry of the majority of the Project impoundment with any specificity. However, bathymetric surveys were conducted in October 2020 in the most upstream portions of the Project impoundment to support hydraulic modeling of the Pejepscot Project tailrace during that FERC relicensing process.[10] Downstream of the Project, the river is tidally influenced.

Downstream of the dam's spillway, the riverbed consists of broad ledges interspersed with one large pool and a few smaller pools. Immediately to the south of the spillway is a concrete retaining wall that separates the tailwater area from the spillway ledge area. Along the downstream end of the spillway area is a naturally occurring rock ledge that acts as a natural barrier to fish. In the 1980s, concrete caps were added to portions of the ledge to create an even more effective barrier to fish. 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 large spill.

5.2.1.4 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 feet to allow the units to operate efficiently as required by the FERC license.

Impoundment fluctuations are limited to less than 2 feet 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.

5.2.1.5 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.

[10] FERC Accession No. 20210330-5404. https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20210330-5404.

Figure 5.2.1.2-1: Annual Flow Duration Curve (1987-2023)

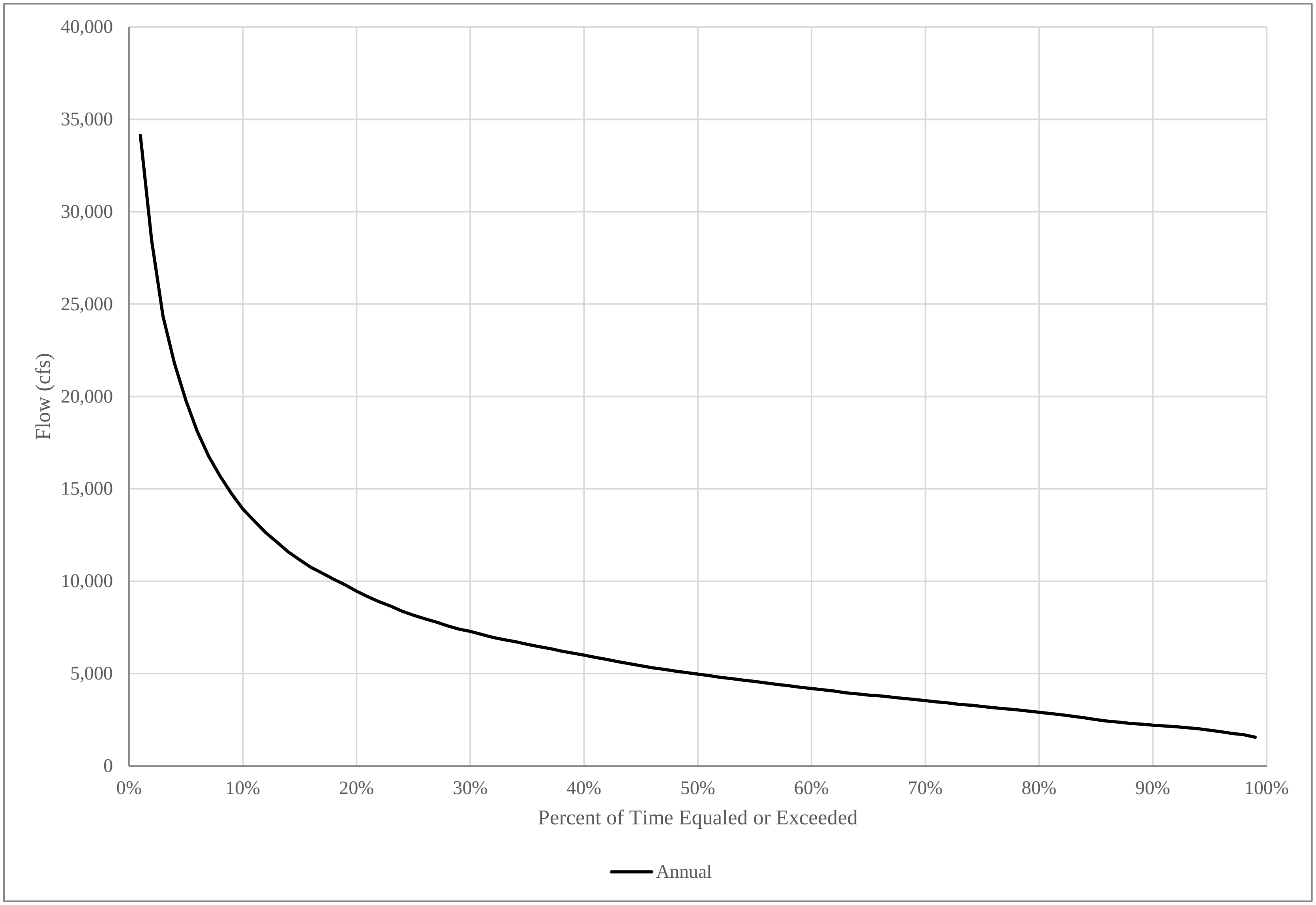


Figure 5.2.1.2-2: January, February, and March Flow Duration Curves (1987-2023)

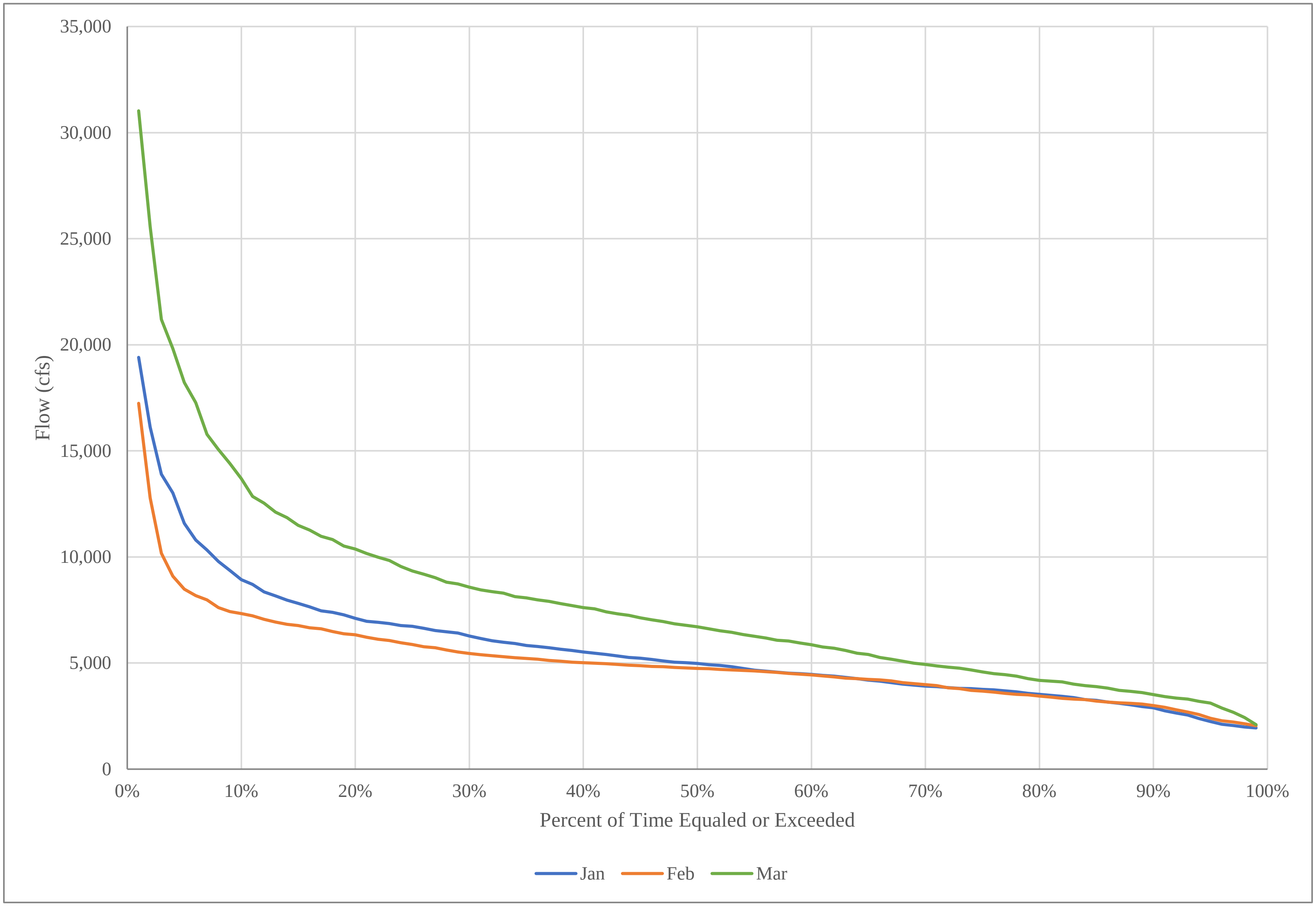


Figure 5.2.1.2-3: April, May, and June Flow Duration Curves (1987-2023)

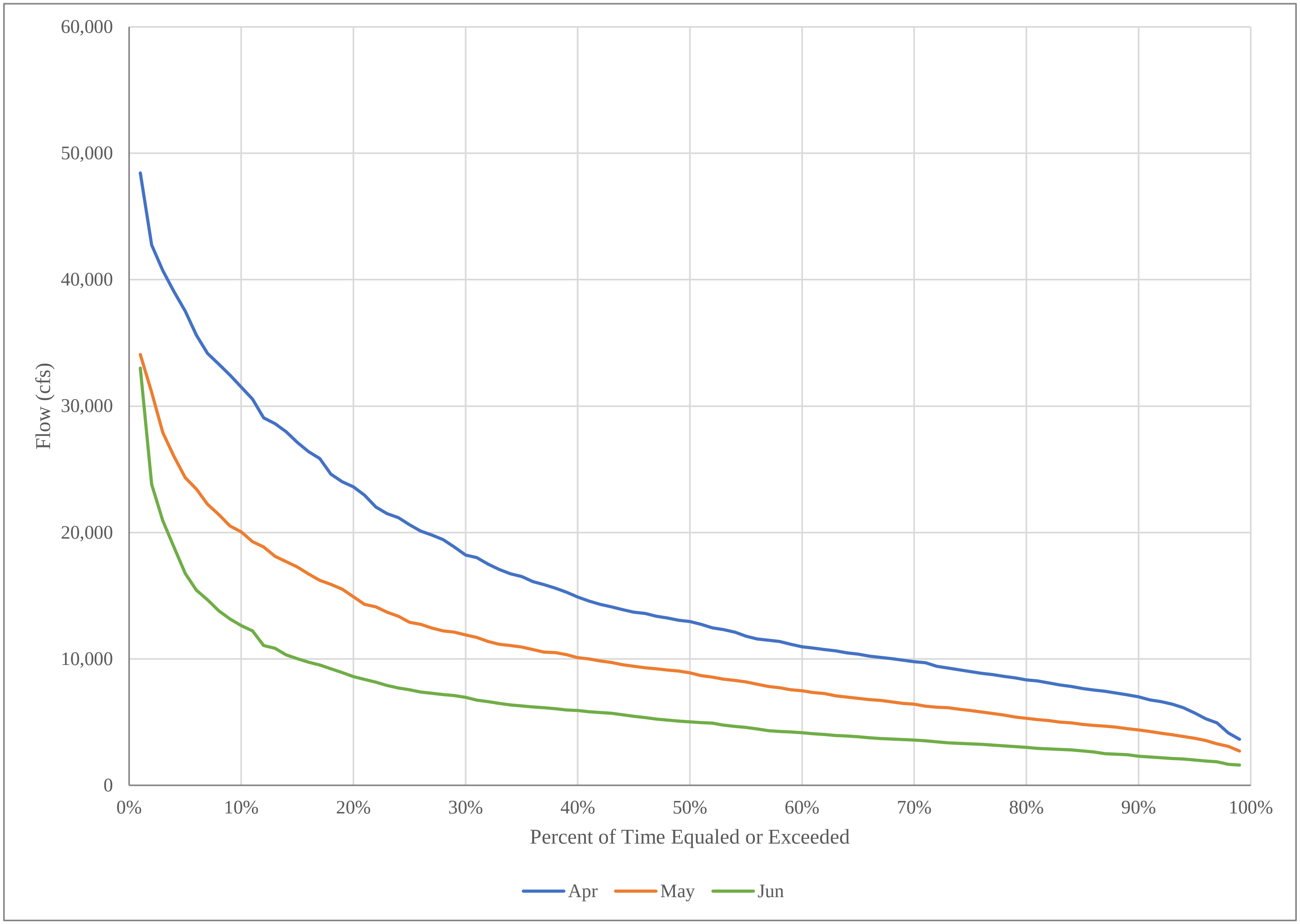


Figure 5.2.1.2-4: July, August, and September Flow Duration Curves (1987-2023)

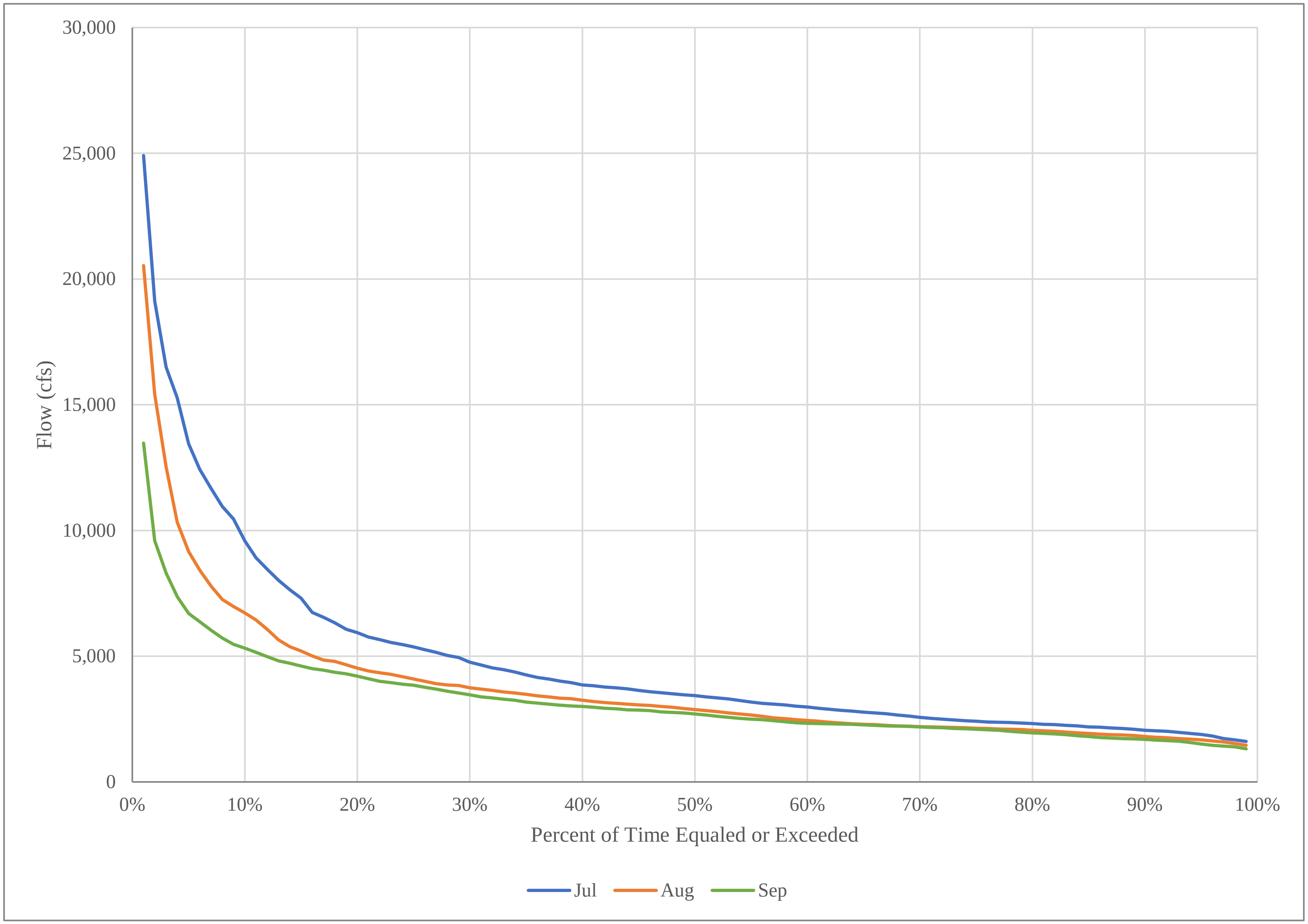


Figure 5.2.1.2-5: October, November, and December Flow Duration Curves (1987-2023)

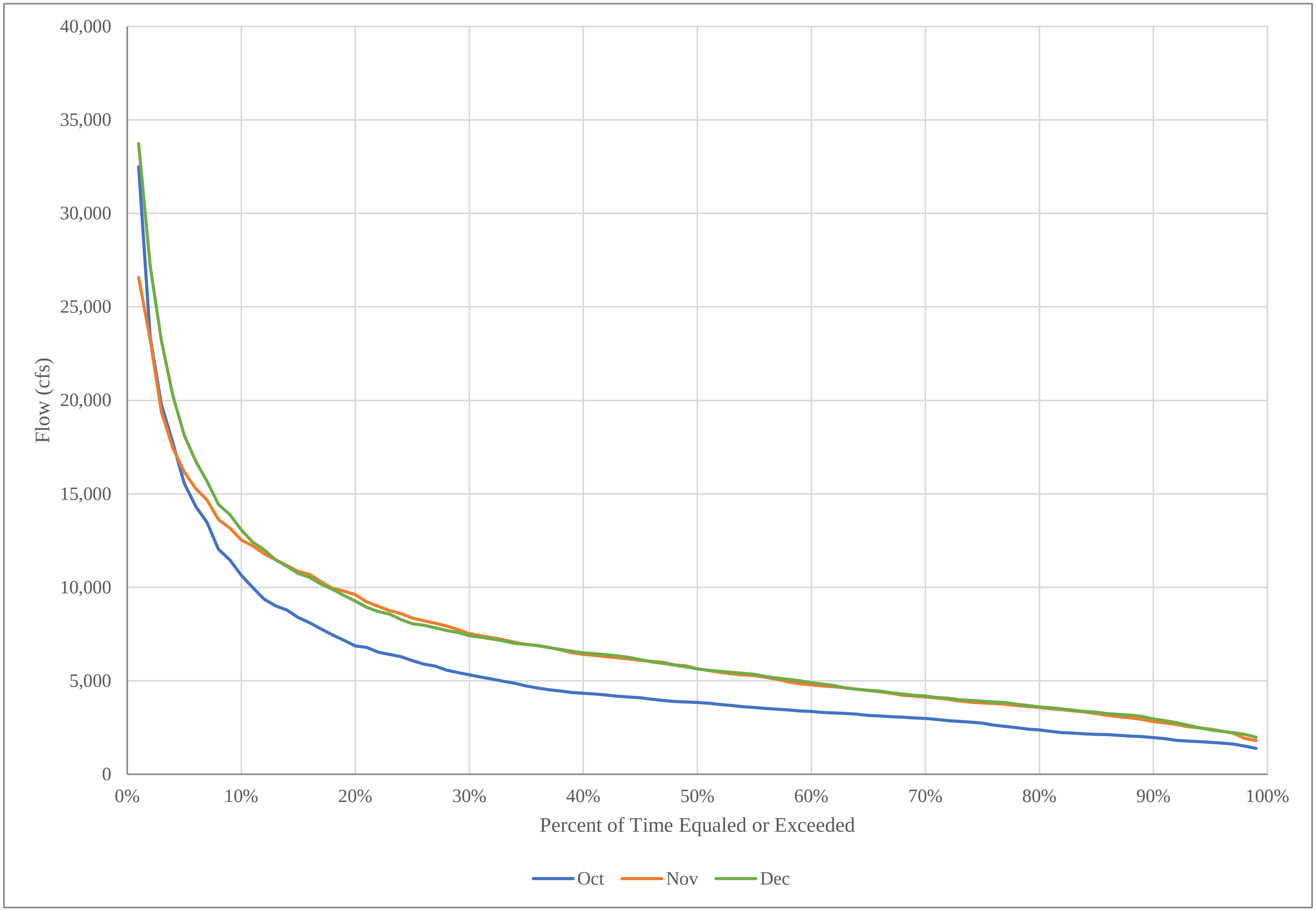
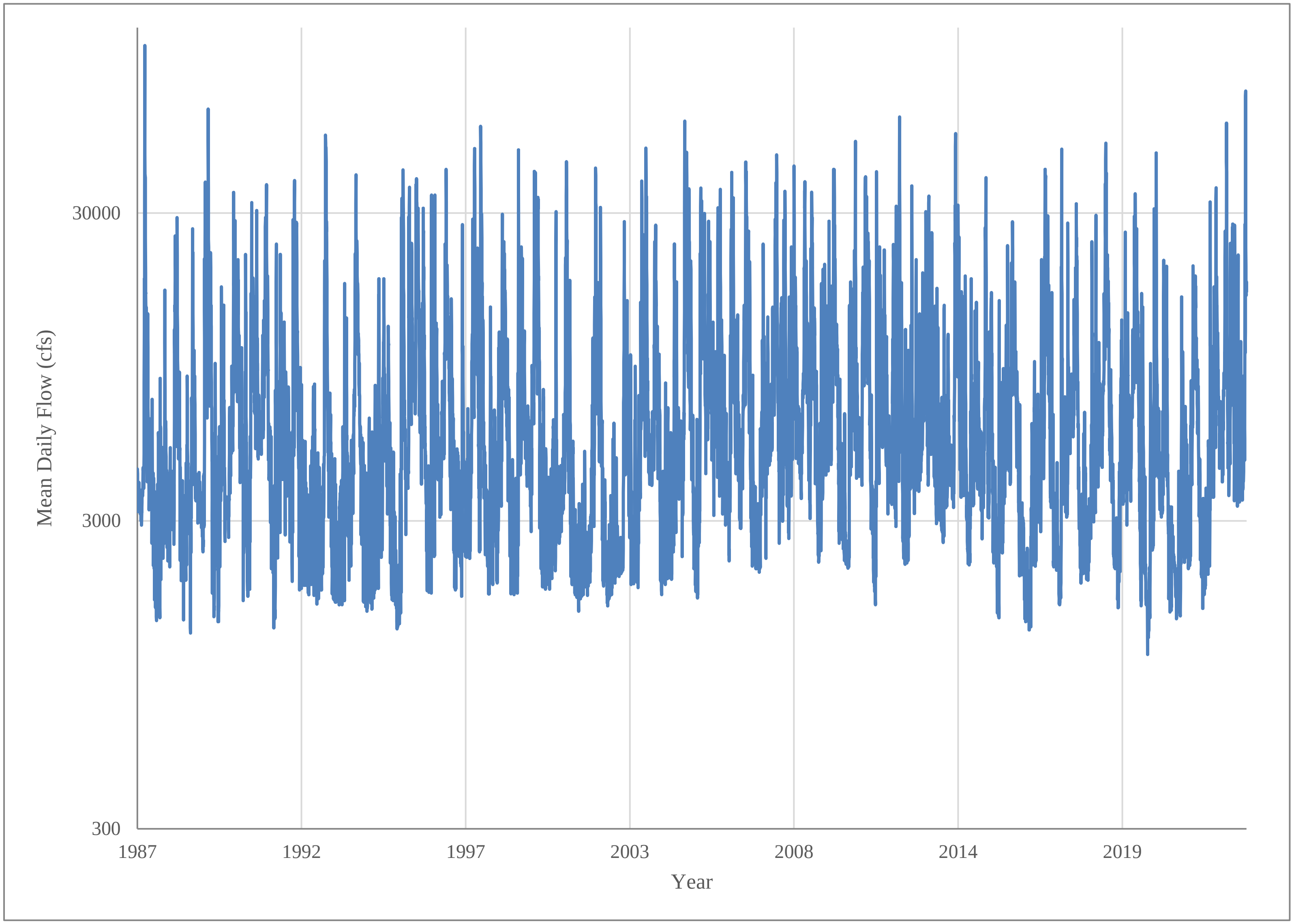


Figure 5.2.1.2-6: Mean Daily Flow at USGS 01059000 Androscoggin River Near Auburn, Maine



5.2.2 Water Quality

The Androscoggin River has a long history of industrial and municipal use. Mainstem dams were constructed for mills in the early 1800's, primarily in the lower Androscoggin River. By the late 1800's several textile and lumber mills operated on the river from Lewiston to Brunswick. Also, in the late 1800's, several pulp and paper mills were established along the Androscoggin River in New Hampshire, as well as in Rumford, and Jay, Maine, some of which still operate today. Since passage of the Clean Water Act (CWA) in the 1970s, water quality in the Androscoggin River has improved, as indicated by several water quality studies conducted on the river, as summarized in the following sections.

5.2.2.1 Federal Clean Water Act

In 1972, the Federal Water Pollution Control Act Amendments established the 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.

5.2.2.2 State Water Quality Standards

Maine statute 38 MRSA §464-470 establishes the State's classification system of surface waters. The classifications and details of major river basins are covered in §467. 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.[11]

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. Water quality standards for Class B waters are provided in Table 5.2.2.2-1.

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, 2022b). 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 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, 2022b) (Table 5.2.2.2-2). The mainstem Androscoggin River from the Pejepscot Dam to the Brunswick Dam is listed in Category 4-B for dioxins, Category 4-C for aquatic life impairment because of inadequate fish passage, and Category 5-D for being impaired due to legacy polychlorinated biphenyls (PCBs) found in fish tissue (Table 5.2.2.2-3). The Androscoggin River from the 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

[11] 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).

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, 2022b).

Table 5.2.2.2-1: 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
Escherichia coli bacteria	May not exceed a geometric mean of 64 CFU or MPN per 100 milliliters over a 90-day interval or 236 CFU or MPN per 100 milliliters in more than 10% of samples in any 90-day interval
Aquatic Life	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
Chlorophyll-a	≤ 8 µg/L (0.008 mg/L)
Total Phosphorus	≤ 30 µg/L (0.03 mg/L)
Secchi Disk (water transparency)	2.0 m

Source: MDEP, 2021; MRS, 2021b

*CFU = colony forming units, MPN = most probable number, µg/L = microgram per liter, mg/L=milligram per liter

Table 5.2.2.2-2: 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, 2022b

Table 5.2.2.2-3: 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_425R_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_426R	Androscoggin River from Brunswick Dam to Brunswick-Bath Boundary (Merrymeeting Bay)	Dioxin (including 2,3,7,8-TCDD)	Category 4-B
		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.)

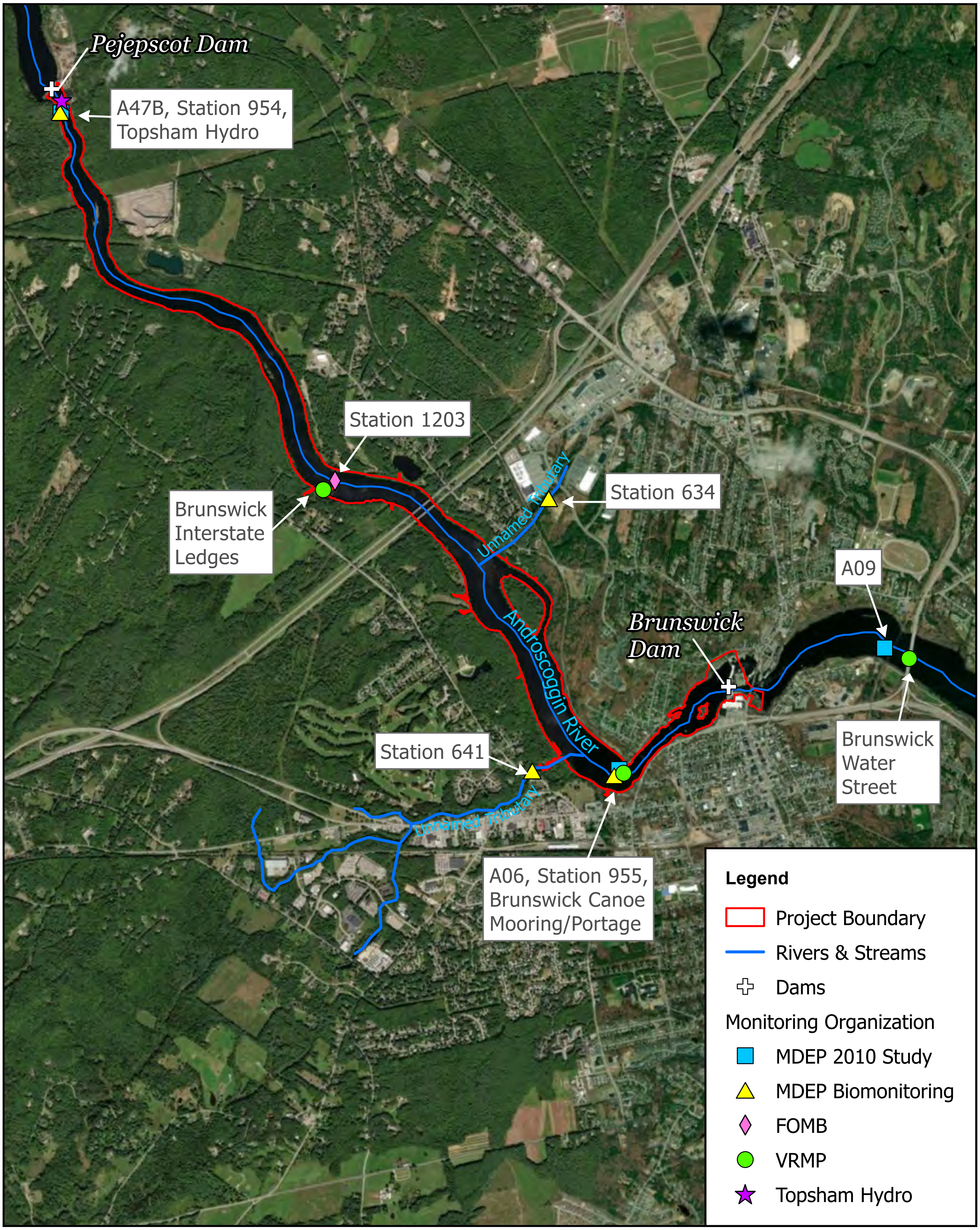
Source: MDEP, 2022b

5.2.2.3 Existing Water Quality Data

The Lower Androscoggin River near the Project has been monitored by several organizations and as part of multiple studies over the past two decades. These include:

- MDEP 2010 Lower Androscoggin River Basin Water Quality Study;
- MDEP Biomonitoring Unit;
- MDEP Surface Water Ambient Toxics Program (SWAT);
- Friends of Merrymeeting Bay (FOMB),
- Topsham Hydro Partners Limited Partnership (Topsham Hydro),
- MDEP Volunteer River Monitoring Program (VRMP).

Figure 5.2.2.3-1 provides a map of the water quality monitoring locations from these studies. As illustrated on the map, several of the monitoring stations used by the various organizations are near one another.



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

0 0.3 0.6 1.2 Miles

N

Figure 5.2.2.3-1:
Water Quality Monitoring Locations in the Project Vicinity

Path: Q:\Client_Data\FERC_Projects\P2284\20_PAD\Previous_WQ_Sites.aprx

2010 Lower Androscoggin River Basin Water Quality Study

In 2010, MDEP conducted a water quality study throughout the Lower Androscoggin River to determine if the section of river from Worumbo Dam to Merrymeeting Bay, which includes the Project area, could be expected to meet criteria for reclassification from Class C to Class B. The monitoring was completed from July 13 to 16, 2010, and from August 2 to 5, 2010 (MDEP, 2011a). Water temperature, DO, pH, conductivity, and depth were recorded in the early morning and afternoon at 13 river sites and 3 tributary sites. Water chemistry samples were collected at 9 riverine sites and in the 3 tributaries. Benthic macroinvertebrate sampling was completed at 3 sites in the Lower Androscoggin River (MDEP, 2011a).

The water quality data was used to develop a Water Quality Analysis Simulation Program[12] (WASP) water quality model for the freshwater section of the river from a location just downstream of the Little Androscoggin River in Auburn, Maine to below the Project. The model was used to simulate effects of nutrients and other pollutants on the Androscoggin River during low river flow and maximum licensed discharge from Publicly Owned Treatment Works to predict water quality conditions during a 7Q10 low flow (occurring 7 consecutive days, once every 10 years) (MDEP, 2011a).

Sampling locations near the Project included (Figure 5.2.2.3-1):

- Site A47B and Station 954 – Upper end of the Brunswick impoundment (just downstream Pejepscot Dam), approximately 4.6 river miles upstream of the Brunswick Dam;
- A06 and Station 955 - approximately 0.6 river miles upstream of the Brunswick Dam in the impoundment;
- A09 - approximately 0.8 river miles downstream the Brunswick Dam; and
- Brunswick Sewer District-approximately 1.5 river miles downstream of the Brunswick Dam.

At all sites, water temperature ranged from 23.8ºC to 27.1ºC, conductivity ranged from 90 µS/cm to 110 µS/cm, and pH ranged from 7.0 to 7.6 (Table 5.2.2.3-1, Table 5.2.2.3-2, Table 5.2.2.3-3). At Site A47B and at Site A09, DO ranged from 7.2 mg/L to 8.2 mg/L and 86.7 percent to 99.4 percent and exceeded the Class B standards. There was no evidence of thermal stratification at Sites A06 and A09. In the early morning measurements at Site A06 in the Brunswick impoundment in July 2010, DO values of 6.8 mg/L and 6.9 mg/L were recorded which were slightly below the Class B standard of 7.0 mg/L but above the Class C standard of 5.0 mg/L (Table 5.2.2.3-2 and Table 5.2.2.3-3); the DO percent saturation was above the standard at those times. MDEP attributed the lower DO concentrations to early morning respiration (MDEP, 2011a).

Water chemistry sample results from Sites A06 and A09 are provided in Table 5.2.2.3-4. Chlorophyll-a and total phosphorus both met the Class C standards. *E. coli* concentrations were below the Class B standard.

Water quality data was collected at deployment and retrieval of the benthic macroinvertebrate samplers at Stations 954 and 955 in 2010 (Figure 5.2.2.3-1, Table 5.2.2.3-5). The water temperature ranged from 22.3ºC to 25ºC, DO ranged from 7.2 mg/L to 8.4 mg/L, and conductivity ranged from 79 µS/cm to 104 µS/cm. The benthic macroinvertebrate community at Station 954 at the upper end of the Brunswick impoundment met Class B aquatic life standards and the dominant taxa generally consisted of sensitive organisms. The Hilsenhoff Biotic Index (HBI)[13] value of 4.1 suggested good water quality. At Station 955 in the Brunswick impoundment, the community met Class C aquatic life standards; sensitive taxa represented approximately

[12] WASP was developed by the EPA and is a commonly used model to interpret and predict water quality responses to natural phenomena and manmade pollution.
[13] The Hilsenhoff Biotic Index is an indicator of the overall tolerance of an aquatic community to pollution and ranges from 0 to 10 (Hilsenhoff, 1987).

one quarter of the community indicating the presence of taxa that were tolerant of pollution (MDEP, 2011a). The HBI value at Station 955 (6.2) suggested fair water quality.

MDEP also evaluated the effects of discharge from the Brunswick Sewer District (BSD) at the daily tidal flow and low flow on the tidal segments of the lower Androscoggin River (MDEP, 2011a). The BSD discharges approximately 1.5 river miles downstream of the Brunswick Dam. A mass balance analysis found that discharge from the BSD had little influence on DO levels. Lower DO readings in the tidal segments were attributed to biological oxygen demand from upstream sources, incoming tides from Merrymeeting Bay, and sediment oxygen demand in Merrymeeting Bay.

Table 5.2.2.3-1. Water Quality Data Collected at Site A47B (Upper end of Brunswick impoundment) during the 2010 Lower Androscoggin Water Quality Study

Date	Depth (m)	Water Temperature (ºC)	Conductivity (µs/cm)	pH	DO (mg/L)	DO (% Saturation)
7/13/2010 8:19	Mid-column	25.7	NA	NA	7.3	90.1
7/13/2010 16:05	Mid-column	26.5	NA	NA	7.7	95.7
7/15/2010 8:04	0.2	25.8	90	7.1	7.2	88.8
7/15/2010 16:22	0.3	26.3	90	7.1	7.4	91.1
7/16/2010 8:09	0.4	26.4	90	7.1	7.2	90.4
7/16/2010 16:01	0.3	26.8	90	7.2	7.5	94.5
8/2/2010 8:49	0.3	24.4	110	7.4	8.1	96.6
8/2/2010 15:01	0.4	24.7	110	7.5	8.2	99.4
8/3/2010 6:40	0.3	25.0	110	7.4	7.7	93.8
8/3/2010 13:25	0.2	25.3	110	7.4	7.8	95.8
8/4/2010 7:38	0.2	25.1	110	7.3	7.8	95.1
8/4/2010 14:11	0.3	25.4	100	7.4	7.9	96.9

Source: MDEP, 2011a, b
NA – data not available

Table 5.2.2.3-2. Vertical Profile Data Collected at Site A06 (0.6 river miles upstream of Brunswick Dam) during the 2010 Lower Androscoggin Water Quality Study

Date	Depth (m)	Water Temperature (ºC)	Conductivity (µs/cm)	pH	DO (mg/L)	DO (% Saturation)
7/13/2010 8:55	0-3	25.2	NA	NA	6.9-7.0	84.3-85.8
7/13/2010 16:40	0-3	26.3	NA	NA	7.7-8.0	96.1-98.8
7/15/2010 7:05	0-2.5	25.7	91	7.0-7.1	6.8-6.9	84.7-84.9
7/15/2010 15:10	0-2.7	27.1	93	7.2	8.0-8.1	100.7-101.2
7/16/2010 7:12	0-2.6	25.9	95	7.0	6.8	84.7-84.8
7/16/2010 15:10	0-2.5	26.4-26.5	94-95	7.2	7.7	95.9-96.0
8/2/2010 7:15	0-2.9	23.8	109	7.3-7.4	7.6	90.1-90.2
8/2/2010 14:18	0-2.7	25.3-25.4	109	7.5-7.6	9	109.5-110.1
8/3/2010 7:07	0-2.6	24.2	108-109	7.3-7.4	7.4	88.2-88.5
8/3/2010 13:50	0-2.4	25.4-25.5	108	7.5	8.3	101.6-101.9
8/4/2010 6:52	0-2.5	24.7	107	7.3	7.4-7.5	90.6-90.9
8/4/2010 13:34	0-2.4	25.8-25.9	106-107	7.5	8.3	103.0-103.3

Source: MDEP, 2011a, b
NA – data not available

Table 5.2.2.3-3. Vertical Profile Data Collected at Site A09 (0.8 miles downstream of Brunswick Dam) during the 2010 Lower Androscoggin Water Quality Study

Date	Depth (m)	Water Temperature (ºC)	Conductivity (µs/cm)	pH	DO (mg/L)	DO (% Saturation)
7/13/2010 9:59	0-2	25.2	NA	NA	7.2-7.3	87.9-88.9
7/13/2010 17:17	0-2	25.8-26.1	NA	NA	7.4-7.6	90.9-94.5
7/15/2010 6:25	0-4.5	25.9	91	7.1	7	86.7-87.0
7/15/2010 14:27	0-3.6	26.4-27.1	91	7.1	7.3-7.4	91.3-94.1
7/16/2010 6:30	0-4	25.9	94	7.0-7.1	7	86.8-87.0
7/16/2010 14:26	0-3.4	26.2-26.3	95	7.1	7.1-7.2	88.8-90.3
8/2/2010 6:30	0-4	24.2	109	7.4	7.8	93.3-93.6
8/2/2010 13:40	0-3.3	24.6-24.7	109	7.4-7.5	8.1-8.2	98.1-99.4
8/3/2010 7:47	0-3	24.3	109	7.3-7.4	7.6	91.3-91.5
8/3/2010 14:25	0-2	24.9	108	7.4	7.8-7.9	95.3-95.9
8/4/2010 6:20	0-2.7	24.9	108	7.3-7.4	7.6	93.2-93.3
8/4/2010 13:05	0-2.5	25.2-25.4	107	7.4-7.5	7.7	94.5-95.6

Source: MDEP, 2011a, b
NA – data not available

Table 5.2.2.3-4. Water Chemistry Data collected at Sites A06 and A09 during the 2010 Lower Androscoggin Water Quality Study

Date	Chl-a (mg/L)	NOx-N (mg/L)	NH3-N (mg/L)	TKN (mg/L)	Organic Nitrogen (mg/L)	Total Phosphorus (mg/L)	Orthophosphate (µg/L)	*E. coli* (MPN/100 mL)
Site A06								
07/13/2010	0.0036	0.10	0.02	0.3	0.28	0.023	4	36
07/15/2010	0.0027	0.10	0.03	0.3	0.27	0.020	5	36
07/16/2010	0.0022	0.11	0.04	0.3	0.26	0.021	6	55
08/02/2010	0.0035	0.09	0.01	0.3	0.29	0.017	2	10
08/03/2010	0.0039	0.08	0.01	0.4	0.39	0.017	2	15
08/04/2010	0.0040	0.08	0.02	0.3	0.28	0.021	2	20
Site A09								
07/13/2010	0.0036	0.10	0.02	0.3	0.28	0.023	4	60
07/15/2010	0.0028	0.10	0.03	0.3	0.27	0.020	4	42
07/16/2010	0.0024	0.10	0.03	0.3	0.27	0.021	4	37
08/02/2010	0.0039	0.09	0.01	0.4	0.39	0.024	2	20
08/03/2010	0.0036	0.08	0.01	0.3	0.29	0.018	2	11
08/04/2010	0.0037	0.08	0.01	0.3	0.29	0.024	2	7

Source: MDEP, 2011a, b
*Chl-a = chlorophyll-a; NOx-N = nitrite + nitrate; NH3-N = ammonia nitrogen, TKN = Total Kjeldahl Nitrogen

Benthic Macroinvertebrate Monitoring

Through the SWAT program, the MDEP biomonitoring unit conducted benthic macroinvertebrate sampling at Station 954 in 2018 and Stations 954 and 955 in 2021 (Table 5.2.2.3-5) (MDEP, 2022c). In coordination with the macroinvertebrate sampling, the SWAT program completed water chemistry sampling at Station 954 (Table 5.2.2.3-6). Station 1203 was sampled as part of the 2021 Aquatic Life Determination Macroinvertebrate Sampling Study of the Androscoggin River, Lewiston to Brunswick (FOMB, 2022) (Figure 5.2.2.3-1). MDEP has also performed sampling in two unnamed tributaries that empty into the Brunswick Project impoundment (Station 634 in 2008, 2013, 2014, and 2018 and Station 641 in 2008 and 2013) (Figure 5.2.2.3-1) (MDEP, 2022c). These are the same unnamed tributaries in Category 4-A listed in Table 5.2.2.2-3 and are influenced by urban and nonpoint sources (MDEP 2019, 2022b).

The water quality data collected at macroinvertebrate sampler deployment and retrieval are shown in Tables 5.2.2.3-5, 5.2.2.3-6, and 5.2.2.3-7. DO and pH data collected in 2018 and 2021 at the mainstem sites met water quality standards, and similar water temperatures and conductivity levels were observed (Table 5.2.2.3-5). The benthic macroinvertebrate community structure data collected in 2018 at Station 954 met Class A aquatic life standards and Class B standards in 2021. The water chemistry data collected at Station 954 was similar in 2018 and 2021; total phosphorus was below the Class B standard (Table 5.2.2.3-6). Station 1203 and Station 955 in the Brunswick impoundment met Class C aquatic life standards. HBI values indicated good to fair water quality at Station 954 and fair water quality at Stations 1203 and 955.

At the unnamed tributary sites, DO ranged from 7.1 mg/L to 9.8 mg/L and met water quality standards (Table 5.2.2.3-7). pH ranged from 6.2 to 7.1 with several values below the lower limit of the standard (6.5). Water temperature ranged from 14.7ºC to 18.2ºC. The high conductivity values (306 µS/cm to 1,082 µS/cm) were indicative of the influence from urban sources. The aquatic life community sampled in the urban-impacted unnamed tributaries at Stations 634 and 641 was found to be non-attaining, indeterminate, or met the Class C standard (Table 5.2.2.3-7).

Table 5.2.2.3-5. Water Quality Data Collected during Benthic Macroinvertebrate Sampler Deployment and Retrieval in the Mainstem Androscoggin River

Date	Water Quality Class	MDEP Determination	HBI	Water Temperature (ºC)	DO (mg/L)	DO (% Saturation)	Conductivity (μS/cm)	pH
Station 954 Upper End Brunswick Impoundment								
7/10/2010	C	B	4.1	25.0	7.2		90.0	
8/24/2010				22.3	7.3		79.0	
7/17/2018	C	A	4.5	25.2	8.9	106	100.9	7.2
8/14/2018				24.5	9.9	108.7	74.4	7.1
7/13/2021	C	B	5.8	22.7	8.7	99.8	108.9	8.1
8/13/2021				25.7	10.6	129.8	90.5	7.2
Station 955 Brunswick Impoundment								
7/27/2010	C	C	6.2	24.8	8.4		95.0	
9/8/2010				22.4	8.1		104.0	
6/29/2021	C	C	6.6					
8/25/2021				25.6	8.2	100.5	99.3	7.1
Station 1203 Brunswick Impoundment								
8/5/2021	C	C	5.6	25.3	8.3			
9/3/2021				23.2	7.6			

Source: FOMB, 2022; MDEP, 2022c

Table 5.2.2.3-6. Water Chemistry Data collected at Station 954 in 2018 and 2021

Date	NOx-N (mg/L)	TKN (mg/L)	Total Phosphorus (mg/L)	Orthophosphate (mg/L)
7/17/2018	0.15	0.3	0.019	0.002
7/13/2021	0.2	0.4	0.024	0.004

Source: MDEP 2019, 2023a

Table 5.2.2.3-7. Water Quality Data Collected during Benthic Macroinvertebrate Sampler Deployment and Retrieval in tributaries to the Brunswick Project Impoundment

Date	Water Quality Class	MDEP Determination	HBI	Water Temperature (ºC)	DO (mg/L)	DO (% Saturation)	Conductivity (µS/cm)	pH
Station 634 Unnamed Tributary (Topsham 4)								
7/16/2008	B	Non-attaining	7.2	14.9	8.5		706	6.6
8/13/2008				15.2	8.2		608	6.4
7/10/2013	B	Indeterminate (Unusual taxa assemblage)	2.6	15.6	7.8		786	6.3
8/7/2013				14.7	7.1		705	6.4
7/16/2014	B	C	3.6	16.6	8.5		775	
8/11/2014				15.0	9.1		820	
7/17/2018	B	Non-attaining	3.3	15.2	9.6	94.7	941	6.7
8/13/2018				16.1	9.8	98.2	1,082	6.8
Station 641 Unnamed Tributary (Brunswick 2)								
7/16/2008	B	Non-attaining	6.7	18.2	8.8		389	6.9
8/13/2008				16.3	9.4		306	6.8
7/10/2013	B	Non-attaining	6.0	15.8	8.1		393	6.7
8/7/2013				16.3	8.8		345	6.2

Source: MDEP, 2022c

MDEP Volunteer River Monitoring Program

The VRMP monitors eight sites on the mainstem of the Androscoggin River between Durham, Maine, and Merrymeeting Bay once per month from May to October. Data is collected for water temperature, DO (concentration and percent saturation), pH, conductivity, and *E. coli* in the early morning (e.g., between 5:30 AM and 8:00 AM) (MDEP, 2023b). Two monitoring sites are within the Brunswick impoundment, and one is within the riverine reach downstream of the dam (Figure 5.2.2.3-1):

- 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 2018 to 2022 are presented in Tables 5.2.2.3-8, 5.2.2.3-9, and 5.2.2.3-10, respectively. Overall, the water temperature was similar at the 3 monitoring sites with median values of 20.2ºC to 20.6ºC and average values of 19.0ºC to 19.6ºC. All DO concentration measurements at monitoring station BIL were above 7.0 mg/L, except for the August 14, 2022, measurement of 6.4 mg/L (Table 5.2.2.3-8). Median and average DO measurements at BIL were 7.9 and 8.3 mg/L. All DO concentration measurements at monitoring station BCM/BCP were above 7.0 mg/L, except the July 14, 2019, measurement of 6.8 mg/L. Median and average DO at BCM/BCP were 8.3 and 8.7 mg/L (Table 5.2.2.3-9). The DO concentration at monitoring station BWS was above 7.0 mg/L (Table 5.2.2.3-10). All DO percent saturation measurements at all 3 sampling locations were above the water quality standards. Conductivity ranged from 50 µS/cm to 150 µS/cm. Individual *E. coli* measurements were generally low.

Table 5.2.2.3-8. Water Quality data collected at Site BIL by VRMP from 2018-2022

Date	Water Temperature (ºC)	DO (mg/L)	DO (% Saturation)	Conductivity (µS/cm)	E. coli (MPN/100 mL)
5/20/2018	14.9	9.8	97.9	67	6.3
6/17/2018	21	8.3	94.5	99	15.8
7/15/2018	24.8	7.6	90.1	120	193.5
8/12/2018	24.5	7.9	94.6	90	32.7
9/9/2018	22.3	7.6	88.2	120	24.1
10/14/2018	13.2	9.8	93.1	110	866.4
5/19/2019	10.1	11.8	104.4	50	5.2
6/19/2019	19.3	8.7	95.3	90	21.1
7/14/2019	24.5	7.2	86	100	62.7
8/11/2019	17	7.3	87.4	114	14.6
9/8/2019	11.7	7.9	88.3	140	9.6
10/13/2019	8.9	9.7	92.6	120	82
5/17/2020	11.2	10.7	97.5	62	28.8
6/14/2020	20.3	7.3	81.5	85	10.9
7/12/2020	24.1	7.5	90.2	64	67
8/16/2020	25.4	7.8	94.8	85	6.3
9/13/2020	20.9	7.6	85.5	107	42.8
10/10/2020	14	9.4	91	120	49.6
5/16/2021	14.5	9	88.4	60	7.4
6/13/2021	21.1	8.5	94.8	100	53.8
7/11/2021	20.7	7.6	85	119	1986.3
8/15/2021	25.5	7.1	87.1	90	13.4
9/12/2021	21.5	7.8	88.2	110	88.4
10/17/2021	17.5	8.5	87.5	90	368.1
5/15/2022	16.3	9	92.3	60	29.5
6/12/2022	20	7.7	84.4	80	33.7
7/10/2022	24	7.3	86.9	100	12.2
8/14/2022	24.9	6.4	77.9	90	12.1
9/11/2022	22.5	7.6	87.8	90	14.8
10/9/2022	14.4	8.4	82.2	59	>307.6
Minimum	8.9	6.4	77.9	50.0	5.2
Maximum	25.5	11.8	104.4	140.0	1986.3
Median	20.5	7.9	88.4	90.0	28.8
Average	19.0	8.3	89.8	93.0	143.4

Source. MDEP, 2023b

Table 5.2.2.3-9. Water Quality data collected at Site BCM/BCP by VRMP from 2018-2022

Date	Water Temperature (ºC)	DO (mg/L)	DO (% Saturation)	Conductivity (µS/cm)	E. coli (MPN/100 mL)
5/20/2018	15	10.4	100.7	70	11
6/17/2018	21	9	100.6	100	16
7/15/2018	24.5	7.5	92.2	110	21.6
8/12/2018	25	7.6	91.4	83	26.2
9/9/2018	22	8.2	94.4	107	26.6
10/14/2018	12.8	10	95.1	104	727
5/19/2019	10	11.8	105.7	60	7.5
6/19/2019	19	9.4	102.2	80	
7/14/2019	24.3	6.8	81.5	92.3	103.9
8/11/2019	25	7.1	85	130	14.5
9/8/2019	20.3	8.1	88.2	150	13.5
10/13/2019	13.7	10.9	104.2	120	88.4
5/17/2020	11.6	11.6	106.1	60	31.7
6/14/2020	19.5	8.2	90.1	90	22.1
7/12/2020	24	8	95.1	60	61.3
8/16/2020	25	8.3	108	90	18.7
9/13/2020	21	8.4	93.6	120	18.7
10/10/2020	15	9.6	94.2	140	20.1
5/16/2021	14	9.9	97.1	60	13.4
6/13/2021	22	8.7	96.2	100	73.8
7/11/2021	19.5	7.3	81	110	1986.3
8/15/2021	23.3	7.2	88.2	100	17.3
9/12/2021	20.1	7.7	86.3	100	261.3
10/17/2021	17.4	8.9	91.3	100	381.1
5/15/2022	16.2	9.7	99.1	60	83.9
6/12/2022	19.7	8.1	87.2	80	34.1
7/10/2022	23.6	7.5	88.4	93.7	14.5
8/14/2022	25	7.5	89.8	86	14.6
9/11/2022	22.3	8.1	93.4	88.4	>27.2
10/9/2022	14.3	9.1	88.9	77.4	>387.3
Minimum	10.0	6.8	81.0	60.0	7.5
Maximum	25.0	11.8	108.0	150.0	1986.3
Median	20.2	8.3	93.5	93.0	22.1
Average	19.5	8.7	93.8	94.1	152.2

Source: MDEP, 2023b

Table 5.2.2.3-10. Water Quality data collected at Site BWS by VRMP from 2018-2022

Date	Water Temperature (ºC)	DO (mg/L)	DO (% Saturation)	Conductivity (µS/cm)	E. coli (MPN/100 mL)
5/20/2018	15	10.4	103.6	78	23.3
6/17/2018	21.3	9.1	102	101	18.1
7/15/2018	24.6	7.9	95.3	108	50.4
8/12/2018	25	7.7	93.3	85	46.4
9/9/2018	22	8.2	94.3	106	66.3
10/14/2018	13.4	10.9	104.5	125	1986.3
5/19/2019	10	11.9	106.5	120	25.9
6/19/2019	19	10	108.7	80	33.1
7/14/2019	24.1	7.2	86.3	95	101.4
8/11/2019	25	7.4	88.8	140	25.6
9/8/2019	20.4	8.2	91.1	150	10.9
10/13/2019	13.7	12	116	120	95.9
5/17/2020	11.6	11.9	107.3	140	21.3
6/14/2020	19.4	8.3	91	90	19.9
7/12/2020	24	8.5	99.9	60	50.4
8/16/2020	25	8.4	102.3	100	24.6
9/13/2020	21	8.6	96.8	110	23.1
10/10/2020	15	9.8	97.7	130	18.7
5/16/2021	14	10.3	100.6	60	10.9
6/13/2021	22	8.6	98.6	90	57.3
7/11/2021	20.5	7.8	86.7	110	>2419.6
8/15/2021	25.7	7.6	93	100	24.9
9/12/2021	21.4	7.8	88.2	110	14.6
10/17/2021	17.4	9.4	98.3	100	141.4
5/15/2022	16.3	10	102	60	54.8
6/12/2022	19.5	8.3	91.4	80	42
7/10/2022	20.7	8.5	100.8	102.3	8.6
8/14/2022	25	7.8	95	88	9.8
9/11/2022	22.7	8.1	92.3	89.4	8.4
10/9/2022	14.3	9.5	93	92	>260.3
Minimum	10.0	7.2	86.3	60.0	8.4
Maximum	25.7	12.0	116.0	150.0	1986.3
Median	20.6	8.5	97.3	100.0	25.3
Average	19.6	9.0	97.5	100.7	107.7

Source: MDEP, 2023b

Pejepscot Hydroelectric Project Water Quality Study

The Project impoundment extends upstream (approximately 4.7 river miles) to the tailwater of the Pejepscot Project. In support of the Pejepscot Project relicensing, Topsham Hydro conducted a water quality study upstream and downstream of the dam in 2018 following the MDEP protocol for Hydropower Studies (Topsham Hydro 2020). Sampling completed at the deep spot in the impoundment from June to October demonstrated that total phosphorus, chlorophyll-a, pH, and water transparency were in attainment with Class C standards. Vertical profiles of water temperature and DO showed that the impoundment did not thermally stratify, and both the DO concentration and percent saturation exceeded the Class C standards (5 mg/L, 60 percent saturation).

Topsham Hydro also installed a data logger approximately 500 feet downstream of the dam that continuously measured water temperature and DO from August 2 to October 2, 2018; this site corresponds to the upper end of the Brunswick Project impoundment and approximately the same location previously sampled by MDEP (A47B, Station 954) (Figure 5.2.2.3-1). Both the DO concentration and percent saturation met Class C standards during the entire monitoring period.

Topsham Hydro also conducted benthic macroinvertebrate sampling from August 2-29, 2018, at Station 954 (Topsham Hydro 2020). The MDEP final determination found that the aquatic life community met Class A standards.

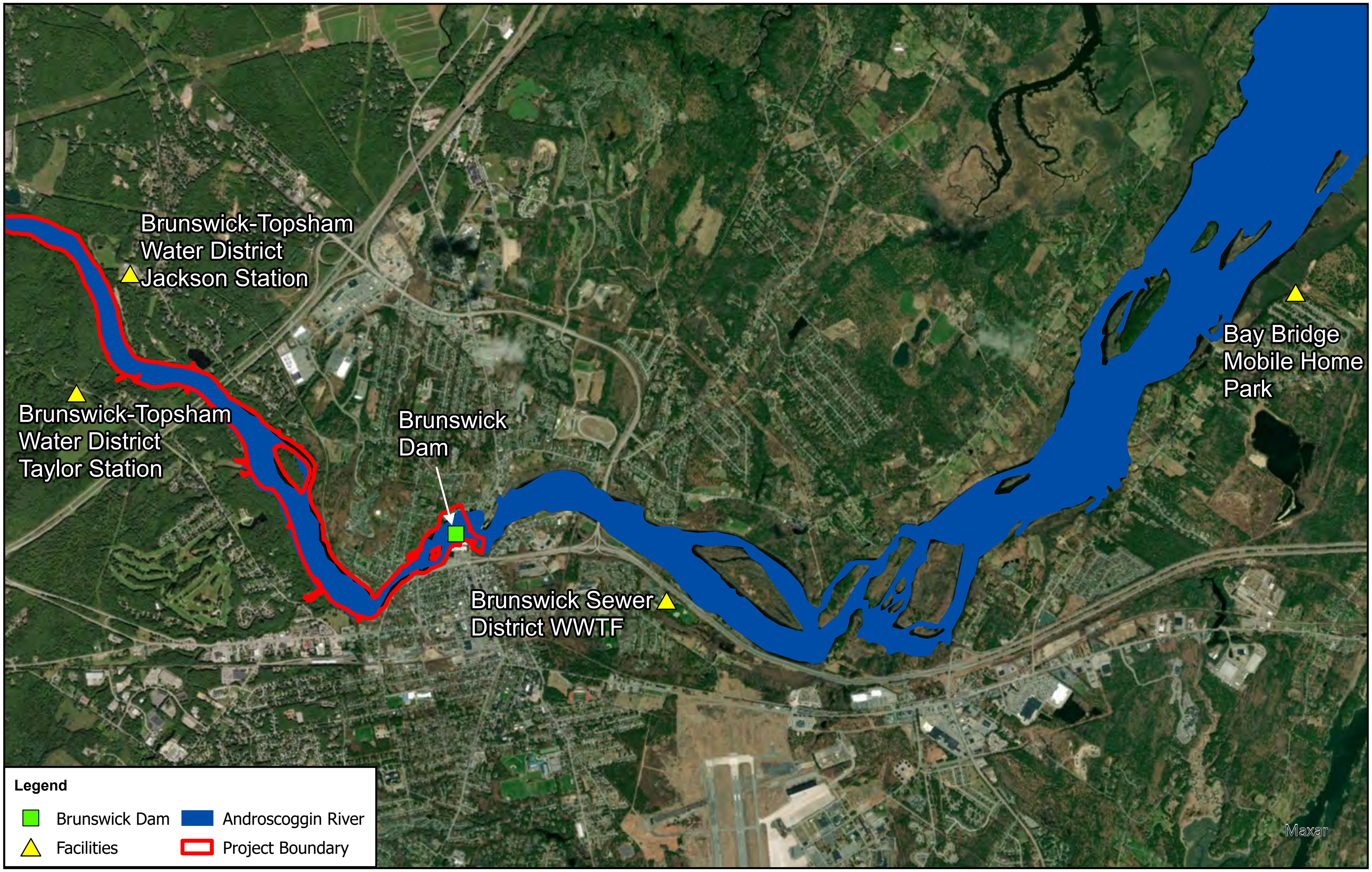
5.2.2.4 Wastewater Discharges

The NPDES permit program was created in the 1970s by the CWA and helps address pollution by regulating point sources that discharge pollutants into receiving waters. The MDEP is authorized to implement the NPDES program and to issue permits in the state of Maine through the Maine Pollution Discharge Elimination System Permit (MEPDES) program (USEPA, 2023). BWPH holds MEPDES permit number ME0022721 for a daily discharge of 0.586 MGD of non-contact cooling water, wastewater, and stormwater runoff from five outfalls at the Project. The Brunswick-Topsham Water District discharges into the Project impoundment in two locations (Taylor Station and Jackson Station) (Table 5.2.2.4-1, Figure 5.2.2.4-1). The Brunswick Sewer District and a mobile home park discharge downstream of the Project.

Table 5.2.2.4-1. MEPDES Permitted Facilities near the Brunswick Project

Facility Name	MEPDES Permit Number (Waste Discharge License Number)	Authorized Discharge (MGD)
Brunswick-Topsham Water District Taylor Station Water Treatment Facility	ME0000957 (W-002631)	0.040 (monthly average)
Brunswick-Topsham Water District Jackson Station Water Treatment Facility	ME0002763 (W-009192)	0.080 (monthly average)
Brunswick Sewer District Wastewater Treatment Facility	ME100102 (W-002600)	3.85 (monthly average)
Bay Bridge Estates, LLC Mobile Home Park	ME0036811 (W-002101)	0.060 (daily maximum)

Source: MDEP, 2023c; USEPA, 2023.



Brookfield

Brunswick Hydroelectric
Project (FERC No. 2284)

N

0 0.38 0.75 1.5 Miles

Figure 5.2.2.4-1:
MEPDES Permitted Facilities near
the Brunswick Project

Path: Q:\Client_Data\FERC_Projects\P2284\20_PAD\Discharges\Discharges.aprx

5.2.3 References

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5.3 Fish and Aquatic Resources (18 CFR §5.6 (d)(3)(iv))

5.3.1 Fisheries Overview

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, Maine (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 5.3.1-1 and Table 5.3.1-2).

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 5.3.1-3). 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 5.3.1-3). 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 5.3.1-4).

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.

Table 5.3.1-1: Abundance of Fish in the Androscoggin River in the Vicinity of the Brunswick Project (Yoder et al. 2006)

Species	Number of Fish (per/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%

Species	Number of Fish (per/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**
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%**

Table 5.3.1-2: Biomass of Fish in the Androscoggin River in the Vicinity of the Brunswick Project (Yoder et al. 2006)

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%

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**
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%

Table 5.3.1-3: 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

Common Name	Scientific Name	Upstream	Downstream	Status	Source
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
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 5.3.1-4: Diadromous Fish Captured at the Brunswick Fishway, 2000-2023.

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	TBD[14]	0

[14] Data not yet available, as of November 20, 2023.

5.3.2 Fish Habitats

5.3.2.1 Fish 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 5.3.2-1.

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 5.3.2.-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
	Ratio of Modified: Good Attributes	0.00	0.00	0.29	0.33	2.00

5.3.2.2 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 Endangered Species Act (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. Essential fish habitat (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. Habitats of particular concern (HAPC) are EFHs that are 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 Salmon Habitat Recovery Unit (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 Gulf of Maine Distinct Population Segment (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 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).

EFH for Atlantic Salmon is described as 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 defined 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 Gulf of Maine 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:

- o Spawning;
- o Annual and interannual adult, subadult, larval, and juvenile survival; and
- o 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).

5.3.3 Fish Species Temporal/Life History Information

5.3.3.1 Resident Fish Species Temporal/Life History Information

The following resident species represent different taxonomic groupings (Centrarchidae, Cypriniformes, Salmonidae, and Perciformes, respectively) with a recreational fishery and/or that are likely to be found in the Project area in relatively large abundance based on fish surveys (Yoder et al. 2006).

Smallmouth Bass (*Micropterus dolomieu*) **-** Smallmouth Bass are native to the Great Lakes – St. Lawrence system and the Ohio, Tennessee, and upper Mississippi River systems. Optimum riverine habitat for Smallmouth Bass is characterized by cool, clear, mid-order streams with abundant shade and cover, deep pools, moderate current, and a gravel or rubble substrate (Edwards et al. 1983). They are nest-builders and require clean, rocky, or gravelly substrate for spawning. They spawn in spring on rocky lake shoals, river shallows, or backwaters, or move into tributaries to spawn. Juvenile and adult Smallmouth Bass both prefer low velocity water near current, but juveniles are often found in shallower water than adults (Edwards et al. 1983). All life stages of Smallmouth Bass utilize cover heavily for protection from sunlight and use many forms of available cover. As waters cool, Smallmouth Bass will seek deeper, darker areas; below water temperatures of 50°F, they become relatively inactive and seek shelter (Edwards et al. 1983).

White Sucker (*Catostomus commersonii*) – White Sucker are the most common sucker species and have a wide geographic range stretching in the north from east of the Mackenzie River to Labrador in Canada and south into the Eastern and Midwestern U.S. (Page and Burr 2011). Suckers are a generalist species that tolerate murky and anoxic waters and can be found in rivers and lakes, though seem to prefer smaller streams with cool, clear water (11.8-20.6°C) and small to medium-sized rivers (Becker 1983). Adult suckers are typically mature at 2-3 years old and 10-20 inches and can live for up to 10 years (Smith 1985). Suckers migrate upstream to spawn after ice-out, typically from April to early May. Adults seek out areas with gravelly substrate and relatively fast water velocities. During spawning, two male suckers will spawn to either side of a female releasing eggs, which sink to attach to the substrate. Eggs incubate for 5-7 days, and juveniles less than 2-inches in length seek out shallower water for feeding (Becker 1983). Suckers have a selective diet and commonly seek out crustaceans, rotifers, algae, aquatic insects, snails, and bivalves (Werner 1980).

Redbreast Sunfish (*Lepomis auritis*) – Redbreast Sunfish are native to Maine, with a geographic range that extends from New Brunswick to central Florida (Page and Burr 2011). Redbreast Sunfish are a warmwater species inhabiting waters from 4-22°C with a preferred temperature range of 27-29°C (Froese and Casal 2017). This species is found in streams, small to medium-sized rivers, and vegetated lake margins over rocky and sandy substrate (Page and Burr 2011). In Yoho Lake, New Brunswick at the northern extent of their range, Redbreast Sunfish were typically found in areas of dense, submerged aquatic vegetation or large woody debris over silt and sand (Gautreau and Curry 2012). Redbreast Sunfish are opportunistic feeders that prey on aquatic and terrestrial invertebrates and small fish (Gautreau and Curry 2012). Adults typically mature at age-2 at approximately 90-120 mm total length and can live up to 7 years. Growth rates seem to be tied to river flow, with larger individuals typically found in riverine environments and in years with higher flows (Sammons and MacEina 2009). Spawning occurs in the spring and summer starting in

April when water temperatures range from 16.8-25.6°C. Males build nests in the littoral zone and guard them after females deposit eggs (Gautreau and Curry 2012).

5.3.3.2 Diadromous Species Temporal/Life History Information

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 considered to be 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 2023). 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 likely the Brunswick Falls.

Atlantic Salmon (*Salmo salar*) – Atlantic Salmon 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 Distinct Population Segments 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 GOM DPS of Atlantic Salmon are a federally endangered species. The Project Area is within the Merrymeeting Bay 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 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 5.3.3.2-1). 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 5.3.3.2-1). Atlantic Salmon stocking in the Androscoggin River watershed was attempted in the 1980s and 1990s, but the program was discontinued due to low returns. Overall, stocking in the Androscoggin River has been very limited relative to many other large river systems in the GOM DPS, with approximately 18,000 fry stocked since 2001 (USASAC 2015; NOAA 2020), the majority of which were stocked into the Little River annually by school groups. The fish entering the fishway at Brunswick are often assumed to be strays from other coastal rivers such as the Penobscot (ASRP 2015).

In response to the listing of GOM DPS of Atlantic Salmon, BWPH developed an Interim Species Protection Plan for the Brunswick Project.[15] 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. Further details on the ISPP and SPP are provided in Section 5.3.5.4.

Table 5.3.3.2-1. Atlantic Salmon Counts at the Brunswick Fishway Indicating Hatchery and Wild Origin Individuals (1983-2023)

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

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

Year	Total Atlantic Salmon	Hatchery Origin	Wild Origin
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
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	**	**

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

American Shad (*Alosa sapidissima*) – American Shad 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.

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 (MDMR and MDIFW 2017). 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 time period with 2-1,090 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 2000-2023 (Table 5.3.1-4). Large fluctuations are seen in American Shad numbers, with 1-2 years of higher counts often followed by years with low counts. A total of 877 American Shad were captured at the Project fishway between 2019-2023. 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, but 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., 1983a). 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., 1983a). Alewife spawn in a variety of habitats, from mid-river sites to ponds and lakes, whereas Blueback Herring prefer to spawn in areas with current and hard substrates (Fay et al., 1983a). 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 (Fay et al., 1983a). 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., 1983a). 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 5.3.1-3). 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; Table 5.3.1-4). 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 above the head-of-tide. 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 (*Petromyzon marinus*) – Sea Lamprey 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, but in recent years have been captured in higher but varying abundance. Counts have ranged from 48-491 from 2019-2023 (Table 5.3.1-3), 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 (*Anguilla rostrata*) – American Eel 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 will 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 (Table 5.3.1-3) in low numbers. 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 (*Morone saxatilis*) – Striped Bass 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 feet 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 5.3.1-3). No information was found about stock status in the Androscoggin River specifically, though oceanic stocks as a whole 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 (*Acipenser oxyrhynchus oxyrhynchus*) – Atlantic Sturgeon 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 feet, 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, egg 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 captured 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 Brunswick Falls where the dam is built is thought to be the historical upstream extent of this species.

Shortnose Sturgeon (*Acipenser brevirostrum*) – Shortnose Sturgeon 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 feet 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 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 Brunswick Falls, 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 m downstream of the Route 201 bridge and ~500 m 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 (*Osmerus mordax*) – Rainbow Smelt 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).

5.3.4 Fish Passage Studies Conducted at the Project

5.3.4.1 Atlantic Salmon Smolt Downstream Passage Studies

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 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.

5.3.4.2 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 (Table 5.3.1-3), and the study has been suspended indefinitely until an adequate source of study fish is available (FERC 2020).

5.3.4.3 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 (Table 5.3.1-3). 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).

5.3.4.4 River Herring and American Shad Upstream Passage Studies

The Brunswick fishway is used by both river herring and American Shad. The fish handling facility serves as a trap and transport facility that is used for stocking river herring in upstream areas in accordance with state management plans and conservation efforts, and passage counts exceed the 10's of thousands annually. American Shad occasionally pass the facility but their success in ascending the fishway and passing appear to be limited. American Shad are well documented entering the lower pools of the upstream fishway as is evidenced in annual fish passage reports by MDMR (FERC 2016). As described below, several recent fish passage studies at the Project have been conducted involving American Shad and river herring.

American Shad

MDMR personnel who operate the fishway facilities at the Project have made observations of larger numbers of American Shad in the tailrace and at the entrance of the upstream fishway, but seldom successfully passing the facility. These observations have been documented in annual fishway reports such as FERC 2016 (and other similar annual reports).

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/min) when Unit 1 was not operating compared with when it was operating (4.1 individuals/min).

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.

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

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.

5.3.5 Fisheries Management Plans

5.3.5.1 Atlantic Salmon Management Plans

Recovery Plan and Workplans

The GOM DPS of Atlantic Salmon is listed as a federally endangered species. Atlantic Salmon is not listed by the State of Maine. The USFWS and NMFS recently developed a recovery plan which wholly supersedes the previous recovery plan developed in 2005 (USFWS and NMFS 2018). The recovery plan is not a regulatory or implementation plan but provides recommendations to achieve recovery objectives. Items in the plan are not to be construed as requirements of federal agencies or any laws/regulations. The plan does, however, include the development of various implementation plans, such as 5-year SHRU-level “workplans.” These workplans follow an adaptive management process and could change over time.

Workplans for the three SHRUs were developed in 2015 (Kircheis 2015). The workplan for the Merrymeeting Bay SHRU identified the three lowest dams as one of the SHRU-specific threats on the Androscoggin River. It states that the Brunswick, Pejepscot, and Worumbo dams and their operations can: 1) Block and impede access of Atlantic Salmon and co-evolved diadromous species; 2) Directly and indirectly kill or harm Atlantic Salmon; 3) Alter flow and sediment transport that creates freshwater habitats and stimulates migratory behaviors that salmon are adapted to; and 4) Exacerbate the effects of climate change. Recovery activities suggested by the plan include:

- Develop a final species protection plan and adjust operations at these dams such that they meet or exceed any upstream and downstream fish passage efficiency standards required to allow for survival and recovery of Atlantic Salmon.

- Evaluate and modify operations as needed until operations meet or exceed the specified standards. Standards must be met within ten years of the completion of any final species protection plan.

The Little River, which enters the Androscoggin River outside of the Project area but only 0.5 miles downstream of the Worumbo Project, is described in the workplan as being one of the best opportunities on the Androscoggin River for Atlantic Salmon spawning and rearing given the current configuration of dams in the Androscoggin River. The workplan recommends identifying and addressing anthropogenic barriers on the Little River that could block of impair access to migratory fish. The Sabattus River is also identified in the workplan as having considerable potential for river herring restoration, and to work with dam owners along the Sabattus River to explore dam removal or fish passage improvements to maximize production potential of river herring in Sabattus Pond. River herring restoration has the potential to benefit Atlantic Salmon restoration as a prey buffer for salmon smolts and as a vector of marine derived nutrients.

5.3.5.2 Atlantic Sturgeon Management Plans

Recovery Plans

Atlantic Sturgeon are managed in the U.S. from Maine to Florida through Amendment 1 to the Interstate Fisheries Management Plan for Atlantic Sturgeon (1990). The goal of Amendment 1 is to restore spawning stocks to population levels that will provide for sustainable fisheries and ensure viable spawning populations (ASMFC 1998). This includes the following specific goals:

- Establish 20 protected year classes of females in each spawning stock

- Close the fishery for a sufficient time period to reestablish spawning stocks and increase numbers in current spawning stocks

- Reduce or eliminate bycatch mortality

- Determine the spawning sites and provide protection of spawning habitats for each spawning stock

- Where feasible, reestablish access to historical spawning habitats

- Conduct approach research to define unit stocks

States must maintain a complete closure of any fishery for Atlantic Sturgeon and prohibit possession of the species. States are required to provide annual reports on bycatch monitoring in other fisheries, other monitoring results, and habitat status (i.e., restoration efforts, FERC relicensing studies). Addendums I-III to the FMP exempts several specific private aquaculture facilities from the possession moratorium, none of which are in Maine.

Addendum IV provides updated habitat information and identifies habitat characteristics for specific life stages (ASMFC 2012). Recommendations in Addendum IV that may pertain to the Project include the following:

- Maintain water quality and suitable habitat for all life stages in all rivers with extant populations
- Reduce non-point and point-source pollution in Atlantic Sturgeon habitat areas
- Reduce thermal effluent into rivers, with larger rivers involving the inclusion of a thermal zone of passage or thermal discharge windows
- Time water withdrawals, releases, and discharges to reduce impacts to migrating fish, including using screens to reduce impacts and time water releases and duration to increase reproductive/recruitment success for spawning fishes
- Map critical/key habitats to maximize scrutiny given to projects likely to impact key habitats and to prioritize areas for protection and restoration. Any project that would unavoidably alter critical/key habitat should be minimize as much as possible.
- Each state encompassing and federal agencies regulating dams blocking Atlantic Sturgeon spawning rivers and/or production areas should develop water use and flow regime guidelines protective of sturgeon spawning and nursery areas to ensure the long-term health and sustainability of the stocks.

5.3.5.3 Shortnose Sturgeon Management Plans

Shortnose Sturgeon are listed as Federally Endangered rangewide. Nineteen distinct population segments of Shortnose Sturgeon are recognized rangewide, including the Kennebec System in Maine that includes the Androscoggin River. NMFS developed a rangewide Recovery Plan for Shortnose Sturgeon (NMFS 1998), the goal of which is to recover all population segments to levels of abundance at which they can be delisted. For each population segment, the minimum population size would need to be large enough to maintain genetic diversity and avoid extinction. This Recovery Plan lists the following specific objectives:

- Establish listing criteria
    - Determine the size of Shortnose Sturgeon population segments for listing and evaluate trends in recruitment
    - Determine minimum habitat for population segments
    - Determine maximum allowable mortality for population segments
    - Protect Shortnose Sturgeon populations and habitats
    - Ensure agency compliance with the ESA
- Reduce bycatch

  - Determine if critical habitat designations are prudent for population segments
  - Mitigate/eliminate impact of adverse anthropogenic actions on population segments
  - Formulate a public education program to increase awareness of the species and its status
  - Coordinate federal, state, and private efforts to implement recovery tasks
- Rehabilitate habitats and population segments
  - Restore habitat and their functions in the life histories of each population segment
  - Develop a breeding and stocking protocol
  - Reintroduce Shortnose Sturgeon into river systems where they have been extirpated
  - Assess the need for augmentation

5.3.5.4 Species Protection Plans, Biological Opinion, and Order Amending License (BWPH, FERC, and NMFS)

Following ESA listing of the GOM DPS of Atlantic Salmon in 2009, BWPH notified NMFS of their intent to obtain an Incidental Take Permit (ITP) in May of 2010. The ITP was to be obtained through a Habitat Conservation Plan (HCP) under Section 10 of the ESA, which was concurrently developed for three Projects on the Kennebec (Weston, Shawmut, and Lockwood), and for the Brunswick Project on the Androscoggin. This process was initiated in the fall of 2010 with the forming of a technical advisory and steering committee. A draft HCP was submitted in February 2012 and, after review by NMFS, alternative approaches were discussed. BWPH notified NMFS of their intention to develop an ISPP and Biological Assessment (BA) for the Project under Section 7 of the ESA, both of which were filed with FERC in February of 2013 (FPL Energy Maine Hydro 2013). The Commission adopted the draft BA without modification, concluding that operation of the project may adversely affect individual GOM DPS Atlantic Salmon and critical habitat for this species. The BA was forwarded to NMFS on March 14, 2013 to start formal consultation under Section 7 of the ESA. An addendum was added to the BA on March 29, 2013 by BWPH to incorporate a Sturgeon Protection Plan for both Shortnose and Atlantic Sturgeon. The Commission adopted this addendum without modification and forwarded it to NMFS, concluding that operation of the Project was likely to adversely affect individual Shortnose Sturgeon and GOM and New York Bight DPSs of Atlantic Surgeon (FERC 2013).

The ISPP was developed in collaboration with MDMR, USFWS, and NMFS to identify fish passage enhancements and studies to be conducted at the Project to minimize and/or avoid impacts to GOM DPS of Atlantic Salmon, Shortnose Sturgeon, and Atlantic Sturgeon related to continued Project operation. The ISPP covered seven years (2013-2019), with a final SPP developed in 2019. Specific measures for Atlantic Salmon and Shortnose Sturgeon included in the ISPP (FPL Energy Maine Hydro 2013):

- Atlantic Salmon (Upstream)
  - MDMR will operate the trap and sort facility from May 1 - October 31, including maintenance of passage records and assessments.
  - BWPH is responsible for keeping the fishway in good operating condition.

  - BWPH will design and conduct upstream adult passage effectiveness studies from 2013-2015 using PIT tagging in consultation with NMFS and in collaboration with the Pejepscot and Worumbo Projects.

- Atlantic Salmon (Downstream)

  - BWPH will operate the existing downstream bypass facility from April 1 – December 31, with the vertical slot fishway open for downstream passage between April 15-October 31 and additional spill provided if needed.

  - BWPH will conduct paired release studies for up to three years between 2013-2015 of downstream passage for smolts.

  - BWPH will conduct kelt passage effectiveness studies for up to three years between 2014-2016 in consultation with NMFS.

- Atlantic Sturgeon and Shortnose Sturgeon

  - BWPH will implement Sturgeon Protection Plan.

  - BWPH will schedule maintenance that requires dewatering the generating units outside of the sturgeon spawning season. When dewatering occurs within the spawning season, BWPH will inspect tailrace stoplogs, area upstream, and inside scroll case before and after dewatering. If fish are found, BWPH will implement rescue procedures and report to NMFS within 24 hours.

  - BWPH will remove any sturgeon found in the fishway and report to NMFS within 24 hours.

NMFS filed a Biological Opinion (BiOp) in July of 2013 that included an Incidental Take Statement (ITS) and Reasonable and Prudent Measures (RPMs) to minimize incidental take. The BiOp concluded that continued Project operation under the ISPP may adversely affect, but is not likely to jeopardize, the continued existence of GOM DPS Atlantic Salmon, Shortnose Sturgeon, and Atlantic Sturgeon. In addition, while Project operation would continue to affect critical habitat for Atlantic Salmon, the BiOp concluded that the proposed ISPP was anticipated to improve functioning of critical habitat for this species in the Androscoggin River (FERC 2013).

The ITS included with the 2013 BiOp included three RPMs, each with several terms and conditions. These were updated on August 23, 2013, and the final versions are listed below (FERC 2013).

- BWPH must conduct all in-water and near-water construction activities in a manner that minimizes incidental take of ESA-listed or proposed species and conserves the aquatic resources needed by ESA-listed species. 17 terms and conditions were included related to contractor education, the timing of construction, erosion control and protection of water quality, storage and staging of materials and construction equipment, and riparian vegetation management.

- BWPH must measure and monitor the provisions contained in the ISPP in a way that is adequately protective of listed Atlantic Salmon, Shortnose Surgeon, and Atlantic Sturgeon. This included 7 terms and conditions related to preparing plans to study the passage and survival of migrating salmon, monitor migratory delay of pre-spawn salmon, providing NMFS the opportunity to comment on any fishway design at various design phases, allowing NMFS to inspect fishways at least annually, inspecting fishways each day between April 1 and December 31, conducting maintenance requiring shut down of the fishways during the first two weeks of August, and developing project-specific adaptive management plans to address any downstream passage deficiencies at the project documented through site-specific survival studies during the period of the ISPP.

- BWPH must complete an annual monitoring and reporting program to confirm that BWPH is minimizing incidental take and is reporting to NMFS all Project-related observations of dead or injured salmon or sturgeon. Terms and conditions were related to notifying NMFS of any changes in operation, maintenance activities, and debris management, contacting NMFS within 24 hours of an interactions with Atlantic Salmon or sturgeon, including non-lethal and lethal takes, and following specific procedures when collecting fin clips of any sturgeon captured at the Project.

The BiOp also included four conservation recommendations that were not required by the Commission at the Brunswick Project. The terms and conditions listed above were incorporated into the Project license by the Commission in a December 13, 2013 letter. Also included in this letter was a requirement by the Commission to prepare an annual report for the duration of the ISPP that would include the following: 1) a summary of consultation with NMFS and other resource agencies and any other issues regarding Atlantic Samon or modifications to study plans; 2) a summary of the BWPH's actions under the Sturgeon Protection Plan; 3) a schedule for implementing the elements associated with the ISPP every year, with the last report including a schedule for developing the final SPP (FERC 2013).

The results of the 2013-2015 downstream Atlantic Salmon smolt studies indicated that the estimated average mortality at the Project was higher than the amount of take exempted in NMFS' 2013 ITS (NMFS 2017b). In accordance with RPM 2(j) in the ITS, BWPH met with state and federal fisheries agencies to develop and implement an adaptive management strategy for the remaining years of the ISPP (2016-2019). Results of the downstream smolt studies indicated that more smolts needed to pass the project via the spillway and fewer through the turbines to improve survival at the Project (NMFS 2017b). BWPH proposed to shut down turbines during the smolt outmigration season (May) to address both of these issues, specifically shutting down Unit 1 at night when flows drop below 18,275 cfs and to shut down an additional unit if flows drop below 7,615 cfs. BWPH agreed to test this proposal in 2018 as part of a downstream smolt survival study already planned for the Pejepscot Project. NMFS agreed with this adaptive management strategy in a May 2017 letter and concluded that no changes to the existing BiOp or ITS were necessary (NMFS 2017b).

The ISPP covered seven years (2013-2019). In advance of its expiration, BWPH collaborated with the fishery agencies on the development of a Final Species Protection Plan (SPP). In December of 2019, BWPH filed a request to amend its license for the Project for Commission approval of the Final SPP for Atlantic Salmon, Atlantic Sturgeon, and Shortnose Sturgeon at the Project (BWPH 2019). BWPH also filed a Fishway Operations and Maintenance Plan (FOMP) for the Project in April of 2021. NMFS issued its BiOp for the Project in December, of 2021 that included an ITS for Atlantic Salmon, Atlantic Sturgeon, and Shortnose Sturgeon. FERC approved the Final SPP and incorporated the FOMP and conditions of the BiOp to the license in August of 2022. The terms of the Final SPP for upstream and downstream passage include (BWPH 2019):

- Upstream Passage

- Operate the vertical slot fishway as conditions allow during upstream migration periods for Atlantic salmon (as well as river herring and American shad) from May 1[16] through November 15; the time of day of operations would continue to be determined in consultation with MDMR
- Trap and sort all fish species, including Atlantic Salmon, and release all Atlantic Salmon upstream into the impoundment so that they may continue their upstream migration
- Undertake measures necessary to keep the fishway in good operating condition
- If the fishway malfunctions or becomes inoperable during the migration period, repair the fishway and return it to service as soon as it can safely and reasonably be done
- Maintain records of all Atlantic Salmon moved by the fishway, including an assessment of size, age, and condition
- If an Atlantic Salmon is observed while MDMR is not on site, utilize trained fishway tour staff to operate the fishway gates
- At such time as more than 40 adult Atlantic salmon return to the Androscoggin River and are observed at the Project for two consecutive years, consult with NMFS, USFWS, and MDMR to conduct an upstream passage and survival study.[17]
- Conduct a brief annual shutdown of the upstream fishway for inspection and maintenance, including dewatering, during the first two weeks of August

- Downstream Passage
  - Operate the existing bypass as conditions allow for passage of adult and juvenile Atlantic Salmon from April 1 through December 31
  - Operate the Project in accordance with the river flow/unit operations protocols listed in Table 5.3.5-1 during the Atlantic Salmon smolt downstream passage season (i.e., month of May)
  - Conduct a bathymetry[18] study of the below the Project spillway to investigate potential for, and possible solutions to, fish stranding[19]

[16] The Final Species Protection Plan, filed on December 31, 2019, proposes to begin operating the upstream fishway on April 15. However, Brookfield's April 12, 2021 revised Fishway Operations and Maintenance (FO&M) Plan—requested by NMFS to initiate formal ESA section 7 consultation and integrated into the final plan—proposes that operation begin on May 1. Commission staff subsequently confirmed the May 1 start date with Brookfield, NMFS, FWS, and MDMR.
[17] On January 5, 2017, Commission staff issued an Order Modifying and Granting Extension of Time for Atlantic Salmon Upstream Passage Study, which required a progress report by May 31, 2020. In its amendment request, Brookfield reports, following consultation with NMFS, FWS, and MDMR, that there are still insufficient returning adult Atlantic salmon at the project to conduct upstream adult passage studies. Brookfield December 31, 2019 Amendment Request at 6-1.
[18] Bathymetry is the study of underwater depth, the underwater equivalent to topography.
[19] Fish stranding is the phenomenon whereby fish are restricted to poor habitat, often as a result of anthropogenic rapid decreases in water level.

  - At such time as 40 adult Atlantic Salmon return to Androscoggin River and are observed at the project for more than two consecutive years, conduct a downstream passage and survival study

  - If additional smolt studies are conducted at the upstream Pejepscot Project No. 4784, consult with NMFS, USFWS, and MDMR on whether and how to include the project in those studies.

- Sturgeon Handling and Protection

  - Sturgeon may become trapped within the turbine/generator units when they are dewatered annually for routine inspection and maintenance and during operation of the upstream fishway. For each sturgeon found in the upstream fishway or other project facilities, BWPH would scan the fish for an existing tag and record the fish's weight, length, and condition, river flow, bypass reach minimum flow, and water temperature. Any live, uninjured sturgeon would be reported to NMFS within 24 hours and returned to the Androscoggin River downstream of the project using specified handling techniques. If any injured sturgeon are found, BWPH would measure, photograph if possible, and report them to NMFS within 24 hours. BWPH would retain any badly injured fish until notified by NMFS of instructions for potential rehabilitation. Any dead sturgeon or body parts would be recovered and reported to NMFS within 24 hours and photographed, measured, scanned for tags, and preserved in a refrigerator until NMFS can obtain them for analysis.

  - There is also a remote chance that sturgeon may become stranded in the area downstream of the spillway as a result of project operation and maintenance. Implementation the Sturgeon Handling and Protection Plan as part of the final plan would minimize these potential adverse effects. Alive, injured, or dead sturgeon found in the pools would be handled in generally the same manner as fish found in the upstream fishway or other project facilities, as discussed above.

- Other terms

  BWPH will:

  - Schedule routine turbine inspection and maintenance activities outside the sturgeon spawning window

  - Meet annually with NMFS, USFWS, MDMR, and MDIFW to review draft annual reports, and to consult on fishway operations and study activities planned for the coming year

  - Prepare an annual report, describing the previous year's activities under the final plan and its progress in implementing the plan's measures. Provide a draft report to the agencies by January 31 of each year and would then meet with the agencies to discuss the report, implementation of the final plan, and any other issues related to the Atlantic Salmon restoration and management activities in the Androscoggin River. File a final report with the agencies and the Commission by March 31 of each year[20]

[20] In a December 2022 letter, the Licensee requested to extend the deadline for the draft report to February 15th, as the downstream fish passage season ends annually on December 31st. The request specified that the final report would still be filed by March 31st. This proposed change was accepted by NMFS in April 2023.

The Final FOMP outlines specific details for the seasonal opening, operation, maintenance, and winterizing of the upstream and downstream passage facilities at the Project (BWHP 2021). The FOMP also includes a description of workforce planning and roles and responsibilities, a fish mortality disposal plan, operating agreements with state and federal agencies, and safety rules and procedures. The operational period for upstream and downstream passage is defined in the FOMP as follows:

- Upstream Passage:
    - The opening date of the Brunswick fishway is May 1, as conditions allow.
    - From May 1 through June 15:
        - MDMR or BWHP staff will monitor the fishway seven days per week daily from 07:00 to 19:00[21]
        - BWHP seasonal staff and operational staff will provide supplement coverage as needed.
    - From June 15 through July 31:
        - MDMR or BWHP staff will monitor the fishway seven days per week daily from 09:00 to 19:00[22]
        - BWHP seasonal staff and operational staff will provide supplement coverage as needed.
    - August 1 to November 15:
        - A brief August shutdown for maintenance and inspection is typically undertaken during the first two weeks of August.
        - BWHP seasonal staff and operational staff will be on site several hours a day to conduct daily checks and cleaning.
- Downstream Passage:
    - The downstream fish way is operated between April 1 and December 31, as river conditions allow
    - During the month of May, unit operational scenarios as described in Table 5.3.5-1 will be implemented. Night time is considered to be 20:00 until 07:00. Smolt studies between 2013-2018 have determined that these unit prioritization scenarios provided the most successful smolt passage.
    - It is expected that Brunswick units #2 and unit #3 will be required to be shut down for three or four nights each year in late September or early October to accommodate downstream

[21] Trapping and trucking activities are dictated by river herring run and count numbers within the 7 am to 7 pm work window

[22] Sorting and passage activities are dictated by shad run and count numbers within the 9 am to 7 pm work window

passage of out-migrating juvenile herring from the upstream Sabattus Lake. BWPH's compliance team will coordinate this timing with operations.

NMFS' 2021 ITS included two RPMs and terms and conditions for each in addition to the measures outlined in the Final SPP. The Commission ordered these incorporated into the license. The RPMs and conditions are listed below (FERC 2022):

- RPM #1: The Commission will ensure that BWPH implement the Final SPP in a manner that is adequately protective of listed species, as follows:
    - Adequately monitor take and prepare, in consultation with NMFS, a plan to measure the survival of downstream migrating Atlantic Salmon smolts at the project if and when similar studies are conducted at the upstream Pejepscot Project and/or Worumbo Project No. 3428
    - Prepare in consultation with NMFS a plan to evaluate adult Atlantic Salmon upstream and downstream passage at the Project's dam
    - Operate the upstream and downstream fishways to ensure that passage of Atlantic Salmon is safe, timely, and effective
    - Actively monitor stranding of federally listed fish downstream of the Project dam
    - Update the Sturgeon Handling and Protection Plan to (a) record the weight, length, and condition of all sturgeon that are handled, scan sturgeon for PIT tags, and take genetic samples from all captured Atlantic Sturgeon alive or dead; and (b) refrigerate or place on ice any dead sturgeon and immediately contact NMFS for further instructions
- RPM #2: The Commission will ensure, through enforceable conditions, that BWPH complete an annual monitoring and reporting program to confirm that they are minimizing incidental take and reporting all project-related observations of dead or injured salmon to NMFS, including the following terms:
    - Inspect the upstream and downstream fish passage facilities daily when they are open and submit summary reports to NMFS weekly during the fish passage season
    - Notify NMFS of any changes in operation at the project, including maintenance activities and debris management, during the term of the amended license
    - Submit as-built drawings to NMFS for the current configuration of the upstream and downstream fishways
    - Allow NMFS staff to inspect the upstream and downstream fishways
    - Review and update the FO&M Plan a minimum of every three years in cooperation with NMFS
    - In the event of a serious injury or mortality of any ESA listed species, allow NMFS access to investigate the source of the mortality and work in cooperation with NMFS to correct the source of serious injury/mortality

  - Submit an annual report to NMFS by December 31 each year summarizing the results of the proposed action and any takes of listed sturgeon or Atlantic Salmon

  - Contact NMFS within 24 hours of any interactions with Atlantic Salmon, Atlantic Sturgeon, or Shortnose Sturgeon, including non-lethal and lethal take and, by December 31 of each year, submit an annual report to NMFS summarizing this information

  - In the event of any lethal take, any dead specimens or body parts must be photographed, measured, and preserved until disposal procedures are discussed with NMFS

In addition, the Commission ordered the following:

- BWPH must inform the Commission after contacting the NMFS regarding any interactions with Atlantic Salmon or sturgeon, including lethal and non-lethal take, pursuant to the terms and conditions of the ITS included in NMFS's BiOp by filing a written report within 15 days of the occurrence of any issue

- BWPH must file an annual Final Protection Plan report with the Commission. A draft of the report must be provided to NMFS, USFWS, MDMR, and MDIFW by December 31 each year following implementation of the final plan. A final report, after consultation with the resource agencies, shall be filed with the Commission by March 31 each year following implementation of the final plan. Each report shall include, at minimum, the following information:

  - A summary of BWPH's actions undertaken the previous year to implement the final plan, including a summary of its consultation with NMFS and other resource agencies regarding progress under the plan and any other pertinent issues regarding Atlantic Salmon;

  - A summary of BWPH's actions undertaken the previous year to implement the Sturgeon Handling and Protection Plan for Atlantic and Shortnose Sturgeon; and

  - A proposed schedule for implementing the elements associated with the final plan for the next year.

Table 5.3.5-1. Unit Prioritization Scenarios for Downstream Fish Passage

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 to 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

5.3.5.5 American Shad and River Herring Management Plans (MDMR)

The coastal states are responsible for American Shad and river herring management, which is coordinated through the ASMFC (ASMFC 2010). In Maine, management of these species is the responsibility of the MDMR. MDMR developed an American Shad Habitat Plan to fulfill the requirement of Amendment 3 to the ASMFC Interstate Management Plan for Shad and River Herring. Recommended actions in the plan, as outlined in MDMR (2013), are:

- Remove mainstem hydropower dams or install effective fish passage;
- Ground-truth assumed current spawning habitat state-wide;
- Conduct population estimates for the Saco, Androscoggin, Kennebec/Sebasticook, and Penobscot Rivers;
- Map young-of-year habitat based on existing beach seine and in-river trawl surveys in the Kennebec River/Merrymeeting Bay estuary complex and Penobscot River;
- Conduct fishway efficiency studies that focus on shad passage at existing fishways;
- Determine locations beyond those regularly monitored where American Shad passage may be limited by human-made obstructions; and
- Monitor water chemistry (DO, turbidity, pH, temperature, conductivity) at known spawning grounds during May-July.

An updated American Shad Habitat Plan for Maine rivers was developed by MDMR and approved in 2021 following the ASMFC American Shad Stock Assessment (2020). The updated plan focused specifically on the major known American Shad spawning rivers, including the Androscoggin River. Goals and recommended actions listed specifically for the Androscoggin River, as outlined in MDMR (2021), include:

- Conduct population estimates for adults spawning in the lower Androscoggin River
- Map young-of-year habitat based on existing beach seine surveys
- Continue fishway efficiency studies at Brunswick Fishway that document poor passage by adult American shad
- Monitor water chemistry (DO, turbidity, pH, temperature, conductivity) during spawning season
- Study impact of invasive species populations on shad population

River herring are managed under Amendment 2 of the ASMFC Interstate Management Plan for Shad and River Herring (ASMFC 2009). This amendment requires states to develop FMPs to maintain a commercial and/or recreational river herring fishery. MDMR developed the Maine Herring Sustainable Fishing Plan, most recently updated in 2020. This plan primarily addresses the management of commercial fisheries, which are not present in the Androscoggin River, therefore specific management goals are not outlined for the Androscoggin River population. The ASMFC Amendment 2 also requires monitoring programs for fishery-independent data in the Androscoggin River, including annual spawning stock survey and sampling of biological data, calculation of mortality and/or survival estimates, estimation of a Juvenile Abundance

Index, and hatchery evaluations. The most recent ASMFC River Herring Stock Assessment (2017) recommended the following in regards to Maine river herring populations:

- Increase sampling of stock specific runs that support directed commercial fisheries
- Increase upstream and downstream fish passage into historical spawning and nursery habitats
- Quantify bycatch of river herring in ocean fisheries, especially within three miles of the coast

In addition, the Atlantic Coast River Herring Cooperate Forum developed a River Herring Conservation Plan (most recently updated in 2023) that outlines goals, objectives, and recommended actions for restoring healthy, sustainable populations along the Atlantic coast region. While this Forum does not have regulatory power, the goals outlined in the River Herring Conservation Plan are intended to inform future conservation and restoration activities through NOAA Fisheries and other agencies and stakeholder groups (German et al. 2023). Goals that have relevance to the Brunswick Project include:

- Improve connectivity of river herring habitat throughout the species range, including the development of water-shed based plans that prioritize barrier removals, fish passage, and habitat connectivity. Where barrier removal is not practical or feasible, install and/or improve upstream and downstream passage for all life stages.
- Address information gaps and research needs where applied research is needed to expand knowledge of river herring related topics. This includes monitoring river herring populations, supporting research focused on the effectiveness of upstream and downstream passage, including alternative approach to passage, and supporting research on impingement and entrainment races of various intake screen designs.

5.3.5.6 American Eel Management Plans

No specific management plan has been developed for American Eel in the state of Maine. All Atlantic states must comply with the management goals and objectives set forth by the ASMFC when regulating fishing activity. However, Maine is the only state with a glass eel fishery, which requires extensive regulation and enforcement. The goal of the ASMFC fishery management plan for American Eel, as described in ASMFC (2000) is to conserve and protect the American Eel resource to ensure its continued role in the ecosystems while providing the opportunity for its commercial, recreational, scientific, and educational use. To accomplish this, the plan aims to:

- 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
- Provide for sustainable commercial, subsistence, and recreational fisheries by preventing overharvest of any eel life stage.

Objectives of the ASMFC (2000) plan are to:

- Improve knowledge of eel utilization at all life stages through mandatory reporting of harvest and effort by commercial fishers and dealers and enhanced recreational fisheries monitoring.
- Increase understanding of factors affecting eel population dynamics and life history through increased research and monitoring.

- Protect and enhance American Eel abundance in all watersheds where eel now occur.
- Where practical, restore American Eel to those waters where they had historical abundance but may now be absent by providing access to inland waters for glass eel, elvers, and yellow eel and adequate escapement to the ocean for pre-spawning adult eel.
- Investigate the abundance level of eel at the various life stages, necessary to provide adequate forage for natural predators and support ecosystem health and food chain structure.

Addendums to the plan include:

- 2006 – Mandatory reporting of catch and effort data.
- 2008 – Increased emphasis on improving upstream and downstream passage for American Eel.
- 2013 – New management measures for commercial and recreational fisheries. Implementation of fishery-independent and fishery-dependent monitoring requirements.
- 2014 – Established a coast-wide quota of 907,671 pounds for yellow eel fishery, reduced Maine's glass eel quota to 9,688 pounds, and allowed for continuation of the silver eel fishery on the Delaware River in New York State. The quota for Maine's glass eel fishery may be re-evaluated in 2018. If the quota is exceeded, then the overage will be deducted from the quota of the following year.
- 2018 – Established a new commercial coastwide landings cap for the yellow eel fishery, new management triggers to evaluate the yellow eel coastwide cap, a process for addressing overages and reductions if the coastwide cap is exceeded and outlines new criteria for evaluating glass eel aquaculture proposals. The addendum maintained Maine's glass eel quota of 9,688 pounds through 2024.
- 2023 – Initiated addendum to address quota for Maine's glass eel fishery, which will be set for 2025 and beyond. Also initiated addendum to consider changes to yellow eel harvest cap based on 2023 Benchmark Stock Assessment.

5.3.5.7 Atlantic Striped Bass Management Plans

Striped Bass are currently managed under Amendment 7 to the Interstate Fishery Management Plan (ASMFC 2022b), which builds on previous Amendments and addendums to address overfishing and initiating rebuilding of the stock by 2029. Amendment 7 established new requirements for management triggers, conservation equivalency, additional measures to address recreational release mortality, and the stock rebuilding plan. The recreational fishery is managed by bag limits, minimum or slot size limits, and closed seasons in some states to restrict harvest. Amendment 7 maintains the same recreational and commercial measures specified in Addendum VI to Amendment 6, as implemented in 2020, with state implementation plans maintained until measured are changed in the future. An Emergency Action was approved in May of 2023 to change the recreational size limit, which has since been extended through October 2024, in response to the large magnitude of recreational harvest in 2022.

5.3.5.8 Androscoggin River Watershed Comprehensive Plan for Diadromous Fishes (NOAA Fisheries)

The purpose of the Androscoggin River Watershed Comprehensive Plan for Diadromous Fishes (NOAA 2020) is to establish a framework that balances the restoration of diadromous fishes and the need for sustainable energy production. It defines goals to protect, conserve, and enhance Androscoggin River habitat and resources. Relevant restoration goals that pertain to the Brunswick Project include:

- Condition FERC licenses for safe, timely, and effective passage of diadromous fish. On the Lower Androscoggin, including the Brunswick Project, the plan outlined the following objectives for specific diadromous species:
  - *American Shad*: Improved passage for adult and juvenile American Shad on the lower mainstem Androscoggin River by engaging in the FERC relicensing and compliance actions at hydropower dams. This would allow shad to access habitats upstream in conjunction with other restoration efforts. NOAA's goal for American Shad is a minimum of 125,000 adults returning each year once mainstem and tributary spawning habitat is accessible.
  - *Blueback Herring*: Improved passage goals similar American Shad as the two species have similar habitat requirements. NOAA anticipates a minimum of one million adults returning after habitat access is restored.
  - *Alewife*: Restoration focusing on the Little Androscoggin and Sabattus Rivers. Though the plan did not mention the mainstem Androscoggin hydropower projects regarding Alewife, there was emphasis on restoring volitional passage to spawning/rearing habitats into sub-watersheds upstream of the Brunswick Project. The plan outlines two phases for completion of habitat restoration, and the goal upon completion of both phases is a minimum of 2.3 million adults returning to the watershed.
  - *American Eel*: Installing and maintaining upstream eelways at hydroelectric facilities, along with downstream protection measures to address turbine mortality of pre-spawn silver eels. Because of the numerous hydroelectric facilities that may cause significant mortality for silver eels, the plan focuses on access to habitat below Lewiston Falls.
  - *Sea Lamprey*: Restoring volitional passage to Sea Lamprey in the Androscoggin River and tributaries up to Lewiston Falls.
- Atlantic Salmon: Following the approach outlined to restore the GOM DPS of Atlantic Salmon in the Atlantic Salmon Recovery Plan (USFWS and NMFS, 2018), particularly regarding habitat connectivity.
- Support for FERC hydropower facility upgrades that do not pose an additional threat to diadromous species resources. The plan provided an analysis of power production potential. The three Lower Androscoggin River hydropower projects (Brunswick, Pejepscot, Worumbo) have a combined installed capacity of 36 MW but have a production potential of 57.5 MW according to the plan.

5.3.5.9 Draft Fisheries Management Plan for the Lower Androscoggin River, Little Androscoggin River and Sabattus River (MDMR and MDIFW)

A draft Fisheries Management Plan was developed in 2017 by MDMR and MDIFW focusing on four sections of the Androscoggin River: the tidal portion from Merrymeeting Bay to Brunswick Dam, the mainstem from Brunswick Dam to Lewiston Falls, the Little Androscoggin River to Snow Falls, and the Sabattus River/Little River Tributaries. The goal of this draft FMP is to protect, conserve, and enhance fisheries resources within the watershed, to present information on past and present anadromous fish management plans, and propose management actions and timelines. Reaches 1 and 2 of the draft FMP are located downstream and upstream of the Project, respectively (MDMR and MDIFW 2017). The specific goals identified in the draft FMP and associated with these reaches as they pertain to the Brunswick Project are listed below:

- Reach 1: Merrymeeting Bay to Brunswick Project Dam
    - Manage as migratory pathway for Alewife, American Shad, Blueback Herring, Atlantic Salmon, American Eel, Striped Bass, and Sea Lamprey and as spawning habitat for Atlantic Sturgeon, Shortnose Sturgeon, American Shad, Blueback Herring, Rainbow Smelt, Striped Bass, and Sea Lamprey
    - MDMR will recommend in-water work windows for any projects that could impact spawning fish and will continue ongoing biweekly beach seine surveys to assess juvenile production and growth
- Reach 2: Brunswick Project Dam to Lewiston Falls
    - Manage as a migratory pathway for Alewife, American Shad, Blueback Herring, Atlantic Salmon, American Eel, Striped Bass, and Sea Lamprey and for sustained production of these species consistent with habitat capacities (if known). Annual production of adults is estimated to be 387,870 Alewife, 84,178 American Shad, 730,664 Blueback Herring, and 182 Atlantic Salmon.
    - MDMR will continue current practice of passing 57,995 Alewife into the Project headpond annually (minimum escapement for currently accessible habitat), and will begin passing additional Alewife and Blueback Herring into the Project headpond as upstream habitat becomes accessible
    - MDMR will continue annual, interim stocking of Blueback Herring above the Project
    - MDMR will continue to pass any adult American Shad that utilize the Project fishway into the Project headpond
    - MDMR will continue upstream passage of all Atlantic Salmon that utilize the fishway at the Project
    - MDMR will begin passing Striped Bass at the Project in 2026[23]
    - Species management will occur in accordance with ASMFC Interstate FMPs for American Shad, river herring, American Eels, and the Species Protection Plans for Atlantic Salmon
        - MDMR will continue to identify and enumerate annual adult returns at the Project and will continue to collect weekly biological data to assess restoration success

The draft Fisheries Management Plan also included certain suggestions for BWPH to undertake at the Project which are listed below. BWPH is complying with conditions of the Final SPP for Atlantic Salmon, Shortnose Sturgeon, and Atlantic Sturgeon. The suggested provisions for design, installation, and operation of fish passage facilities are inconsistent with the current SPP and terms of the existing FERC license.

[23] The year after downstream fish passage is improved at the Project

- Improve upstream and downstream passage for anadromous species and test effectiveness no later than 2025
- Provide upstream and downstream passage for American Eel no later than 2031[24]
- Develop fish passage designs, effectiveness testing studies, and operations and maintenance plans for passage facilities in consultation with the state and federal resource agencies
- Comply with conditions of the SPP for Atlantic Salmon

5.3.6 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 2023), 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 therefore may be present in the Project Area (Table 5.3.6-1). 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 2023). Some listed species, while recorded within one or more of the above counties, had observations that were not along the mainstem Androscoggin River.

5.3.6.1 Salamanders

Nine species of salamander could potentially use aquatic or terrestrial habitats in the Project Area (Table 5.3.6-1). Of these, the Blue-Spotted Salamander and the Northern Spring Salamander are listed as Species of Special Concern in Maine (MDIFW 2023). 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 2023). 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 2023).

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

[24] Two years after license expiration

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 2023).

5.3.6.2 Frogs and Toads

There are eight species of frog and toad that may utilize habitats within the Project Area (Table 5.3.6-1). 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 2023).

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).

5.3.6.3 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 5.3.6-1). 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 2023). 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 2023).

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).

5.3.6.4 Turtles

There are seven species of turtle that may utilize habitats within the Project Area (Table 5.3.6-1). 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 2023). 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 2023).

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 2023).

Table 5.3.6-1: 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
	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

Type	Common Name	Scientific Name	Aquatic Habitat Use	Riparian Habitat Use	Status in Maine
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 (hibernation)	Not Listed
	Wood Turtle	Glyptemys insculpta	Juvenile/Adult	Juvenile/Adult (summer)	Special Concern

5.3.7 Benthic Macroinvertebrate Resources, Habitats, and Temporal/Life History

The macroinvertebrate community plays an important role in the composition of an aquatic ecosystem. Macroinvertebrates are a food source for the fishery and other aquatic resources that may be present. 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 5.3.7-1) (MDEP 2020).

For the majority of benthic macroinvertebrates, there is limited distribution data available, however, dragonflies, damselflies, and freshwater mussels have had specific surveys completed for the creation of a statewide atlas, as discussed in the below section. Other benthic macroinvertebrate data was collected by the MDEP's Biological Monitoring Program, which assess the health of rivers, streams, and wetlands as part of the Water Classification Program.

5.3.7.1 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 5.3.7-2. Aquatic life classification at all sites except the furthest site upstream had a final determination of Class C (MDEP 2023). 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.

Table 5.3.7-1. 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 5.3.7-2. 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[25]	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
EPT Generic Richness/Diptera Richness	1.07	1.50	1.08	1.91	1.79	1.75	2.4

Source: MDEP 2023

[25] 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.

5.3.7.2 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 (MDDS) 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 2023). 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 5.3.7.2-1). 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 2023). 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.

Table 5.3.7.2-1. 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
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

Common Name	Scientific Name	Odonate Type	Family	Township	Status in Maine
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
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 2023

5.3.7.3 Freshwater Mussels

Freshwater mussels are considered a conservation priority by state and federal agencies due to their role in aquatic food webs, water quality, and nutrient cycling (Nedeau et al. 2000). Distribution data was provided by the mussel surveys that were conducted between 1992 and 1997 for the statewide atlas. Freshwater mussels, which are sedentary and found in shallow or shoreline benthic habitats, are dependent on specific freshwater fish species that act as hosts during their larval developmental stage. Mussel larvae (glochidia) are released into the water column and attach to the host (Nedeau et al. 2000).

In the Lower Androscoggin River, eight native freshwater mussel species were documented during the statewide mussel atlas surveys (Nedeau et al. 2000). These species include: Eastern Pearlshell, Triangle Floater, Creeper, Eastern Floater, Alewife Floater, Eastern Elliptio, Eastern Lampmussel, and Tidewater Mucket. The Tidewater Mucket is listed as threatened in Maine and has been documented downstream of the Project (Section 5.6). Table 5.3.7.3-1 provides detailed information for the species that may exist in the Project Area.

Table 5.3.7.3-1: Freshwater Mussel Species with Recorded Presence in the Lower Androscoggin River

Common Name	Scientific Name	Host	County	Substrate	Aquatic Environment	Status
Eastern pearlshell	Margaritifera margaritifera	Atlantic salmon, Landlocked salmon, brook trout, brown trout	Androscoggin	Firm sand/ gravel/cobble	Cool fast-flowing mountain streams, small rivers	Not Listed
Tidewater Mucket	Leptodea ochracea	White Perch, Banded Killifish*, Alewife*	Sagadahoc	Silt/sand/gravel/ cobble/clay	Coastal lakes, ponds, slow-moving portions of rivers	Threatened
Triangle floater	Alasmidonta undulata	Common shiner, blacknose dace, longnose dace, pumpkinseed sunfish, fallfish, largemouth bass, slimy sculpin, white sucker	Androscoggin / Sagadahoc	Sand/gravel	Streams, rivers, lakes, ponds Tolerates standing water	Not Listed
Creeper	Strophitus undulatus	Largemouth bass, creek chub, fathead minnow, bluegill, longnose dace, fallfish, golden shiner, common shiner, yellow perch, slimy sculpin, two-lined salamander, Atlantic salmon	Androscoggin / Sagadahoc	Sand/fine gravel	Streams, rivers and sometimes impounded river sections	Special Concern
Eastern floater	Pyganodon cataracta	White sucker, pumpkinseed sunfish, threespine stickleback, carp, bluegill	All Maine Counties	Sand/mud/deep silt/soft substrates	Slow-moving portions of riverine environments, small streams, ponds, lakes	Not Listed

Common Name	Scientific Name	Host	County	Substrate	Aquatic Environment	Status
Alewife floater	Anodonta implicata	Alewife, American shad, blueback herring	Androscoggin / Sagadahoc / Cumberland	Silt/sand/gravel	Streams, rivers, lakes	Not Listed
Eastern elliptio	Elliptio complanata	Yellow perch, banded killifish, largemouth bass	All Maine Counties	Clay/mud/sand/ gravel/cobble	Small streams, large rivers, freshwater tidal, ponds, lakes	Not Listed
Eastern lampmussel	Lampsilis radiate radiata	Yellow perch, largemouth bass, smallmouth bass, black crappie, pumpkinseed sunfish	Androscoggin / Sagadahoc	Sand/gravel	Small streams, large rivers, ponds, lakes	Not Listed

Source: Nedeau et a. 2000; Swartz and Nedeau 2007
*Suspected host

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5.4 Terrestrial Wildlife and Botanical Resources (18 CFR §5.6 (d)(3)(v))

5.4.1 Regional Setting

The Project is in the Warm Continental Division in a Laurentian Mixed Forest Province, as described by the United States Forest Service (USFS). 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, Maine on the Androscoggin River.

The Project boundary follows the contour level of 42.0 feet msl around most of the impoundment, except along the northerly shore of the impoundment between the Project dam and the Black Bridge railroad crossing where is follows the contour level of 46.0 feet, msl. 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.

5.4.2 Upland Botanical Resources

Upland habitats adjacent to the Project impoundment were determined based on the Conservancy Gateway/The Nature Conservancy NatureServe Terrestrial Northeast Habitat Map (CG/TNC, 2018), 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, hemlock, and red oak are typical canopy dominants. Red maple is common, and other hardwoods like sugar maple, beech, and birch also occur. In Maine, the natural community is referred to as a Hemlock Forest. Associated plant species include barren strawberry, mountain laurel, giant pinedrops, green adder's-mouth, loesel's twayblade, sand violet, scarlet oak, slender mountain-ricegrass, spotted wintergreen, and spreading-pod rockcress (TNC, 2023).

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 5.5.

5.4.2.1 Invasive Plant Species and Noxious Weeds

According to the Maine Department of Agricultural, Conservation and Forestry (MDACF), there are 125 plants species that are considered invasive in Maine. Out of these 125 species, 87 species have known populations in Maine, 45 species are widespread, and 42 species are in localized areas (MDACF, 2019). Invasive species with confirmed observations within the Project boundary or area include Asiatic Bittersweet (*Celastrus orbiculatus*), Purple Loosestrife (*Lythrum salicaria*) and Bouncing-bet (*Saponaria officinalis*) (MNAP, 2021). Aquatic plants such as hydrilla, milfoil and curly pond weed are not likely to occur near the Project since they prefer to grow in still or slow-flowing water, such as in a lake or pond, and have not been documented to date (MNAP, 2021).

5.4.2.2 Temporal and Spatial Distribution of 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, Star-nosed Mole, New England Cottontail, Snowshoe Hare, Southern Flying Squirrel, Woodland Vole, Striped Skunk, Northern Raccoon, North American Porcupine, Coyote, Red Squirrel, and Gray Squirrel. Habitats bordering or close to the Project boundary include developed or agricultural. 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, Red Fox, Virginia Opossum, Eastern Cottontail, Meadow Vole, Woodchuck, and White-footed Deermouse (MDIFW, 2023b).

There are several bat species that may utilize lands around the Project Area including Big Brown Bat, Little Brown Bat, Northern Long-eared Bat, and the Silver-haired Bat (MDIFW, 2023b). Furbearers that may utilize the Brunswick impoundment and the various terrestrial habitats include: American Mink, American Marten, Fisher, North American Beaver, Common Muskrat, and Norther River Otter. Larger mammals may also utilize the Project Area including White-tailed Deer, Moose, and American Black Bear. 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, 2023b). 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, 2023b).

Regarding bird species, there are multiple avian species which 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, blackburnian warbler, black-throated blue warbler, eastern wood-pewee, hermit thrush, northern saw-whet owl, northern waterthrush, ovenbird, pine warbler, ruffed grouse, scarlet tanager, veery, wood thrush, and yellow-bellied sapsucker (CG/TNC, 2018). In addition, the Project impoundment and surrounding areas provide habitat for migrating bird species (USFWS, 2023). A list of bird species which may occur in the Project Area is provided in Table 5.4.2-1.

Table 5.4.2-1: 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*
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 Name	Scientific Name
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*
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*

Common Name	**Scientific Name**
Mallard	*Anas platyrhynchos*
Merlin	*Falco columbarius*
Mourning Dove	*Zenaida macroura*
Nashville Warbler	*Leiothlypis ruficapilla*
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*
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*

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

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

5.4.3 Invasive Wildlife Species

Several exotic wildlife species are known to occur in Maine. These include bird species such as the rock pigeon, European starling, and house sparrow, as well as mammal species such as the red fox, house mouse and Norway rat (MISN, 2016). According to EDDMapS invasive 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 (EDDMaps, 2023).

5.4.4 References

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5.5 Wetlands, Riparian and Littoral Habitat (18 CFR §5.6 (d)(3)(vi))

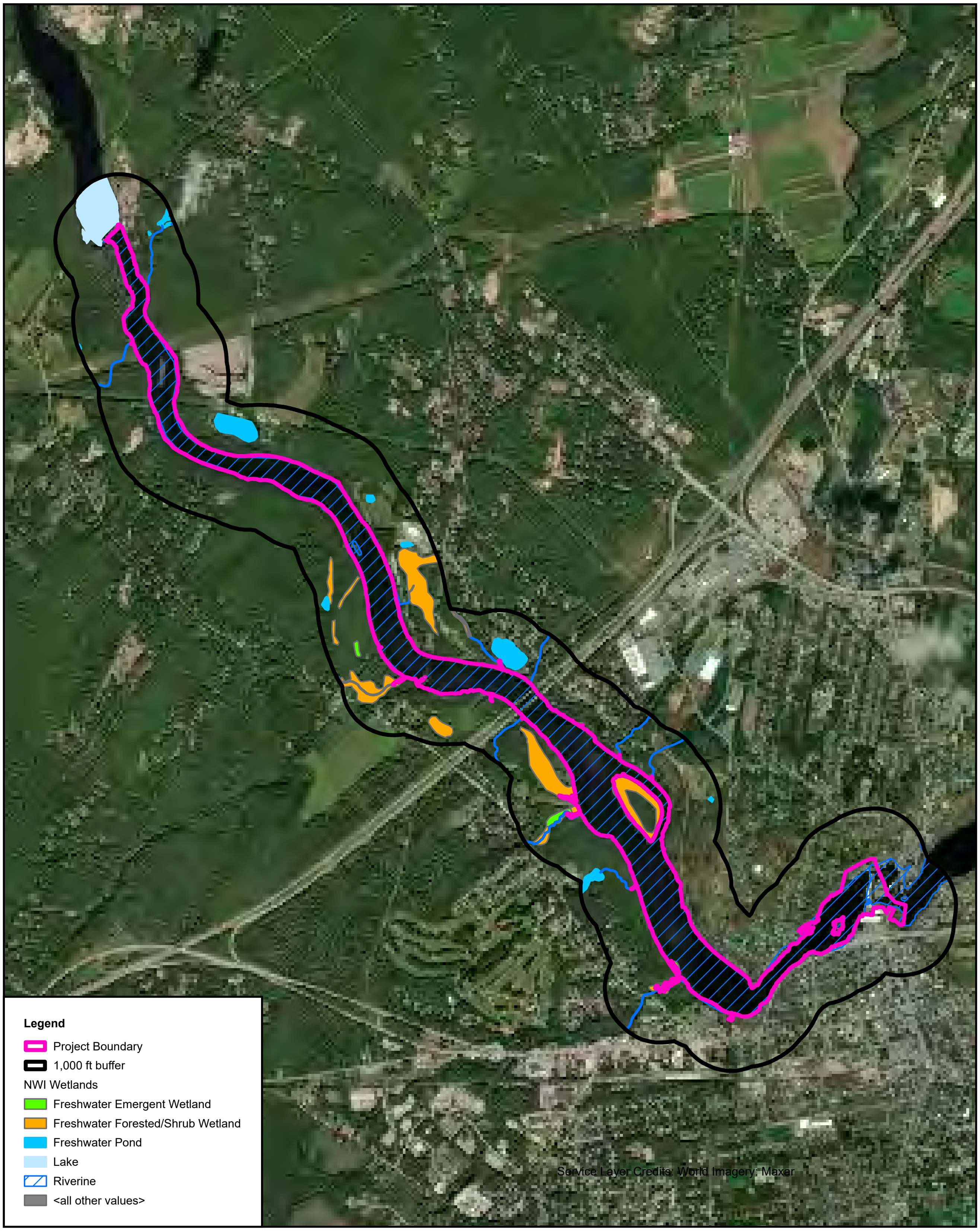
5.5.1 Wetland Habitat and Vegetation

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 feet of the Project boundary, there are approximately 451 acres categorized as wetlands (Figure 5.5.1-1). 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).



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

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Figure 5.5.1-1: Wetlands within 1,000 feet of the Project boundary

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5.5.2 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.

5.5.3 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-feet at a pond elevation of 39.4 feet. Google images 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.

5.5.4 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 5.3.6 and 5.4.3 and provide additional information on wildlife that may exist in the Project Area.

5.5.5 References

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United States Fish & Wildlife Service. 2016. National Wetlands Inventory. https://www.fws.gov/wetlands/index.html Accessed December 2016.

5.6 Threatened and Endangered Species (18 CFR §5.6(d)(3)(vii))

5.6.1 Overview

State and federal threatened or endangered (TE) species have the potential to utilize both aquatic and terrestrial habitats located in or around the Project Area. The state of Maine also identifies species of special concern, which are species that do not meet the criteria established for being state or federally listed but are considered vulnerable and could become threatened or endangered. Several database searches were performed to assess the TE species that may utilize the Project Area. These databases included USFWS Information for Planning and Consultation (IPaC) and the Maine Natural Areas Program (MNAP). 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 of 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, 2023b). The species discussed in the sections below were determined based on their known species distribution and the potential presence of the species in the vicinity of the Project Area.

5.6.2 Critical and Special Status Habitats

An IPaC review determined that the Project area provides critical habitat for the Atlantic Salmon, a federally endangered fish species. In addition, the Project tailwater area is in designated critical habitat for the threatened Atlantic Sturgeon and within the known range of the endangered Shortnose Sturgeon. The life history and habitat requirements of these species are discussed extensively in Section 5.3.

Shortnose Sturgeon were listed as endangered on March 11, 1967, and the species remained on the endangered species list with the enactment of the Endangered Species Act (ESA) in 1973. Critical habitat has not been designated for Shortnose Sturgeon. On February 6, 2012, NMFS listed the Atlantic Sturgeon as endangered in the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs, and as threatened in the GOM DPS. The Brunswick Project falls within the Atlantic Sturgeon GOM DPS. On August 17, 2017, NMFS designated critical habitat for Atlantic Sturgeon in the threatened GOM DPS. Critical habitat listed for Atlantic Sturgeon within the Androscoggin River is downstream of the Project. The critical habitat listing for Atlantic Salmon was finalized in June 2009 and includes the Project location as well as areas above and below it. These listings are discussed in more detail in Sections 5.3.2 and 5.3.3. Likewise, EFH for these species is discussed Section 5.3.2.

MDIFW has not mapped any Essential Habitats in the Project area (MDIFW, 2023b). Currently, Essential Habitats are only designated for three state endangered coastal breeding bird species, the Piping Plover (*Charadrius melodus*), Least Tern (*Sternula antillarum*), and Roseate Tern (*Sterna dougallii*). In Maine, Essential Habitats are areas that currently or historically provide physical or biological features essential to the conservation of an endangered or threatened species in Maine, and which may require special management considerations. Essential Habitat pertains only to definitions under Maine's endangered species laws and regulations established by MDIFW (MDIFW, 2023a)

Tidal Waterfowl Wading Bird Habitat, a Significant Wildlife Habitat under Maine's Natural Resources Protection Act, is located downstream of the Project. This habitat provides important breeding, feeding, migration, staging, and wintering habitat for diverse waterfowl and wading bird species (MDIFW, 2023b).

5.6.3 Threatened and Endangered Fish and Freshwater Aquatic Species and Temporal/Life History Information

Atlantic Salmon, Shortnose Sturgeon, and Atlantic Sturgeon are the only federally endangered fish or protected aquatic species that may be found in the Project Area. 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 be occurring 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. However, MDIFW determined that this species may potentially be present upstream of the Project, including within the impoundment (MDIFW, 2023b).

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, 2023b). Table 5.3.7.2-1 provides additional information pertaining to the odonate species of special concern, while Table 5.6.3-1 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 5.3.6 and 5.3.7.

Table 5.6.3-1: TE and Special Concern Fish and Aquatic Species Potentially Occurring in the Project Area

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

5.6.4 Threatened and Endangered Wildlife Species

There are several terrestrial species identified by USFWS and MDIFW as TE or Special Concern. MDIFW has documented the presence of the peregrine falcon, a State Endangered Species, as being near the Project (MDIFW, 2023b). The USFWS identified the northern long-eared bat, a federally endangered species, and the monarch butterfly, a candidate species, as potentially occurring in the Project Area (USFWS, 2023). In addition, MDIFW has identified eight mammal species and one avian species that are classified as TE or Special Concern that may occur in the Project Area (Table 5.6.4-1) (MDIFW, 2023b). All identified mammals are comprised of various bat species. Bat species' populations have been declining due to White Nose Syndrome, a fungal disease. In 2023, the USFWS reclassified the northern long-eared bat from federally threatened to federally endangered due to the range-wide impacts of White Nose Syndrome. Furthermore, MDIFW has identified 65 bird species that meet Maine's TE or Special Concern requirements (Table 5.6.4-2). Several of these bird species are also considered to be Birds of Conservation Concern by the USFWS and are protected under the Migratory Bird Treaty Act. Of these bird species, MDIFW has identified the great blue heron as potentially occurring within the area of the Project, however one or more listed species of migratory birds may be found in the area during spring and fall migrations (MDIFW, 2023b).

TE or species of special concern which may be found near the Project can be grouped into two categories; those that may be found in the Project Area year-round (i.e., the mammal species) or those that may be found in the Project Area for shorter periods of time (e.g., migratory birds). The big brown bat, little brown bat, and northern long-eared bat are species that hibernate in Maine during the winter. The silver-haired bat is a tree bat that migrates to warmer locations during winter. These bat species have the potential to utilize lands around the Project Area seasonally.

Table 5.6.4-1: Mammals Identified as TE or Special Concern Potentially Occurring in the Project Area

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

Source: MDIFW,2023b; MDIFW, 2023c.

Table 5.6.4-2: Birds Identified as TE or Special Concern Potentially Occurring in the Project Area

Common Name	Scientific Name	State Status
Harlequin Duck	*Histrionicus histrionicus*	Threatened
Barrow's Goldeneye	*Bucephala islandica*	Threatened
Greater Scaup	*Aythya marila*	Special Concern
Northern Harrier	*Circus cyaneus*	Special Concern
Peregrine Falcon (breeding population only)	*Falco peregrinus*	Endangered
Short-eared Owl (breeding population only)	*Asio flammeus*	Threatened
American Coot (breeding population only)	*Fulica americana*	Special Concern
Lesser Yellowlegs	*Tringa flavipes*	Special Concern
American Oystercatcher	*Haematopus palliates*	Special Concern
Whimbrel	*Numenius phaeopus*	Special Concern
Red Knot	*Calidris canutus*	Special Concern
Red-necked Phalarope	*Phalaropus lobatus*	Special Concern
Semipalmated Sandpiper	*Calidris pusilla*	Special Concern
Purple Sandpiper	*Calidris maritima*	Special Concern
Upland Sandpiper	*Bartramia longicauda*	Threatened
Black Tern	*Chlidonias niger*	Endangered
Arctic Tern	*Sterna paradisaea*	Threatened
Bonaparte's Gull	*Chroicocephalus Philadelphia*	Special Concern
Leach's Storm-petrel	*Oceanodroma leucorhoa*	Special Concern
Laughing Gull	*Larus atricilla*	Special Concern
Razorbill	*Alca torda*	Threatened
Common Murre	*Uria aalge*	Special Concern
Atlantic Puffin	*Fratercula arctica*	Threatened
Eastern Whip-poor-will	*Antrostomus vociferus*	Special Concern
Common Nighthawk	*Chordeiles minor*	Special Concern
Chimney Swift	*Chaetura pelagica*	Special Concern
Olive-sided Flycatcher	*Empidonax minimus*	Special Concern
Eastern Kingbird	*Tyrannus tyrannus*	Special Concern
Eastern Wood-Pewee	*Contopus virens)*	Special Concern
Loggerhead Shrike	*Lanius ludovicianus*	Special Concern
Horned Lark (breeding population only)	*Eremophila alpestris*	Special Concern
Purple Martin	*Progne subis*	Special Concern
Barn Swallow	*Hirundo rustica*	Special Concern
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Special Concern
Cliff Swallow	*Petrochelidon pyrrhonota*	Threatened

Common Name	Scientific Name	State Status
Bank Swallow	*Riparia riparia*	Special Concern
Tree Swallow	*Tachycineta bicolor*	Special Concern
American Pipit (breeding population only)	*Anthus rubescens*	Endangered
Bicknell’s Thrush	*Catharus bicknelli*	Threatened
Brown Thrasher	*Toxostoma rufum*	Special Concern
Bay-breasted Warbler	*Setophaga castariea*	Special Concern
Cape May Warbler	*Setophaga tigrine*	Special Concern
Blackpoll Warbler	*Setophaga striata*	Threatened
Canada Warbler	*Wilsonia canadensis*	Special Concern
Tennessee Warbler	*Vermivora peregrina*	Special Concern
Fox Sparrow (breeding population only)	*Passerella iliaca*	Special Concern
Nelson’s Sparrow	*Ammodramus nelson*	Special Concern
Grasshopper Sparrow	*Ammodramus savannarum*	Endangered
Saltmarsh Sparrow	*Ammodramus caudacutus*	Endangered
Vesper Sparrow	*Pooecetes gramineus*	Special Concern
American Kestrel	*Falco sparverius*	Special Concern
Eastern Towhee	*Pipilo erythrophthalmus*	Special Concern
Rusty Blackbird	*Euphagus carolinus*	Special Concern
Eastern Meadowlark	*Sturnella magna*	Special Concern
Evening Grosbeak (breeding population only)	*Coccothraustes vespertinus*	Special Concern
Field Sparrow	*Spizella pusilla*	Special Concern
Bobolink	*Dolichonyx oryzivorus*	Special Concern
American Three-toed Woodpecker	*Picoides dorsalis*	Special Concern
Sedge Wren	*Cistothorus platensis*	Endangered
Great Blue Heron	*Ardea Herodias*	Special Concern
Least Bittern	*Ixobrychus exilis*	Endangered
Black-Crowned Night-Heron	*Nycticorax nycticorax*	Endangered
Common Gallinule	*Gallinula gakeata*	Threatened
Great Cormorant (breeding population only)	*Phalacrocorax carbo*	Threatened

Source: MDIFW, 2023c;MDIFW, 2022.

5.6.5 Threatened and Endangered Botanical Resources and Habitats

The Maine Natural Areas Program provides county level TE or species of special concern information for Botanical Resources and Habitats. Table 5.6.5-1 provides the county level botanical resources that may be in the Project Area.

Table 5.6.5-1: Botanical Resources Identified as TE or Special Concern Potentially Occurring in the Project Area

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

Source: MDIFW, 2021.

5.6.6 References

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United States Fish & Wildlife Service. 2023. *IPaC Trust Resources Report*. https://ipac.ecosphere.fws.gov/. Accessed October 2023.

5.7 Recreation and Land Use (18 CFR §5.6 (d)(3)(viii))

5.7.1 Overview

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 uses surrounding the Project dam are generally residential, commercial, and industrial. Both banks of the river are relatively populated for about a mile upstream from the Project dam. Further upstream, the riversides become rural and sparsely populated along for the length of the Project boundary. The river immediately below the dam is contained within steep banks. This downstream area is also well populated. There are several islands located in the channel in the first three to four miles below the dam, including Shad Island, which is directly below the dam spillway. Goat Island is located a few hundred feet upstream of the dam. The Project dam is located just upstream of the Frank J. Wood Bridge[26], 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.

5.7.2 Regional Recreation Opportunities

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.). Both communities provide outdoor recreational opportunities, including parks and trails along the Androscoggin River and a swinging pedestrian suspension bridge connecting the two communities just upstream from the Project. 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 of 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, 2023c). The 2.6-mile Androscoggin River Bicycle Path provides a paved Americans with Disabilities Act (ADA) 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. 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 at 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

[26] The Maine Department of Transportation (MDOT) is replacing the Frank J. Wood Bridge; construction has begun and is expected to be completed in 2026 (MDOT, 2015).

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.

5.7.3 Existing Project Area Recreation Sites

No Project lands are included in, or under study for inclusion in, the National Trails System or the National Wilderness Preservation System (University of Montana, n.d.). The Project site is not located within or adjacent to any river segment that is designated as a part of, or under study for inclusion in, the National Wild and Scenic River System (NWSRS) (NWSRS, n.d.). The downstream tidewater section of the Androscoggin River from Merrymeeting Bay to the Project dam is listed in the Nationwide Rivers Inventory (NRI) for outstanding fish, wildlife, botanical, hydrologic, recreational, and historic values (NPS, n.d.).

As discussed above, recreational access to the Project area is provided by local municipalities and organizations as well as by BWPH. Recreation sites required by the FERC license (i.e., Project recreation sites) are discussed in the following section. 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) are discussed in Section 5.7.3.2. Project and non-Project recreation sites in the Project area are depicted in Figure 5.7.3-1.

In addition to the sites discussed in the following sections, plans for the replacement of the Frank J. Wood Bridge include improvements to the existing 250th Anniversary Park, discussed below, and development of a new park in the Topsham side of the bridge (MDOT, n.d.). The replacement project will also include sidewalks on both sides of the bridge with viewing bump-outs, dedicated bike lanes, and lighting (MDOT, n.d.).

5.7.3.1 Project Recreation Sites

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 Summer Street, just upstream of the left dam abutment. This area has since been developed by the Town of Topsham as part of the Androscoggin Riverwalk. The approved Exhibit R also included a viewing area at the fishway discussed in Section 3.3.7. These three Project recreation sites are discussed below.

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 west of the Frank J. Wood Bridge. The Park is on lands owned by 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, 2023a). The parcel owned by BWPH was leased to the Town in 1984 for the duration of the original 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 costs associated with the park.

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. Limited parking is available in the lot serving the Fishway Viewing Area, discussed below, and in a municipal lot on Cabot Street (Town of Brunswick, n.d.). 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. Photographs of the site are provided in Figure 5.7.3.1-1 and Figure 5.7.3.1-2.

Fishway Viewing Area

On August 29, 1980, BWPH entered into an agreement with the Town of Brunswick to establish a Fishway Viewing Area at the Project fishway. Per the agreement, BWPH was to arrange for the construction of the viewing area using funds provided by the Town, and the Town was to retain the right and responsibility to operate the viewing area for the term of the license (Brunswick Fishway Viewing Area Agreement, 1980). The Town of Brunswick eventually ceased operation of the viewing area due to staffing issues, and BWPH took on the responsibility for operations and maintenance in order to reopen the facility to the public.

The Fishway Viewing Area consists of a small room with a window allowing for viewing of fish utilizing the fishway. The viewing facility is generally open to the public from May 1st through June 30th from 1:00 pm to 5:00 pm. Paved parking for 13 vehicles is provided at the Project entrance. The site is located within the Project boundary. Photographs of the site are provided in Figure 5.7.3.1-3 and Figure 5.7.3.1-4.

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 site operations and maintenance. 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 for trail parking, 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. Photographs of the site are provided in Figure 5.7.3.1-5 and Figure 5.7.3.1-6.

5.7.3.2 Non-Project Recreation Sites

As discussed above, several parks and trails provide physical or visual access to the Androscoggin River within the Project boundary in addition to the Project recreation sites described above. These non-Project recreation sites are discussed below and are depicted in Figure 5.7.3-1.

Pejepscot Dam Recreation Area

Pejepscot Dam Recreation Area, owned and operated cooperatively by BWPH and the Town of Brunswick, provides hand-carry boat access around the Pejepscot Dam near the upstream end of the Project impoundment, informal shoreline access for bank fishing, and a network of informal trails along the shoreline (Town of Brunswick, n.d.). The site is accessed from River Road in Brunswick. The recreation area was studied extensively as part of the relicensing of the Pejepscot Hydroelectric Project (FERC No. 4784) and the results are included in the Final License Application filed with FERC on August 31, 2020. FERC's Order Issuing New License issued on September 21, 2023, requires upgrades to the downstream portage facility at the site. A photograph of the site is provided as Figure 5.7.3.2-1.

Coffin Pond Recreation Area

Coffin Pond Recreation Area, owned and operated by the Town of Brunswick, is accessed from River Road. The Park provides year-round recreation opportunities including playground equipment, restrooms, concessions, a picnic area, ice skating and swimming at Coffin Pond, youth fishing, and hiking trails. Just north of the Coffin Pond Recreation Area is Coombs Property, a 24-acre parcel with 1,900 feet of river frontage owned and operated by BTLT. The property provides water access and is planned for recreational development (Town of Brunswick, n.d.). BTLT intends to donate the parcel to the Town of Brunswick (BTLT will retain an easement) for low-impact recreation, including public access and trails linked to the Coffin Pond Recreation Area (BTLT, 2023b). A photograph of the site is provided as Figure 5.7.3.2-2.

Mill Street Canoe Portage

The Mill Street Canoe Portage provides hand-carry boat access just upstream from the Project boat barrier. The facility serves as the portage take-out for boaters portaging the Project dam. Accessed off Mill Street (Route 1), the 3.4-acre park is owned by MDOT and is operated cooperatively by MDOT, the Town of Brunswick, and BWPH (Town of Brunswick, n.d.). BWPH is responsible for capital improvements, while the Town operates and maintains the park (FERC, 2004). Although BWPH has contributed to this facility, the site was not a requirement of the original license. The launch facility is closed to the public during times when the boat barrier is not in place; barriers are typically installed mid to late May, depending on flows, and removed in late fall. Amenities at the site include a gravel parking area, hand-carry boat launch, 2 granite benches, and directional signage (Town of Brunswick, 2016). Additional directional signage along Mill Street directs users to the portage put-in at 250th Anniversary Park, discussed in Section 5.7.3.1. A photograph of the site is provided as Figure 5.7.3.2-3.

Androscoggin Swinging Bridge

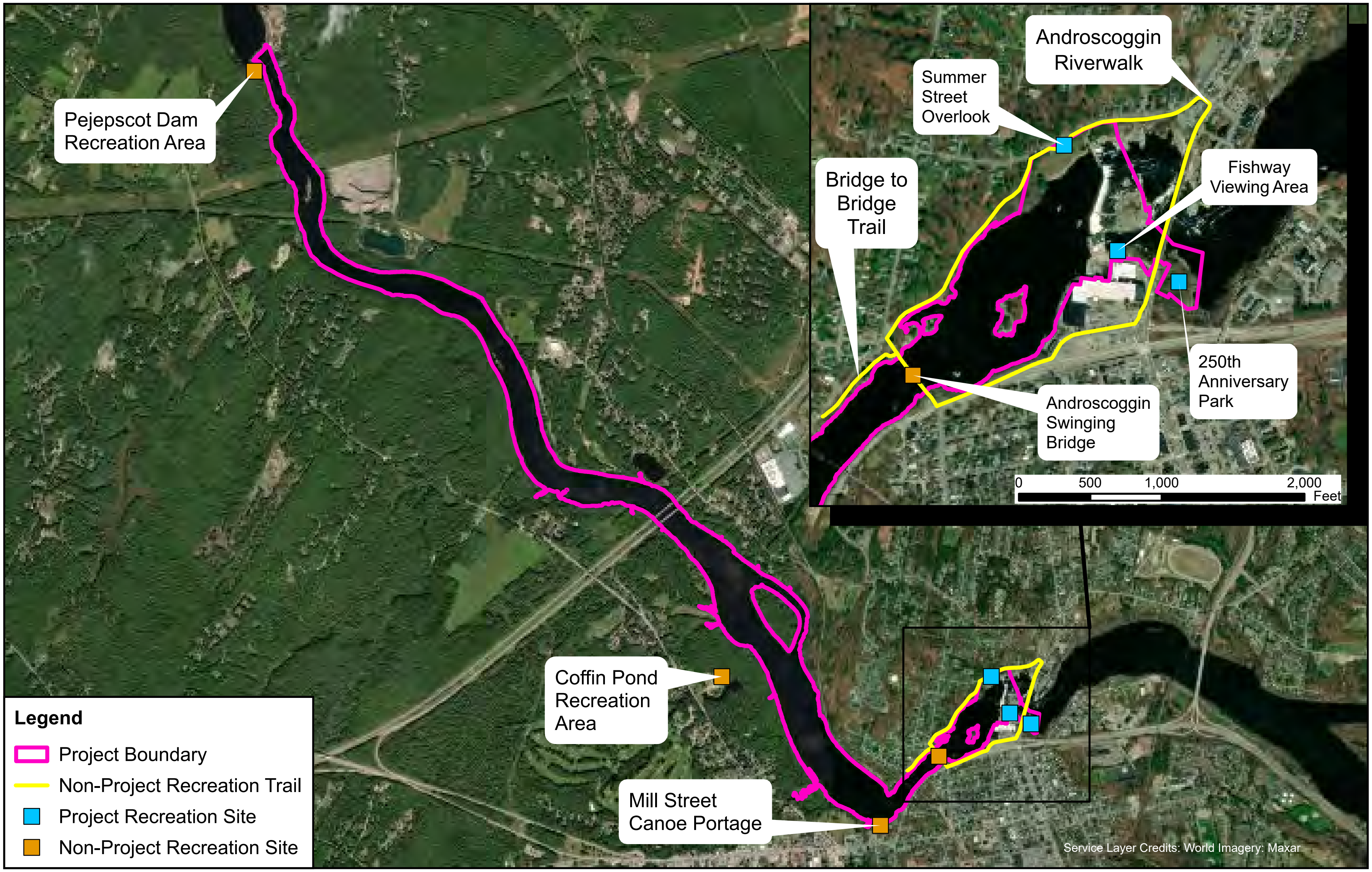
The Androscoggin Swinging Bridge is an historic suspension bridge providing pedestrian access between Brunswick and Topsham as part of the Androscoggin Riverwalk, discussed below. Small parks are located on both sides of the bridge. The Swinging Bridge Park in Brunswick is owned by the State of Maine and operated by the Town of Brunswick. The site provides benches, scenic views, parking for four standard vehicles, and one designated ADA space. On the Topsham side, a small Town-operated park provides benches, trash receptacles, dog waste stations, and informal shoreline access along a sandy beach area. Signs along the shoreline prohibit swimming. The parking area on the Topsham side has paved, lined spaces for six standard vehicles and one designated ADA space. A photograph of the site is provided as Figure 5.7.3.2-4.

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. On the Topsham side, the trail leads from the Androscoggin Swinging Bridge downstream through woods to Summer Street, then continues east to the Frank J. Wood Bridge. On the Brunswick side, the trail follows public sidewalks from the Androscoggin Swinging Bridge to the Frank J. Wood Bridge. Five public parking areas serve the Riverwalk. In Brunswick, parking is provided at Androscoggin Swinging Bridge Park and in the lot across Cabot Street near the Frank. J. Wood Bridge. In Topsham, parking is available at the end of the Androscoggin Swinging Bridge, at the Summer Street Overlook, and in a public lot near the intersection of Main and Summer Streets. Trash receptacles and dog waste stations are provided at the small park on the Topsham side of the swinging bridge and near the Summer Street trail intersection. Informational and interpretive signage is also provided along the trail (Androscoggin Riverwalk, n.d.). A photograph of the trail is provided as Figure 5.7.3.2-5.

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. A photograph of the site is provided as Figure 5.7.3.2-6.



Brookfield

Brunswick Hydroelectric
Project (FERC No. 2284)

0 1,250 2,500 5,000 Feet

N

Figure 5.7.3-1:
Existing Project Area Recreation Sites

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

Figure 5.7.3.1-1: 250th Anniversary Park, Photos 1-2

Source: M. Rheaume, Gomez and Sullivan Engineers, 10/09/2023

Source: M. Rheaume, Gomez and Sullivan Engineers, 10/09/2023

Figure 5.7.3.1-2: 250th Anniversary Park, Photos 3-4

Source: M. Rheaume, Gomez and Sullivan Engineers, 10/09/2023

Source: M. Rheaume, Gomez and Sullivan Engineers, 10/09/2023

Figure 5.7.3.1-3: Fishway Viewing Area, Photos 1-2

Source: J. Commerford, Gomez and Sullivan Engineers, 10/10/2023

Source: M. Rheaume, Gomez and Sullivan Engineers, 10/09/2023

Figure 5.7.3.1-4: Fishway Viewing Area, Photos 3-4

Source: (FERC, 2004)

Source: Steve Yenco, Mainly Maine Photography, 2013

Figure 5.7.3.1-5: 250th Summer Street Overlook, Photos 1-2

Source: I. Kiraly, Gomez and Sullivan Engineers, 10/03/2023

Source: M. Rheaume, Gomez and Sullivan Engineers, 10/09/2023

Figure 5.7.3.1-6: 250th Summer Street Overlook, Photos 3-4

Source: M. Rheaume, Gomez and Sullivan Engineers, 10/09/2023

Source: I. Kiraly, Gomez and Sullivan Engineers, 10/03/2023

Figure 5.7.3.2-1: Pejepscot Dam Recreation Area, Portage Staircase

Source: M. Rheaume, Gomez and Sullivan Engineers, 10/16/2019

Figure 5.7.3.2-2: Coffin Pond Recreation Area

Source: Town of Brunswick, 2016

Figure 5.7.3.2-3: Mill Street Canoe Portage

Source: I. Kiraly, Gomez and Sullivan Engineers, 10/03/2023

Figure 5.7.3.2-4: Androscoggin Swinging Bridge

Source: M. Rheaume, Gomez and Sullivan Engineers, 10/09/2023

Figure 5.7.3.2-5: Androscoggin Riverwalk

Source: K. Smith, Gomez and Sullivan Engineers, 10/03/2023

Figure 5.7.3.2-6: Bridge to Bridge Trail

Source: M. Rheaume, Gomez and Sullivan Engineers, 10/09/2023

5.7.4 Project Recreation Use

Recreational use of Project recreation facilities was historically reported on the Licensed Hydropower Development Recreation Report (Form 80)[27]. According to the Form 80 filed in December 2015, ten percent of the estimated 9 miles of Project shoreline is available for public use (BWPH, 2015).

FERC uses recreation days as a metric for reporting recreational use at hydroelectric projects. A recreation day is defined as each visit by a person to a development for recreational purposes during any portion of a 24-hour period. The 2015 Form 80 indicates there were a total of approximately 3,640 recreation days at Project recreation facilities in 2014, with a peak weekend average of 90 recreation days (BWPH, 2015). Nighttime recreational use was not sampled as part of on-site spot counts as none of the public access sites provide overnight facilities.

The Form 80 also estimates Project recreation facility use relative to capacity during the preceding year. The 2015 Form 80 indicated that the boat launches and portage route were used at approximately 5 percent of capacity on average, non-peak summer weekends in 2014, and the scenic overlook area was used at 10 percent of capacity. The Fishway Viewing Area was utilized at 50 percent of capacity (BWPH, 2015).

5.7.5 Project Vicinity Recreation Needs Identified in Management Plans

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 publishes 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.

5.7.5.1 Maine Statewide Comprehensive Outdoor Recreation Plan

The ME 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 US 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).

5.7.5.2 Boating Facilities Strategic Plan

The ME 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

[27] FERC eliminated the requirement for Licensees to complete the Form 80 in 2018.

the Androscoggin River in the Project Area as needing guaranteed public access or additional access (MBPL, 2013).

5.7.5.3 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.

5.7.5.4 Town of Topsham Comprehensive Plans

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).

5.7.5.5 Town of Brunswick Comprehensive Plans

The Town of Brunswick is in the process of updating its 2008 Comprehensive Plan, with a goal of adopting a final plan in the fall of 2023. As a first step in the process, the Town is reviewing the 2008 Comprehensive Plan goals and implementation status. The 2008 Plan contained goals and policies to guide the Town's future land use and budgeting decisions, some of which specifically pertain to outdoor recreation in the Project area. Of note, Policy Area 6 charges the Town with protecting open space and natural resources and providing outdoor recreational opportunities; several actions under this policy area focus on ensuring adequate outdoor recreational opportunities and access and on protecting and maintaining scenic open space resources. Policy Area 7 calls for promoting an economically viable, attractive downtown. Objectives and actions under this policy area include supporting the concept of the north end of Brunswick's downtown as a recreational "hub" along the Androscoggin River corridor (Town of Brunswick, 2008). The 2023 update process has identified significant progress toward both policy areas as well as additional planning documents with goals for outdoor recreation that align with the 2008 Comprehensive Plan, including the 2011 Master Plan for Downtown Brunswick and the Outer Pleasant Street Corridor, the 2004 Bicycle and Pedestrian Improvement Plan, and the 2002 Parks, Recreation and Open Space Plan (Town of Brunswick, 2023).

5.7.6 Land Use and Management within the Project Vicinity

Land use in the Androscoggin River watershed is discussed in Section 4.2. 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.).

Management of lands outside of the Project boundary fall under the jurisdiction of the municipality in which they are located. The State of Maine's Mandatory Shoreland Zoning Act (MSZA) requires that lands within 250 feet of ponds and non-forested freshwater wetlands; rivers; coastal wetlands and tidal waters; and all land areas within 75 feet 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).

5.7.7 Land Use and Management of Project Lands

BWPH possess 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.

5.7.8 References

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5.8 Aesthetic Resources (18 CFR §5.6 (d)(3)(ix))

5.8.1 Overview

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, Maine. 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.

5.8.2 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 feet downstream of Black Bridge is the Androscoggin Swinging Bridge, a suspension pedestrian bridge that crosses the river, which was originally built in the 19th century 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 2023), a large mill located in Brunswick next to the Project's dam and powerhouse. Just downstream of the dam, the steel arch Frank J. Wood Bridge carries U.S. Route 201 / Maine State Route 24 over the Androscoggin River between the towns of Brunswick and Topsham. Another large mill, the Bowdoin Mill Complex, is located on the left descending bank immediately downstream of the Frank J. Wood 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 are described in greater detail in Section 3.3 and depicted in Figure 3.2-1. Just downstream of the dam, portions of the exposed riverbed and shoreline consist of broad ledges.

Views of the impoundment are available at the Town of Brunswick's Boat Launch 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 Frank J. Wood 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 River Brunswick-Topsham Riverwalk and the Androscoggin River Bicycle Path, which offer views of the river within the vicinity of the Project.

Figures 5.8.2-1 through 5.8.2-4 provide representative photos of the area within the Project vicinity.

Figure 5.8.2-1: View of impoundment from the Town of Brunswick Boat Launch faced downstream

Figure 5.8.2-2: View of impoundment from the north end of the Project's dam faced upstream

Figure 5.8.2-3: View of river from Project's fishway faced downstream

Figure 5.8.2-4: View of river from 250th Anniversary Park faced downstream

5.8.3 Scenic Attractions

The Androscoggin Swinging Bridge, 250th Anniversary Park, and the Androscoggin River Brunswick-Topsham Riverwalk offer scenic views of the area. There are no State or Federal Scenic Byways in the Project vicinity (Federal Highway Administration 2023, Maine Department of Transportation 2023). See Section 5.7 for additional information on recreational opportunities that offer scenic views in the Project and surrounding area.

5.8.4 References

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5.9 Cultural Resources (18 CFR §5.6 (d)(3)(x))

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.

5.9.1 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 5.9.1-1) (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.

Contact Period – Euroamerican Period (ca. AD 1500 – AD 1760). One, or several indigenous groups occupied the Androscoggin River basin some time into the late 18th century when most remnant groups amalgamated with other groups on the St. Francis River in Quebec: and on the Penobscot River in Maine (Snow 1980 in Cowie and Petersen 1988). The Pejepscot Settlement (ME 064-001) is in the vicinity of Androscoggin Falls at the downstream end of the Project. It was first established 1628 and was then devastated by conflict with the indigenous population in 1676. A stone Fort Andros was built in 1688 on the north side of the river and later in 1715 Fort Pejepscot was built from the ruins of Fort Andros. The fort is described by Robert J. Hale in 1731 and it was dismantled ca. 1737 (information taken of MHPC site inventory form).

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 1878:755).

Table 5.9.1-1: 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).

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

5.9.2.1 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 m by 0.5 m 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 m 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 m 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.

5.9.2.2 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.

5.9.3 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 (1990:141) 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 five feet 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:ii).

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.

5.9.4 Historic Structures Overview

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 National Register of Historic Place Inventory-Nomination Forms).

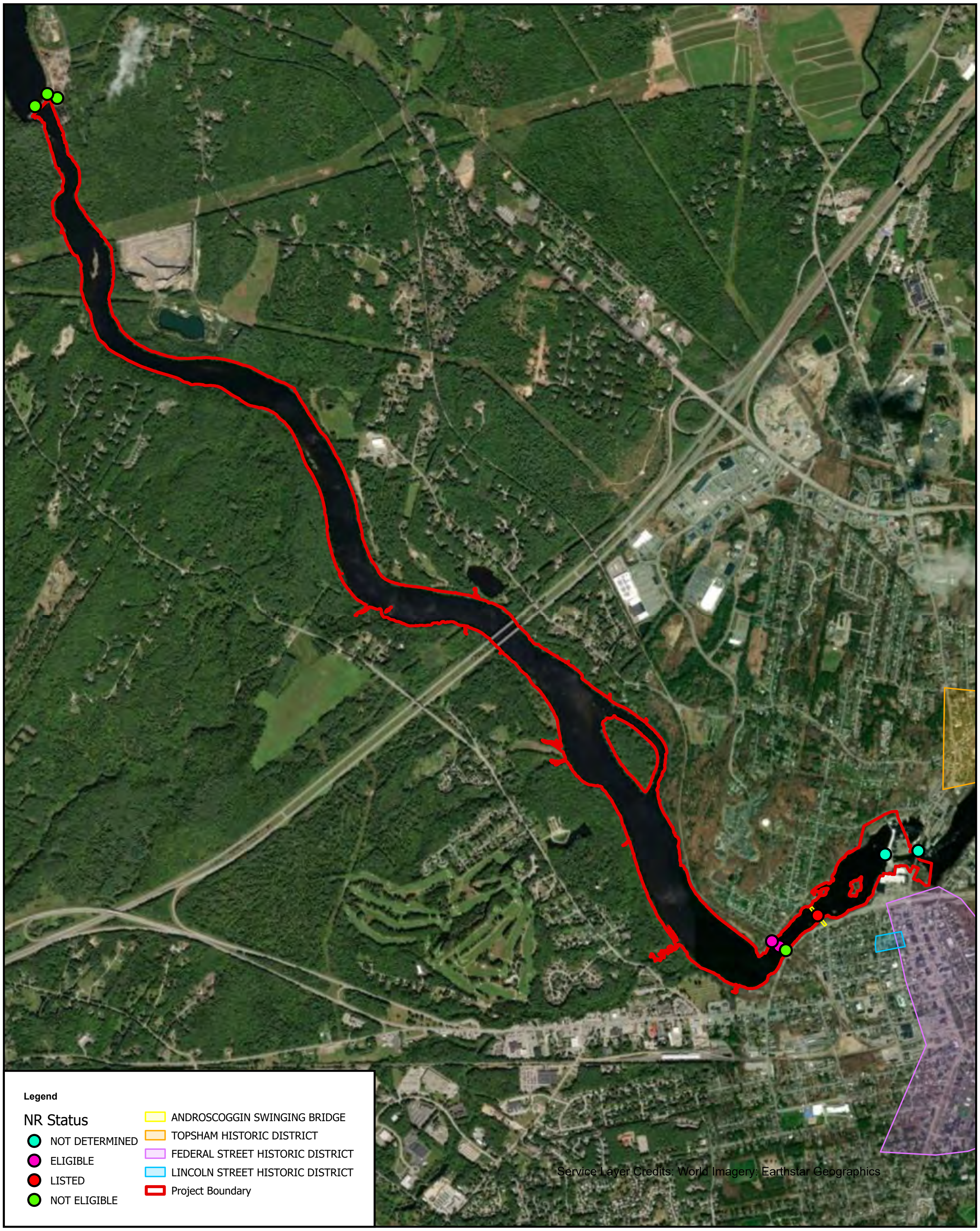
5.9.5 Identification of Historic Districts and Properties within of the Project

Background research in the Maine Historic Preservation Commission's (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 5.9.5-1). 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 National Register of Historic Places in 2004.

In addition to the Swinging Bridge Historic District the Brunswick Project boundary contains the following six historic resources (Table 5.9.5-1). 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 5.9.5-1: Historic Resources Located Inside the Project Boundary

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)

0 5001,000 2,000
US Feet

N

Figure 5.9.5-1:
Historic Structures and Districts

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5.9.6 References

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5.10 Socio-Economic Resources (18 CFR §5.6 (d)(3)(xi))

5.10.1 Overview

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. 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 is generally considered a mixed-use commercial and historic district, with buildings that retain their original design elements, and represent mid-nineteenth through early twentieth century architecture (Maine, An Encyclopedia, 2020). The Project and BWPH continue to bring economic benefits to these communities. In addition to paying property taxes to both towns, BWHP's parent company (Brookfield Renewable) maintains offices in Lewiston, Maine. Brookfield Renewable 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.

5.10.2 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% (Table 5.10.2-1). In Cumberland County, 60% of the housing units are in urban settings, with 40% in rural areas (Table 5.10.2-1).

The city of Bath is the County Seat for Sagadahoc County. Sagadahoc County accounts for 3% of the population for the state of Maine and has the smallest geographical footprint of any of the counties (USA.com, 2023), accounting for approximately 0.8% of the square mileage. Sagadahoc is the 12th most populous county of the 16 Maine counties (Maine Demographics, 2023). Opposite Cumberland County, in Sagadahoc County, 38% of the housing units are urban, with 62% in rural areas (Table 5.10.2-1).

The town of Brunswick more than doubles the population of Topsham, however they have similar urban and rural housing unit percentages, with 79% urban in Brunswick, and 78% in Topsham (Table 5.10.2-1). Similarly, 21% of the housing units in Brunswick are rural, and 22% are rural in Topsham (Table 5.10.2-1).

Table 5.10.2-1. Percent Urban vs. Rural Land Use and Population Density

	Cumberland County	Sagadahoc County	Town of Brunswick	Town of Topsham	State of Maine
Population	303,069	36,699	17,033	6,623	1,362,359
Total Housing units	149,452	18,938	9,966	3,130	739,072
Percent Urban Residences	60%	38%	79%	78%	36%
Percent Rural Residences	40%	62%	21%	22%	64%
Land Area (Square Miles)	836.22	253.97	19.44	11.03	30,842.10
Persons per square mile	362.4	144.5	876.3	600.7	44.2
Housing units per square mile*	178.7	74.6	512.7	283.8	24

Source: US Census 2023; US Census 2020a; US Census 2020b; US Census 2020c
*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.

5.10.3 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 2022 are shown in Table 5.10.3-1. As shown in Table 5.10.3-1, 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; however, 2021 and 2022 data are not yet available for the towns of Brunswick and Topsham (Table 5.10.3-1).

Between 2010 and 2020 Cumberland County grew at a higher rate than the state and has not seen any decreases in annual population during that time, while the towns of Brunswick and Topsham have experienced some years of decreasing population, but an overall increase since 2010 of 7.7% and 10.9%, respectively (Table 5.10.3-1).

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 2040 and are summarized in Table 5.10.3-2. Generally, MEDAFS predicts growth for the state of Maine, Cumberland County, and the town of Topsham, and predicts small declines in population for Sagadahoc County and the town of Brunswick (Table 5.10.3-2). Topsham is predicted to have the most significant growth between 2020 and 2040 at 8.3%, which is 5.2% higher than the expected growth for the state (Table 5.10.3-2).

Table 5.10.3-1. Population Change from 2010 to 2022[28]

	Census		Population Estimate										
Area	**2010**	**2020**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2021**	**2022**
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
Change			0.4%	0.3%	0.7%	0.9%	0.5%	0.6%	0.3%	0.5%	0.5%	3.5%	0.7%
Change from 2010		7.6%	0.4%	0.7%	1.4%	2.3%	2.8%	3.4%	3.7%	4.3%	4.7%	8.4%	9.2%
Sagadahoc County	35,293	36,699	35,121	35,115	35,021	35,076	35,120	35,156	35,436	35,690	35856	-	37,393
Change			-0.5%	0.0%	-0.3%	0.2%	0.1%	0.1%	0.8%	0.7%	0.5%	-	4.3%
Change from 2010		4%	-0.5%	-0.5%	-0.8%	-0.6%	-0.5%	-0.4%	0.4%	1.1%	1.6%	-	6.0%
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	-	21,831
Change			0.1%	0.1%	0.1%	0.4%	0.8%	-0.5%	-0.2%	0.3%	0.0%	-	-
Change from 2010		7.7%	0.1%	0.2%	0.4%	0.7%	1.6%	1.1%	0.9%	1.2%	1.3%	-	-
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	-	9,741
Change			-0.6%	-0.1%	-0.3%	0.3%	0.2%	0.1%	0.7%	0.7%	0.1%	-	-
Change from 2010		10.9%	-0.6%	-0.8%	-1.1%	-0.8%	-0.6%	-0.5%	0.2%	0.9%	1.1%	-	-
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
Change			0.0%	0.0%	0.0%	0.2%	-0.2%	0.2%	0.2%	0.3%	0.4%	2.1%	1.0%
Change from 2010		2.6%	0.0%	0.0%	0.0%	0.2%	0.0%	0.2%	0.5%	0.8%	1.2%	3.3%	4.3%

Source: US Census 2021; US Census 2022

[28] Brunswick, Topsham, and Sagadahoc County varied in availability of data. 2021 and 2022 data are filled where they are available.

Table 5.10.3-2. Population Projections from 2020 through 2040

Area	Observed*	Projections				Percent Change from Previous Period				Ten-Year Percent Change	Total Percent Change
	2020	2025	2030	2035	2040	2020-2025	2025-2030	2030-2035	2035-2040	2020-2030	2020-2040
Maine	1,362,280	1,362,280	1,397,663	1,407,396	1,404,176	0.9%	1.7%	0.7%	-0.2%	2.6%	3.1%
Cumberland County	303,312	304,451	308,124	309,939	308,759	0.4%	1.2%	0.6%	-0.4%	1.6%	1.8%
Sagadahoc County	36,688	36,794	36,921	36,747	36,292	0.3%	0.3%	-0.5%	-1.2%	0.6%	-1.1%
Town of Brunswick	21,756	21,660	21,735	21,677	21,409	-0.4%	0.3%	-0.3%	-1.2%	-0.1%	-1.6%
Town of Topsham	9,560	9,844	10,109	10,238	10,358	3.0%	2.7%	1.7%	0.7%	5.7%	8.3%

Source: MEDAFS 2023
*There are minor variations in the observed population totals between the Census data and the MEDAFS data. Variations incorporated to maintain percent values.

5.10.4 Households / Family Distribution and Income

Household statistics for 2021, including income and poverty levels, are presented in Table 5.10.4-1. 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 2.19 and 2.32 people per household (Table 5.10.4-1).

Within the Project area, Cumberland County's median and per capita incomes were the highest, at $80,679, and $45,704, respectively, while the lowest median and per capita incomes were observed in the town of Brunswick, at $65,285, and $38,689, respectively (Table 5.10.4-1). The median and per capita incomes for Sagadahoc County were slightly higher than the town of Topsham, at $73,343, and $37,443, respectively, in Sagadahoc County, and $70,268, and $37,979, respectively, in the town of Topsham (Table 5.10.4-1). 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 $62,182, and $36,171, respectively (Table 5.10.4-1).

Maine's poverty rate (i.e., the percentage of persons in poverty) for all ages was 10.8 percent in 2021 (Table 5.10.4-1). Cumberland County, Sagadahoc County, and the town of Brunswick all had lower poverty rates than the state of Maine, at 7.7, 8.7, and 9.5%, respectively, while the town of Topsham observed a higher poverty rate than the state, at 12.5% (Table 5.10.4-1).

Table 5.10.4-1. Income and Poverty, 2021

	Cumberland County	Sagadahoc County	Town of Brunswick	Town of Topsham	State of Maine
Total households	125986	15879	6818	3009	571064
Average household size	2.32	2.29	2.19	2.27	2.31
Median household income	$80,679	$73,343	$65,285	$70,268	$62,182
Percentage of State	130%	118%	105%	113%	--
Percentage of U.S. ($69,021)	117%	106%	95%	102%	90%
Per capita income	$45,704	$37,443	$38,689	$37,979	$36,171
Percentage of State	126%	104%	107%	105%	--
Percentage of U.S. ($37,638)	121%	99%	103%	101%	96%
Persons in Poverty	7.7%	8.7%	9.5%	12.5%	10.8%

Source: US Census 2023

5.10.5 Project Vicinity Employment Sources

Table 5.10.5-1 depicts the Census Bureau's 2021 statistics for the unemployment rate and labor force for the Project area. As shown, the 2.4% unemployment rate in Cumberland County is slightly lower than the state unemployment rate of 2.7% (Table 5.10.5-1). Sagadahoc County and the town of Brunswick are slightly higher than Maine's unemployment rate, at 2.8 and 2.9 percent, respectively, while the town of Topsham is the highest, at 4.1 percent (Table 5.10.5-1).

Table 5.10.5-1. Labor Force and Unemployment, 2021

	Cumberland County	Sagadahoc County	Town of Brunswick	Town of Topsham	State of Maine
Labor Force	173,791	19,728	9,165	3,457	713,221
Unemployment	2.4%	2.8%	2.9%	4.1%	2.7%

Source: US Census 2021b, US Census 2021c

Table 5.10.5-2 presents industry and occupation statistics for 2021 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 5.10.5-2). 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 5.10.5-2). The most common industries for all municipalities and counties within the Project area were educational services, health care, and social assistance (Table 5.10.5-2).

Table 5.10.5-2. Industry and Occupation for Civilian Population 16 Years and Over, 2021

	Cumberland County	Sagadahoc County	Town of Brunswick	Town of Topsham	State of Maine
Occupation					
Management, business, science, & arts	49.1%	41.1%	52.8%	40.7%	39.7%
Service	15.0%	16.4%	16.2%	17.7%	17.0%
Sales & office	20.4%	19.7%	16.8%	25.9%	20.6%
Natural resources, construction, maintenance	6.4%	12.7%	3.8%	11.1%	10.6%
Production, transportation, material moving	9.2%	10.1%	10.4%	4.7%	12.1%
Industry					
Agriculture, forestry, fishing and hunting, and mining	1.1%	1.4%	0.6%	0.1%	2.4%
Construction	5.7%	9.4%	3.5%	4.1%	7.6%

	Cumberland County	Sagadahoc County	Town of Brunswick	Town of Topsham	State of Maine
Manufacturing	7.6%	10.9%	8.9%	7.8%	8.8%
Wholesale trade	2.0%	2.2%	0.9%	2.2%	1.9%
Retail trade	11.1%	12.6%	9.9%	16.0%	12.7%
Transportation and warehousing, and utilities	3.8%	3.1%	4.4%	3.3%	4.3%
Information	2.4%	1.8%	1.5%	1.7%	1.7%
Finance and insurance, and real estate and rental and leasing	10.0%	5.0%	6.4%	5.2%	6.6%
Professional, scientific, and management, and administrative and waste management services	12.8%	8.9%	9.9%	10.0%	9.5%
Educational services, and health care and social assistance	27.7%	26.0%	35.1%	24.4%	27.7%
Arts, entertainment, and recreation, and accommodation and food services	8.8%	9.4%	11.0%	12.8%	7.9%
Other services, except public administration	4.0%	4.3%	5.6%	8.5%	4.4%
Public administration	2.9%	4.9%	2.3%	3.8%	4.4%

Source: US Census 2021b, US Census 2021c

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 (Table 5.10.5-3), and in Sagadahoc County that employer is Bath Iron Works, with 6,001 – 6,500 employees (Table 5.10.5-3). Within Cumberland County Unum Group, Idexx Laboratories Inc., Bowdoin College, and Wex Inc. employ approximately the same number of individuals, at 1,001 – 1,500 people, followed by Idexx Operations Inc., Idexx Distribution Inc., LL Bean Inc., MaineHealth, and Northern Light Mercy Hospital, each employing approximately 501 – 1,000 people (Table 5.10.5-3).

In Sagadahoc County, following Bath Iron Works is Hannaford Bros., Grace Management Inc., Reed & Reed Inc., Target, Crooker Construction LLC, Home Depot, the YMCA, Shaw’s (supermarket), and Computer Sciences Corporation, each employing between 1 and 500 individuals (Table 5.10.5-4).

Table 5.10.5-3. Top 10 Private Employers in Cumberland County by Average Monthly Employment (1st Quarter 2023)

Rank	Employer	Number of Employees	Business Description
1	MaineHealth	6,501 - 7,000	General medical and surgical hospitals
2	Unum Group	2,001 - 2,500	Direct life insurance carriers
3	Idexx Laboratories Inc	1,001 - 1,500	Pharmaceutical preparation manufacturing
4	Bowdoin College	1,001 - 1,500	Colleges, universities, and professional schools
5	Wex Inc	1,001 - 1,500	Financial transactions processing, reserve, and clearinghouse activities
6	Idexx Operations Inc	501 - 1,000	Drugs and druggists' sundries merchant wholesalers
7	MaineHealth	501 - 1,000	General medical and surgical hospitals
8	LL Bean Inc	501 - 1,000	General warehousing and storage
9	Northern Light Mercy Hospital	501 - 1,000	General medical and surgical hospitals
10	Idexx Distribution Inc	501 - 1,000	Other professional equipment and supplies merchant wholesalers

Source: Maine.gov 2023

Table 5.10.5-4. Top 10 Private Employers in Sagadahoc County by Average Monthly Employment (1st Quarter 2023)

Rank	Employer	Number of Employees	Business Description
1	Bath Iron Works	6,001 - 6,500	Ship building and repair
2	Hannaford Bros Co LLC	1 - 500	Supermarkets and other grocery retailers (except convenience retailers)
3	Grace Management Inc	1 - 500	Continuing care retirement communities
4	Reed & Reed Inc	1 - 500	Highway, street, and bridge construction
5	Target Corp	1 - 500	Department stores
6	Crooker Construction LLC	1 - 500	Highway, street, and bridge construction
7	The Home Depot	1 - 500	Home centers
8	Bath Area Family YMCA	1 - 500	Civic and social organizations
9	Shaw's Bath	1 - 500	Supermarkets and other grocery retailers (except convenience retailers)
10	Computer Sciences Corporation	1 - 500	Computer facilities management services

Source: Maine.gov 2023

5.10.6 References

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5.11 <u>Environmental Justice</u>

5.11.1 Overview

Consistent with Executive Orders 12898[29] and 14008,[30] BWPH provides the following Environmental Justice (EJ) information for the Project. This analysis is meant to provide an understanding of the number of EJ communities and sensitive receptor locations present within the Project area and identify if there is a need for further study.

5.11.2 Identification of Environmental Justice Communities

The thresholds used for populations meeting EJ status are as follows:

- The "meaningfully greater analysis" and the "50 percent" methods were used to determine EJ status based on race:
  - To meet EJ criteria using the "meaningfully greater analysis," a block group qualifies as having EJ communities if the total minority population for a block group is at least 10 percent greater than that of the county population:
    - (County minority population) x (1.10) = threshold above which a block group minority population must be for inclusion as an environmental justice community.
  - To meet EJ criteria using the "50 percent" method, the total minority population must be greater than 50 percent to qualify as an EJ community.
- The "low-income threshold criteria" was used to identify environmental justice communities based on income level, where the block group must have a higher percentage of low-income households than the county.

5.11.3 Environmental Justice Communities Identified

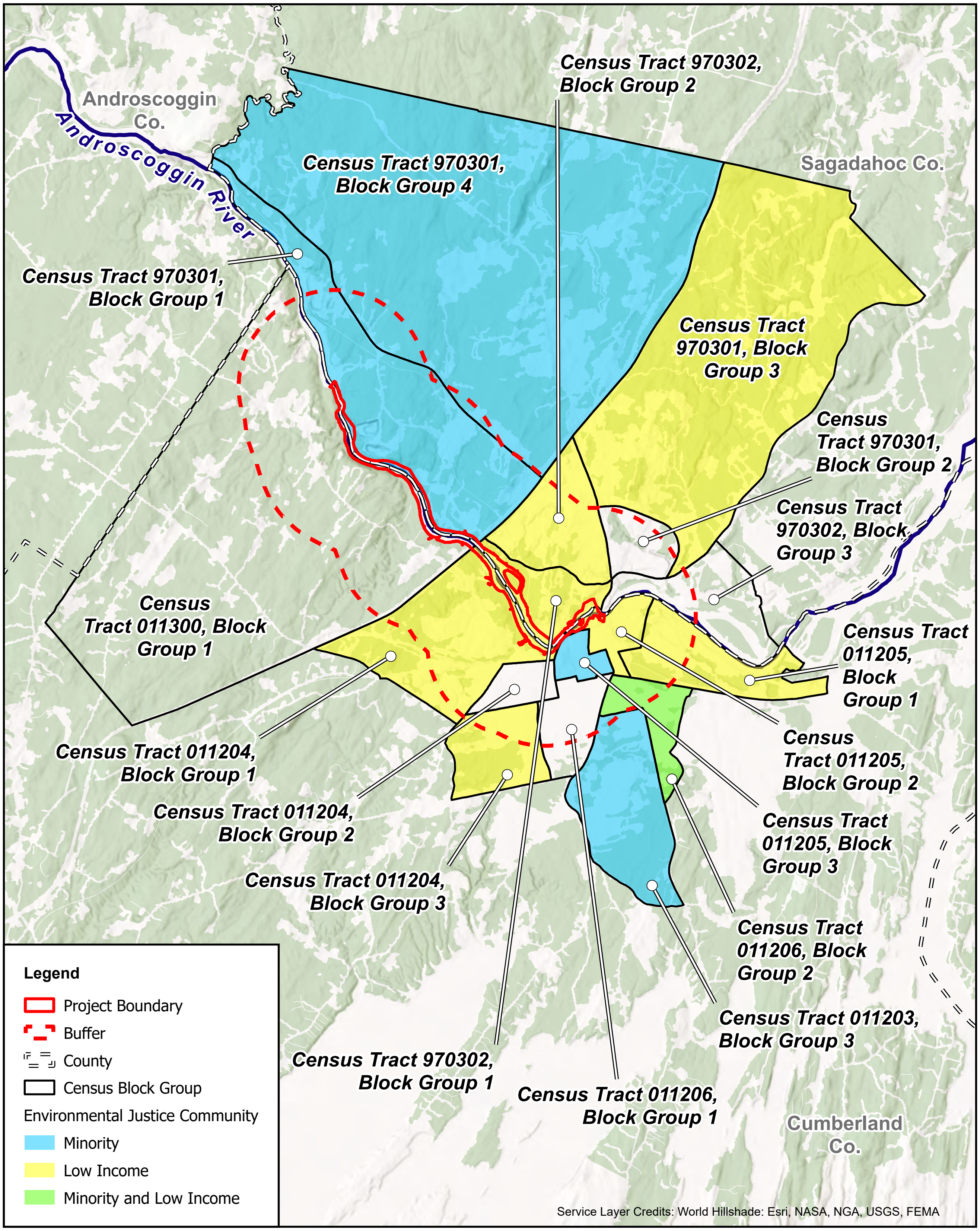
The Project is located on the Androscoggin River in the communities of Brunswick and Topsham, and in the counties of Cumberland and Sagadahoc, Maine. Within a one-mile zone around the Project boundary there are seventeen census block groups that could potentially be impacted by the proposed FERC relicensing, including ten block groups in Cumberland County, and seven block groups in Sagadahoc County. Sixteen of the census block groups within the Project area include minority populations, five of which meet requirements for status as environmental justice communities related to race.

In addition to race, environmental justice communities include groups of individuals with income levels below poverty level, measured by household. Within the Project area there are eight communities meeting environmental justice status related to household income level (Table 5.11.3-1).

The final community analyzed for environmental justice includes individuals that are unable to speak English. Within the Project area there are no such individuals identified in any block groups (United States Census 2021).

[29] Exec. Order No. 12898, 59 Fed. Reg. 7629 (Feb. 16, 1994). Federal Actions to Address Environmental Justice in Minority and Low-Income Populations.
[30] Exec. Order No. 14008, 86 Fed. Reg. 7619-7633 (Jan. 27, 2021) Tackling the Climate Change Crisis at Home and Abroad.

There are seven block groups that directly border Project lands; within those seven groups, two block groups have a minority environmental justice community, and three block groups include low-income environmental justice communities. (Table 5.11.3-1) (Figure 5.11.3-1).



Brookfield

Brunswick Hydroelectric Project (FERC No. 2284)

Figure 5.11.3-1: Map of Census Block Groups and Environmental Justice Populations within the Project Area

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Table 5.11.3-1. Environmental Justice Communities Within a One Mile Area Surrounding the Brunswick Project

	Race and Ethnicity Data*										Low-Income Data*	Language Data
Geographic Area	**Total Population (count)**	**White Alone, not Hispanic (count)**	**African American / Black (count)**	**Native American / Alaska Native (count)**	**Asian (count)**	**Native Hawaiian & Other Pacific Islander (count)**	**Some Other Race (count)**	**Two or More Races (count)**	**Hispanic or Latino (count)**	**Total Minority Population (%)**	**Below Poverty Data (%)**	**Non-English Speaking Persons Aged 5 Years and Greater (%)**
Maine	1357046	1248581	18834	6953	14789	188	3296	39879	24526	8%	12%	0%
Cumberland County	300776	266750	9422	367	6602	59	962	9991	6623	11%	9%	0%
Census Tract 011205, Block Group 1	901	810	6	0	60	0	0	0	25	10%	28%	0%
Census Tract 011204, Block Group 3	1780	1737	0	0	0	0	11	32	0	2%	13%	0%
Census Tract 011203, Block Group 3	2086	1823	39	0	45	0	15	27	137	13%	0%	0%
Census Tract 011204, Block Group 1	752	674	39	0	0	0	0	39	0	10%	13%	0%
Census Tract 011204, Block Group 2	981	876	0	0	11	0	0	21	73	11%	0%	0%
Census Tract 011300, Block Group 1	1626	1513	5	0	13	0	0	81	14	7%	1%	0%
Census Tract 011205, Block Group 2	1230	1210	9	0	11	0	0	0	0	2%	14%	0%

	Race and Ethnicity Data*										Low-Income Data*	Language Data
Geographic Area	Total Population (count)	White Alone, not Hispanic (count)	African American / Black (count)	Native American / Alaska Native (count)	Asian (count)	Native Hawaiian & Other Pacific Islander (count)	Some Other Race (count)	Two or More Races (count)	Hispanic or Latino (count)	Total Minority Population (%)	Below Poverty Data (%)	Non-English Speaking Persons Aged 5 Years and Greater (%)
Census Tract 011205, Block Group 3	671	515	129	0	0	0	0	25	2	23%	5%	0%
Census Tract 011206, Block Group 2	2191	1643	113	0	84	0	0	145	206	25%	18%	0%
Census Tract 011206, Block Group 1	2061	1878	9	0	53	0	0	54	67	9%	5%	0%
Sagadahoc County	36530	34210	232	76	259	0	99	948	706	6%	12%	0%
Census Tract 970302, Block Group 2	1996	1881	0	0	0	0	0	57	58	6%	21%	0%
Census Tract 970301, Block Group 2	526	526	0	0	0	0	0	0	0	0%	8%	0%
Census Tract 970301, Block Group 1	926	834	82	0	0	0	0	10	0	10%	2%	0%
Census Tract 970301, Block Group 3	1644	1572	0	0	58	0	0	0	14	4%	22%	0%
Census Tract 970301, Block Group 4	1060	786	20	0	37	0	23	139	55	26%	3%	0%

	Race and Ethnicity Data*										Low-Income Data*	Language Data
Geographic Area	**Total Population (count)**	**White Alone, not Hispanic (count)**	**African American / Black (count)**	**Native American / Alaska Native (count)**	**Asian (count)**	**Native Hawaiian & Other Pacific Islander (count)**	**Some Other Race (count)**	**Two or More Races (count)**	**Hispanic or Latino (count)**	**Total Minority Population (%)**	**Below Poverty Data (%)**	**Non-English Speaking Persons Aged 5 Years and Greater (%)**
Census Tract 970302, Block Group 3	964	897	0	0	41	0	26	0	0	7%	11%	0%
Census Tract 970302, Block Group 1	1130	1125	0	0	5	0	0	0	0	0%	12%	0%

Source: US Census 2021
*Cells highlighted in grey represent EJ communities

5.11.4 Sensitive Receptor Locations

Sensitive receptor locations refer to places where residents are more susceptible to the effects of pollution and environmental hazards. They include, but are not limited to, childcare facilities, schools, hospitals, and senior living facilities. Within a 1-mile zone around the Project there are twenty-two sensitive receptor locations, consisting of six schools, six childcare facilities, one behavioral health facility, eight assisted living facilities, and a facility providing vocational training to adults with disabilities (Table 5.11.4-1).

Table 5.11.4-1. Sensitive Receptor Locations Within One Mile Surrounding the Brunswick Project

Sensitive Receptor	Distance from Project Boundary (Miles)
FAMILY FOCUS - TOPSHAM WOODSIDE ELEM. SCHOOL	0.62
FAMILY FOCUS - WILLIAMS CONE SCHOOL	0.58
STEPPING STONES CHILDCARE - TOPSHAM	0.76
BRIGHT START AT MID - COAST EARLY CHILDHOOD CENTER	0.64
PEJEPSCOT DAY SCHOOL	0.59
FAMILY FOCUS - COFFIN SCHOOL - AGE PROGRAM	0.84
BOWDOIN COLLEGE CHILDREN'S CENTER	0.88
FAMILY FOCUS – BRUNSWICK	0.18
WATCH ME GROW DAYCARE	0.78
MCKEEN STREET LEARNING CENTER	0.61
ST. JOHN CATHOLIC SCHOOL	0.33
BATH AREA FAMILY YMCA - KATE FURBISH SCHOOL	0.66
FRIENDSHIP COVE	0.63
SPRING STREET	0.41
CADIGAN LODGE	0.67
CHURCH ROAD	0.68
ACHIEVEMENT HOUSE	0.71
16 ROCKY HILL DRIVE	0.20
ELM STREET AL	0.71
TOPSHAM ADULT RESIDENTIAL	0.20
3 PINEWOOD DRIVE	0.97
HEARTWOOD COTTAGE	0.77

Source: USDHS 2023a, 2023b, 2023c, 2023d, 2023e, 2023f, 2023g, 2023h

5.11.5 References

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5.12 Tribal Resources (18 CFR §5.6(d)(3)(xii))

5.12.1 Tribal Lands and Interests

The Project includes no Tribal lands. BWPH has included representatives from the Aroostook Band of Micmacs, the Penobscot Indian Nation, the Passamaquoddy Tribe, and the Houlton Band of Maliseet as part of the distribution list for this PAD.

Further, per 18 CFR §5.7 of the ILP regulations, FERC will hold a tribal consultation meeting, no later than 30 days following filing of the NOI, with any Indian tribe with potential to be affected by the future license application, if the affected Indian tribe agrees to such meeting.

6 PRELIMINARY ISSUES AND STUDIES LIST

6.1 Known or Potential Effects of Relicensing

This section identifies any known or likely effects of relicensing the continued operation of the existing Project. For the purposes of this PAD, Project effects are any new changes to the natural and human environment attributable to relicensing the continued operation of the Project.

6.1.1 Anticipated Project Effects

FERC issued a new license for the Pejepscot Project in 1979. The Project has operated for 45 years under the current license conditions and, exclusive of fish passage, no significant effects are anticipated from relicensing the continued run-of-river operation of the Project (no changes to project structures or operations are being proposed at this time).

Regarding fish passage, the listing of Atlantic salmon under ESA triggered consultation with NMFS, which has resulted in additional study and mitigation commitments. These efforts will continue to occur on a separate, parallel path during the Project relicensing.

6.2 Preliminary Issues, Studies, and Measures by Resource (18 CFR §5.6(d)(4))

Based on the information provided in section 5.0, BWPH believes that sufficient information already exists for the majority of environmental resources at the Project. As such, and as discussed in section 6.2, BWPH is proposing three studies at this time: 1) a baseline water quality assessment; 2) a Project recreation site inventory, and 3) a Phase I Pre and Post contact archaeology and historic structures survey.

Parties to the relicensing have an opportunity to comment on this PAD and request other studies that they deem necessary to fully evaluate the effects of continued Project operations. As noted previously in Section 2.3, study requests must be made in writing to FERC and BWPH no later than 60 days after FERC issues SD1. Study requests should consider the following:

- Identifying the determination of necessary studies to be performed or information to be provided by the applicant;
- Identifying the basis for its determination;
- Discussing its understanding of the resource issues and its goals and objectives for these resources;
- Explaining why each study methodology recommended by it is more appropriate than any other available methodology alternatives, including those identified by the potential applicant;
- Documenting that the use of each study methodology recommended by it is a generally accepted practice;
- Explaining how the studies and information requested will be useful to the agency, Indian tribe, or member of the public in furthering its resource goals and objectives.

Nexus with Project operations and effects is a particularly important criterion that is frequently overlooked. FERC's 2012 *Guide to Understanding and Applying the Integrated Licensing Process Study Criteria* provides additional explanation:

This section of a study request should clearly explain the connection between the Project and its potential effect on the applicable resource. A reasonable connection between Project construction or operation and potential effects on the resource in question is a threshold requirement that must be demonstrated for the Commission to require that an applicant gather the requested information. Just as important, this section should also explain how the information would be used to develop license conditions.

In addition, it is important to note that in FERC relicensing, the environmental baseline used for National Environmental Policy Act (NEPA) analysis is "existing conditions". As noted in FERC's Guide, "Commission staff will not require an applicant to reconstruct pre-project conditions." Specific to this Project, that means the current dam and hydropower facility operating under the current water management regime. As such, studies which examine pre-Project conditions or seek to compare current conditions to pre-Project conditions are not warranted.

6.2.1 Geology and Soils

6.2.1.1 Potential Issues and Project Effects

As described in Section 5.1, Project shorelines are primarily forested with limited areas of development. The erosive potential of soils surrounding the Project Area is low. The continued run-of-river operation of the Project is not likely to affect geologic resources or to cause significant erosion.

6.2.1.2 Proposed Studies

BWPH does not propose a study at this time.

6.2.1.3 Continued or Proposed PM&E Measures

The Project, in accordance with the current FERC license, operates as run-of-river with little fluctuation in the impoundment level, limiting the potential for project-induced erosion in the Project impoundment. No specific PM&E measures are currently in place or proposed relative to geologic or soil resources.

6.2.2 Water Resources

6.2.2.1 Potential Issues and Project Effects

The Androscoggin River in the Project area is classified as Class B. As described in Section 5.2, readily available water quality data collected for the lower Androscoggin River by MDEP and others both upstream and downstream of the Project, strongly suggests that Project water quality meets the current classification standards. In addition, because the Project is operated as essentially run of river, and because the impoundment is small and is operated with limited fluctuations, it is not likely that the operation of the Project causes impoundment stratification or significant warming of impoundment waters that could lead to downstream releases of high temperature or low dissolved oxygen waters. However, there is no recent water quality data specific to the Project impoundment and tailwater. Run of river operations are protective of aquatic habitats in the Project Area because the impoundment is maintained at stable elevations and outflow from the Project matches inflow. As such, no aquatic habitat studies are being proposed.

6.2.2.2 Proposed Studies

BWPH proposes to conduct a trophic state study of the Project impoundment, as well as riverine water quality sampling of the Project tailwater in accordance with the MDEP Sampling Protocol for Hydropower

Studies (November 2021). BWPH plans on conducting the studies to demonstrate continued compliance with applicable state water quality standards.

<u>Impoundment Trophic State Study</u>

The Project impoundment will be sampled twice each month for at least five consecutive months (June through October). Sample parameters will include Secchi disk transparency, temperature profiles, dissolved oxygen profiles, Chlorophyll-a, color, pH, total phosphorus, and total alkalinity.

Additional lake trophic and dissolved metal analyses will be completed during one of the late summer sampling events when the Project impoundment may be thermally stratified (typically in August, but dependent on weather conditions). The late summer sample parameters will include total phosphorus, nitrate, Chlorophyll-a, color, dissolved organic carbon, pH, total alkalinity, total iron, total dissolved aluminum, total calcium, total magnesium, total sodium, total potassium, total silica, specific conductance, chloride, and sulfate.

This late season sample will be completed regardless of whether the Project impoundment stratifies; if the waterbody is thermally stratified, samples will be collected (1) from an epilimnetic core, (2) at the top of the hypolimnion, and (3) at one meter above the sediment. If the Project impoundment is not thermally stratified, only one sample from an integrated epilimnetic water core will be taken from the surface to two times the Secchi disk depth or within 1 meter of the bottom, whichever is less.

<u>Tailwater Temperature and Dissolved Oxygen Study</u>

BWPH will monitor water temperature and dissolved oxygen in the tailwater area using data sonde(s) to collect continuous hourly data during the July-August period. Initial measurements of temperature and dissolved oxygen will be taken at quarter points across the river channel to determine if there are any significant differences in dissolved oxygen concentration across the channel. If there is no significant (<0.4 mg/l) difference in concentrations among the quarter points, subsequent measurements will be made at a location representative of the main flow. Otherwise, measurements will be made at the location of the lowest concentration and the location of the main flow.

<u>Tailwater Benthic Macroinvertebrate Study</u>

The proposed tailwater macroinvertebrate study will be designed following MDEP's Methods for Biological Sampling and Analysis of Maine's Rivers and Streams. A sampling station within the downstream Project Area will be established within representative habitat downstream of the Project facilities. Rock filled mesh bags or wire baskets will be deployed for macroinvertebrate collections. A total of three samplers will be deployed at the site. Sampling will be conducted during the summer, low flow period (July 1 – September 30) for 28 days ± 4 days.

6.2.2.3 Continued or Proposed PM&E Measures

The Project, in accordance with the current FERC license, operates as run-of-river with very little fluctuation in the impoundment level. No specific PM&E measures are currently in place or proposed relative to water resources.

6.2.3 Fish and Aquatic Resources

6.2.3.1 Potential Issues and Project Effects

The Project is operated as run-of-river relative to pond levels. BWPH is not currently proposing any changes to its existing operations for the next license term; therefore, continued operations are expected to provide and maintain aquatic habitats in support of the existing fish and aquatic resources in the Project area.

The Project Dam, like all mainstem river dams, presents a barrier to upstream and downstream movement of migratory fish species. On this portion of the Androscoggin River, the primary effects would be on diadromous species including Atlantic Salmon, American Shad, river herring, and American Eel. To date, studies with a small sample size of fish have been conducted for Atlantic Salmon as too few adult fish have returned to the Androscoggin River to thoroughly study upstream passage effectiveness at the Project (Section 5.3.4.3). If enough Atlantic Salmon returned, an upstream passage study would be triggered by the final SPP that was incorporated into the current license.

Upstream passage effectiveness at the Project for American Shad and river herring has been studied (Section 5.3.4.4). Annual capture of river herring in the upstream fish passage facility average approximately 71,000 fish (Table 5.3.1-4); however, recent studies indicate passage efficiency is low for this species. Annual captures of American Shad in the upstream fish passage facility average 100 individuals; however, recent studies also indicate passage efficiency is low. No assessment of upstream American Eel passage has been conducted.

For downstream passage of diadromous species, BWPH studied Atlantic Salmon smolt passage through the Project and found survival to be relatively high (Section 5.3.4.1). Based on those studies, further measures have been taken at the Project that would result in high smolt survival. These measures were mandated by NMFS in the Reasonable Prudent Measures and Terms and Conditions of the 2022 Biological Opinion and were incorporated into the current Project license. Downstream passage effectiveness for American Shad, river herring and American Eel has not been conducted at the Project.

6.2.3.2 Proposed Studies

BWPH proposes to the conduct the following studies related to Fish and Aquatic Resources.

<u>Computational Fluid Dynamics Modeling – Upstream and Downstream Passage</u>

BWPH is proposing to conduct CFD modeling in the vicinity of the Project forebay/downstream fishway entrance, as well as in the Project tailrace/near the entrance of the upstream fish passage facility. The modeling will provide a better understanding of flow field conditions that exist in these areas, and how those conditions may be affecting migratory fish movements. The results of this modeling effort will also be coupled with the Upstream and Downstream Passage Alternatives Study (see below) to evaluate potential modifications to the upstream and downstream fish passage systems at the Project.

<u>Upstream and Downstream Passage Alternatives Study</u>

BWPH is proposing to conduct an Upstream and Downstream Passage Alternatives Study that will include evaluations of previously conducted telemetry studies at the Project, an evaluation of the existing upstream and downstream fish passage facilities at the Project as compared to agency design criteria, a desktop evaluation of entrainment potential, as well as an evaluation of potential upstream and downstream passage alternatives. The study results will be used to identify potential measures and/or modifications, as necessary, for improving upstream and downstream fish passage at the Project.

<u>Visual Survey of Upstream American Eel Movements</u>

BWPH proposes to conduct a total of 12 nighttime visual monitoring surveys during the primary period of upstream eel migration (June 1 - August 31). Surveys will be conducted twice weekly from June 1 to July 15, once weekly from July 15 to August 15 and a final survey during the last two weeks of August. All surveys will begin approximately 30 minutes after sunset. A pre-determined set of information will be recorded at each survey point and observations of eels (i.e., presence/absence, abundance, and distribution among pre-defined size classes) will be recorded. The study results will be used to understand upstream American Eel movements at the Project, and to inform potential measures and/or modifications for upstream passage of this species.

6.2.3.3 Continued or Proposed PM&E Measures

The Project, in accordance with the current FERC license, operates as run-of-river with very little fluctuation in the impoundment level. In addition, the Project also operates upstream and downstream fish passage facilities. No other specific PM&E measures are currently in place or proposed relative to fish and aquatic resources.

6.2.4 Wildlife and Botanical Resources

6.2.4.1 Potential Issues and Project Effects

There are no significant habitats for terrestrial resources or rare and exemplary natural communities that have been identified by the Maine Natural Areas Program, MDIFW, or USFWS within the Project Area. The plant communities that currently exist within the Project boundary have become established under the operating regime that has existed for many years since the Project was constructed. Therefore, it is anticipated that continued operations will not result in adverse effects on wildlife and botanical resources.

6.2.4.2 Proposed Studies

BWPH does not propose a study at this time.

6.2.4.3 Continued or Proposed PM&E Measures

The Project, in accordance with the current FERC license, operates as run-of-river with very little fluctuation in the impoundment level, limiting the potential for wildlife and botanical resource impacts. No specific PM&E measures are currently in place or proposed relative to wildlife and botanical resources.

6.2.5 Wetlands, Riparian, and Littoral Habitat

6.2.5.1 Potential Issues and Project Effects

The wetland, riparian, and littoral habitats that currently exist within the Project boundary have become established under the existing operating regime that has existed for many years since the Project was constructed. Therefore, it is anticipated that continued operations will not result in adverse effects on wetland, riparian, and littoral habitats.

6.2.5.2 Proposed Studies

BWPH does not propose a study at this time.

6.2.5.3 Continued or Proposed PM&E Measures

The Project, in accordance with the current FERC license, operates as run-of-river with very little fluctuation in the impoundment level, limiting the potential for wetland, riparian, and littoral resource impacts. No specific PM&E measures are currently in place or proposed relative to wetland, riparian, and littoral resources.

6.2.6 Threatened and Endangered Species

6.2.6.1 Potential Issues and Project Effects

The USFWS IPaC Trust Resource Report identifies the presence of critical habitat for Atlantic salmon and Atlantic sturgeon within the Project boundary. Critical habitat for Atlantic salmon on the Androscoggin includes the mainstem and all tributaries from Merrymeeting Bay up to the confluence with the Little Androscoggin River in Auburn, but not including the Little Androscoggin River. This upstream extent of designated critical habitat is about 0.5 miles downstream of the Lewiston Falls Hydroelectric Project. In addition, the Project tailwater area is in designated critical habitat for the threatened Atlantic sturgeon and within the known range of the endangered shortnose sturgeon.

6.2.6.2 Proposed Studies

Significant study work related to Atlantic salmon and fish passage at the Project has been undertaken and is ongoing; while the results of this work will be used to inform the relicensing, these studies are part of a separate ESA consultation process with NMFS. See Section 5.3.4 for a description of the recent and ongoing studies related to Atlantic salmon passage efforts.

6.2.6.3 Continued or Proposed PM&E Measures

Except for the continuing measures to provide for the protection of Atlantic salmon, shortnose sturgeon and Atlantic sturgeon, there are no other PM&E measures in place relative to Threatened and Endangered resources, and none are proposed.

6.2.7 Recreation and Land Use

6.2.7.1 Potential Issues and Project Effects

There are several FERC-approved Project recreation facilities providing access to Project lands and waters; none of these facilities have been reported to experience high use or to be at capacity in previous FERC Form 80 Recreation Reports. There are currently no known issues related to recreation or land use at the Project.

6.2.7.2 Proposed Studies

BWPH proposes to conduct a recreation use and condition assessment at the Project recreation facilities. The proposed methodology consists of conducting a site inventory, condition assessment, and user survey at all Project recreation sites. The site inventory and condition assessment will include photographs of the sites, an estimate of parking capacity provided at each site, an assessment of the overall condition of each site, and general observations on site use and accessibility. The user survey will be conducted as an online survey, with signage directing site visitors to the survey posted at each Project recreation site. The survey instrument will be designed to gather information on general visitor characteristics; use patterns including activities engaged in, mode of transportation, number of visits per year, and seasonality of use; and visitor perceptions of various site parameters, including overall site condition, adequacy of site amenities, perception of crowding, and whether the site serves user needs/interests. The survey will be open for responses during the primary open water recreation period (Memorial Day through Columbus Day).

6.2.7.3 Continued or Proposed PM&E Measures

BWPH will continue to provide for public access and use of Project lands and waters as appropriate and consistent with Project purposes.

6.2.8 Aesthetic Resources

6.2.8.1 Potential Issues and Project Effects

There are currently no known issues related to aesthetic resources at the Project. The Project has limited lands and view-sheds, and the dam and powerhouses are in keeping with the industrial nature of the immediate surroundings.

6.2.8.2 Proposed Studies

BWPH does not propose a study at this time.

6.2.8.3 Continued or Proposed PM&E Measures

No measures have been identified and none are proposed.

6.2.9 Cultural Resources

6.2.9.1 Potential Issues and Project Effects

The Project is operated as run-of-river and no significant erosion or exposure of resources of significance has been documented. Ground disturbances associated with activities such as land-clearing or construction activities can expose culturally significant resources, making them susceptible to alteration, damage, and theft/vandalism; however, no such activities are currently being proposed in this relicensing. The proposed relicensing of the Project anticipates that the Project will be operated without significant changes to its facilities or operations.

6.2.9.2 Proposed Studies

BWPH is proposing to conduct a (1) historic architectural survey; (2) historic archaeological resources survey: and (3) pre-historic archaeological resource survey in accordance with MHPC guidelines.

The historic architectural survey will include archival research, a visual inspection of the Project facilities including the dam, powerhouse, and all associated buildings and structures, as well as buildings and structures within the Project boundary to identify and evaluate affected resources that have the potential for inclusion in the NRHP.

The archaeological surveys will include background archival research, a walkover of areas where previously reported archaeological sites or map-documented structures are identified, and a walkover of Project facilities and the river corridor extending from the Project Dam to the upstream extent of the Project boundary. The following phase will include subsurface testing as needed to confirm geomorphology, erosion, and disturbance, in addition to photography of landforms and areas of interest. The findings of the surveys will be reviewed in consultation with MHPC, and future surveys will be identified, if necessary.

6.2.9.3 Continued or Proposed PM&E Measures

The need for PM&E measures will be determined in consultation with MHPC during the relicensing process.

6.2.10 Socio-Economic Resources

6.2.10.1 Potential Issues and Project Effects

There are currently no known issues related to socioeconomic resources at the Project.

6.2.10.2 Proposed Studies

BWPH does not propose a study at this time.

6.2.10.3 Continued or Proposed PM&E Measures

No measures have been identified and none are proposed at this time.

6.2.11 Environmental Justice

6.2.11.1 Effects

There are currently no known issues related to environmental justice at the Project.

6.2.11.2 Proposed Studies

BWPH does not propose a study at this time.

6.2.11.3 Continued or Proposed PM&E Measures

No measures have been identified and none are proposed at this time.

6.2.12 Tribal Resources

6.2.12.1 Potential Issues and Project Effects

The Aroostook Band of Micmacs, the Penobscot Indian Nation, the Passamaquoddy Tribe, and the Houlton Band of Maliseet have been contacted to determine the tribe's interest in the relicensing of the Project. To date, there has been no response and thus no issues have been identified.

6.2.12.2 Proposed Studies

BWPH does not propose a study at this time.

6.2.12.3 Continued or Proposed PM&E Measures

No measures have been identified and none are proposed.

7 POTENTIALLY RELEVANT QUALIFYING FEDERAL AND STATE OR TRIBAL COMPREHENSIVE WATERWAY PLANS

7.1 Potentially Relevant Resource Management Plans

Section 10(a)(2)(A) of the FPA, 16 USC § 803(a)(2)(A), requires FERC to consider the extent to which a project is consistent with Federal or state comprehensive plans for improving, developing, or conserving a waterway affected by the project. FERC Order No. 481-A, issued on April 27, 1998, established that FERC will accord comprehensive plan status under FPA Section 10(a)(2)(A) to any Federal or state plan that:

- Is a comprehensive study of one or more of the beneficial uses of a waterway or waterways;
- Specifies the standards, the data, and the methodology used; and
- Is filed with the Secretary of the Commission.

Based on FERC's September 2023 (FERC 2023) revised list of comprehensive plans for Maine the following plans may be relevant to the Project:

Atlantic States Marine Fisheries Commission. 1999. Amendment 1 to the Interstate Fishery Management Plan for shad and river herring. (Report No. 35). April 1999.

Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American eel (Anguilla rostrata). (Report No. 36). April 2000.

Atlantic States Marine Fisheries Commission. 2000. Technical Addendum 1 to Amendment 1 of the Interstate Fishery Management Plan for shad and river herring. February 9, 2000.

Atlantic States Marine Fisheries Commission. 2008. Amendment 2 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2008.

Atlantic States Marine Fisheries Commission. 2009. Amendment 2 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. May 2009.

Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. February 2010.

Atlantic States Marine Fisheries Commission. 2013. Amendment 3 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. August 2013.

Atlantic States Marine Fisheries Commission. 2014. Amendment 4 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2014.

Maine Atlantic Sea-Run Salmon Commission. 1984. Strategic plan for management of Atlantic salmon in the State of Maine. Augusta, Maine. July 1984.

Maine Bureau of Parks & Lands (BPL). 2019. Maine State Comprehensive Outdoor Recreation Plan 2020-2024. December 2019.

Maine Department of Agriculture, Conservation, & Forestry. Maine State Comprehensive Outdoor Recreation Plan (SCORP): 2014-2019. Augusta, Maine.

Maine Department of Conservation. 1982. Maine Rivers Study-final report. Augusta, Maine. May 1982.

Maine State Planning Office. 1987. Maine Comprehensive Rivers Management Plan Vols 1-3. Augusta, Maine. May 1987.

Maine State Planning Office. 1992. Maine Comprehensive Rivers Management Plan. Volume 4. Augusta, Maine. December 1992.

National Marine Fisheries Service. 1998. Final Amendment #11 to the Northeast Multi-species Fishery Management Plan; Amendment #9 to the Atlantic sea scallop Fishery Management Plan; Amendment #1 to the monkfish Fishery Management Plan; Amendment #1 to the Atlantic salmon Fishery Management Plan; and Components of the Proposed Atlantic herring Fishery Management Plan for Essential Fish Habitat. Volume 1. October 7, 1998.

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.

National Marine Fisheries Service. 2018. Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon. Hadley, Massachusetts. January 2019.

National Park Service. 1993. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C.

U.S. Fish and Wildlife Service. 1989. Atlantic salmon restoration in New England: Final environmental impact statement 1989-2021. Department of the Interior, Newton Corner, Massachusetts. May 1989.

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.

U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Can. May 1986.

U.S. Fish and Wildlife Service. Maine Department of Inland Fisheries and Wildlife. Maine Atlantic Sea Run Salmon Commission. Maine Department of Marine Resources. 1987. Saco River strategic plan for fisheries management. Department of the Interior, Laconia, New Hampshire. January 1987.

7.2 Potentially Relevant Resource Management Plans

In addition to the qualifying Federal and state comprehensive waterway plans listed in section 7.1 above, some agencies have developed resource management plans to help guide their actions regarding specific resources of jurisdiction. The resource management plans listed below may be relevant to the Project and may be useful in the relicensing proceeding for characterizing desired conditions.

Maine Bureau of Parks and Lands. 2020. Maine State Comprehensive Outdoor Recreation Plan (SCORP).

Maine Department of Inland Fisheries & Wildlife. 2015. Maine’s State Wildlife Action Plan. Maine Department of Inland Fisheries & Wildlife, Augusta, ME.

Maine Department of Marine Resources and Maine Department of Inland Fisheries and Wildlife 2017. Draft Fisheries Management Plan for the Lower Androscoggin River, Little Androscoggin River and Sabattus River.

7.3 References

Federal Energy Regulatory Commission. 2023. List of Comprehensive Plan. [Online] URL: https://cms.ferc.gov/media/comprehensive-plans. Date accessed: 10/11/2023.

APPENDIX A – DISTRIBUTION LIST

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Native American Tribes	
Christopher Sockalexis Tribal Historic Preservation Officer Penobscot Indian Nation Cultural and Historic Preservation Program 12 Wabanaki Way Indian Island, ME 04468 chris.sockalexis@penobscotnation.org	Chief Kirk Francis Penobscot Indian Nation 12 Wabanaki Way Indian Island, ME 04468 Kirk.Francis@penobscotnation.org
Chief Clarisa Sabattis Houlton Band of Maliseet Indians 88 Bell Road Littleton, ME 04730 csabattis@maliseets.com	Isaac St. John Tribal Historic Preservation Officer Houlton Band of Maliseet Indians 88 Bell Road Littleton, ME 04730 istjohn@maliseets.com

Donald Soctomah Tribal Historic Preservation Officer Passamaquoddy Tribe PO Box 159 Princeton, ME 04668 Soctomah@gmail.com	Chief William J. Nicholas, Sr. Passamaquoddy Tribe - Indian Township PO Box 301 Princeton, ME 04668 chief.wnicholas@gmail.com
Jenny Gaenzle THPO Mi'kmaq Nation 7 Northern Rd. Presque Isle, ME 04769 jgaenzle@micmac-nsn.gov	Chief Edward Peter Paul Aroostook Band of Micmacs 7 Northern Road Presque Isle, ME 04769 epeterpaul@micmac-nsn.gov
Additional Parties	
Jody Smet Eagle Creek Renewable Energy 7315 Wisconsin Avenue, Suite 1100W Bethesda, MD 20814 jody.smet@eaglecreekre.com	David Fox Eagle Creek Renewable Energy 7315 Wisconsin Avenue, Suite 1100W Bethesda, MD 20814 David.Fox@eaglecreekre.com
Licensee	
Michael Scarzello Brookfield White Pine Hydro LLC Brookfield Renewable Group 150 Main Street Lewiston, ME 04240 Michael.Scarzello@brookfieldrenewable.com	Kirk Smith Director of Regulatory & Environmental Gomez and Sullivan Engineers, DPC P.O. Box 2179 Henniker, NH 03242 ksmith@gomezandsullivan.com

APPENDIX B – SUMMARY OF CONTACTS AND CORRESPONDENCE LETTERS

Brookfield
Renewable

September 29, 2023

TO: ATTACHED DISTRIBUTION LIST

Re: Request for Information for the Brunswick Hydroelectric Project (FERC No. 2284) FERC Relicensing

Dear Relicensing Stakeholder:

The Brunswick Hydroelectric Project (Project), licensed as FERC No. 2284, is located on the Androscoggin River straddling the border between Cumberland and Sagadahoc Counties in the Towns of Topsham and Brunswick, Maine. This renewable energy Project is owned by and licensed to Brookfield White Pine Hydro LLC (BWPH). BWPH is preparing to initiate relicensing of the Project with the Federal Energy Regulatory Commission (FERC or Commission). The Project generally consists of a 4.5 mile long, 300-acre impoundment; a 605-foot long and 40-foot-high concrete gravity dam; a section containing two Tainter gates and an emergency spillway; and a powerhouse and intake. The attached **Figure 1** provides a regional map of the Project's location, while **Figure 2** depicts the Project boundary.

The current FERC license for the Project expires on February 28, 2029. Accordingly, BWPH is preparing a Notice of Intent (NOI) to relicense the Project using the Integrated Licensing Process (ILP), as described in 18 Code of Federal Regulations (CFR), Part 5, and Pre-Application Document (PAD). Both the PAD and NOI will be filed on or before February 28, 2024. The PAD will provide FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project as well as environmental resources within the Project vicinity.

As part of the relicensing process for the Project, BWPH is initiating consultation and coordination with resource agencies and stakeholders. The attached questionnaire will assist BWPH with the collection of any relevant existing resource information pertinent to the Project.

We respectfully request that you please return the completed PAD Questionnaire to Kirk Smith via email at ksmith@gomezandsullivan.com or via mail (please mail to P.O. Box 2179, Henniker, NH, 03242) by October 30, 2023. This will allow for any follow-up contact that may be needed by BWPH before the filing of the NOI/PAD. Your assistance is greatly appreciated.

Thank you in advance for your cooperation. If you have any questions regarding this filing or require additional information, please contact me by phone at (207) 755-5613 or by email at Luke.Anderson@BrookfieldRenewable.com.

Respectfully submitted,

Luke T. Anderson
Manager, Licensing
Brookfield Renewable

Attachment
Pre-Application Document Questionnaire

Brunswick Hydroelectric Project (FERC No. 2284)
FERC Relicensing Pre-Application Document Questionnaire

1. Contact Information for person completing the questionnaire:

Name & Title	
Organization	
Address	
Phone	
Email Address	

2. Do you or your organization know of existing, relevant, and reasonably available information that describes the existing Project environments (i.e., information regarding the Androscoggin River near the Project)?

    __ Yes *(If yes, please complete 2a through 2e)* __ No *(If no, please go to 3)*

    a. If yes, please indicate the specific resource area(s) that the information relates to:

    - ☐ geology and soils
    - ☐ recreation and land use
    - ☐ water resources
    - ☐ aesthetic resources
    - ☐ fish & aquatic resources
    - ☐ cultural resources
    - ☐ wildlife & botanical resources
    - ☐ socioeconomic resources
    - ☐ wetlands, riparian, & littoral habitat
    - ☐ tribal resources
    - ☐ threatened or endangered species
    - ☐ other resource information.

b. Please briefly describe the information or list available documents.

c. If you are not attaching the information, where can BWPH obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by BWPH's representative for the resource area(s) checked above. If you know of others who are not part of your organization but who may have relevant information, please provide their name(s) and contact information as well.

Representative Contact Information	
Name	
Address	
Phone	
Email Address	

Other Contact Information	
Name	

Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)?

☐ Yes *(please list specific issues below)* ☐ No

Resource Area	**Specific Issue**

3. Do you or your organization plan to participate in the Brunswick Hydroelectric Project relicensing proceedings? ☐ Yes ☐ No

4. We are interested in your comments. If you have comments and/or questions regarding the Brunswick Hydroelectric Project, PAD, or relicensing, please add below:

Please return this questionnaire and any pertinent information within 30 days of receipt, to;

Kirk Smith
Gomez and Sullivan Engineers, D.P.C.
PO Box 2179
Henniker, NH 03242
ksmith@gomezandsullivan.com

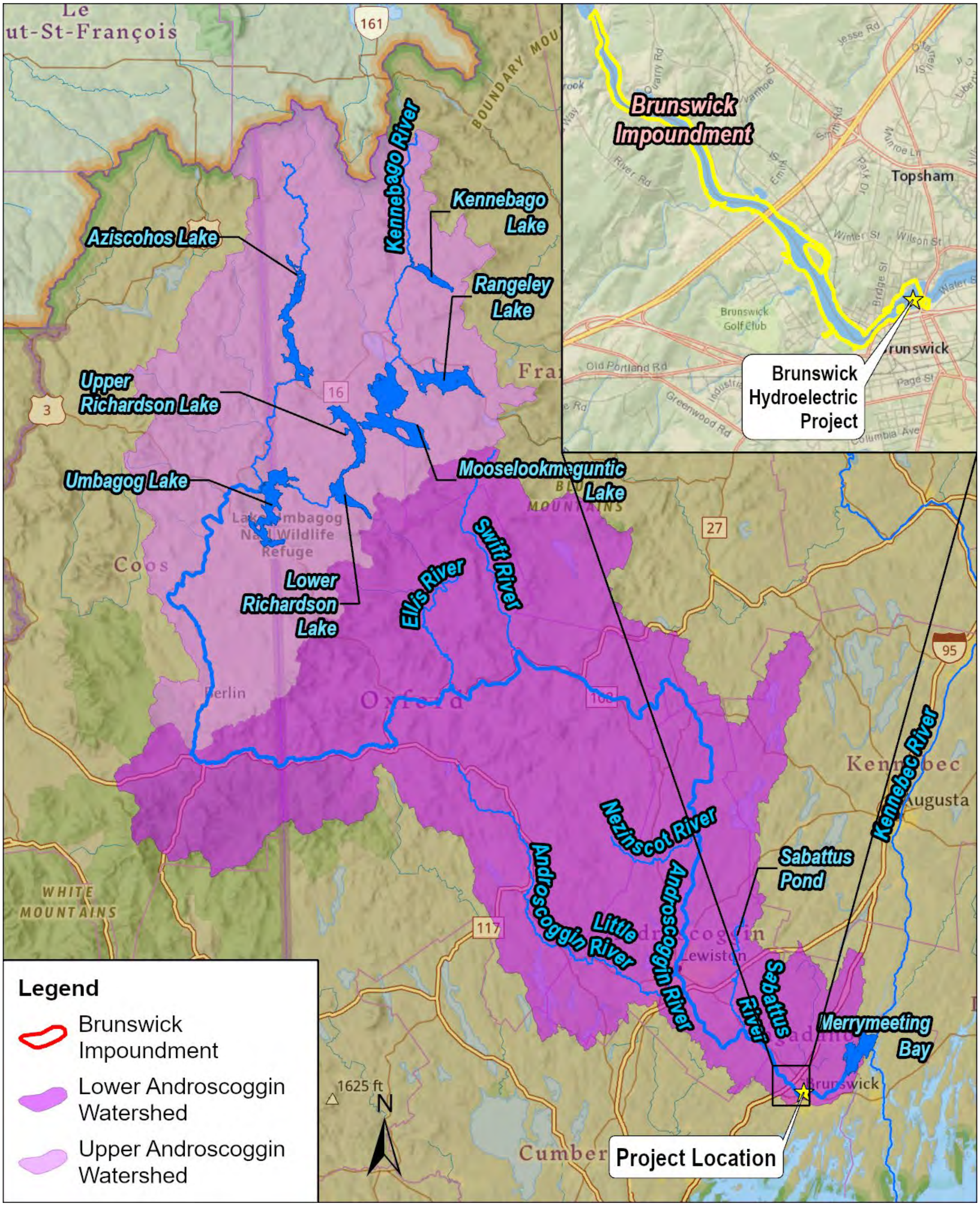


Figure 1: *Regional Map of the Brunswick Hydroelectric Project*

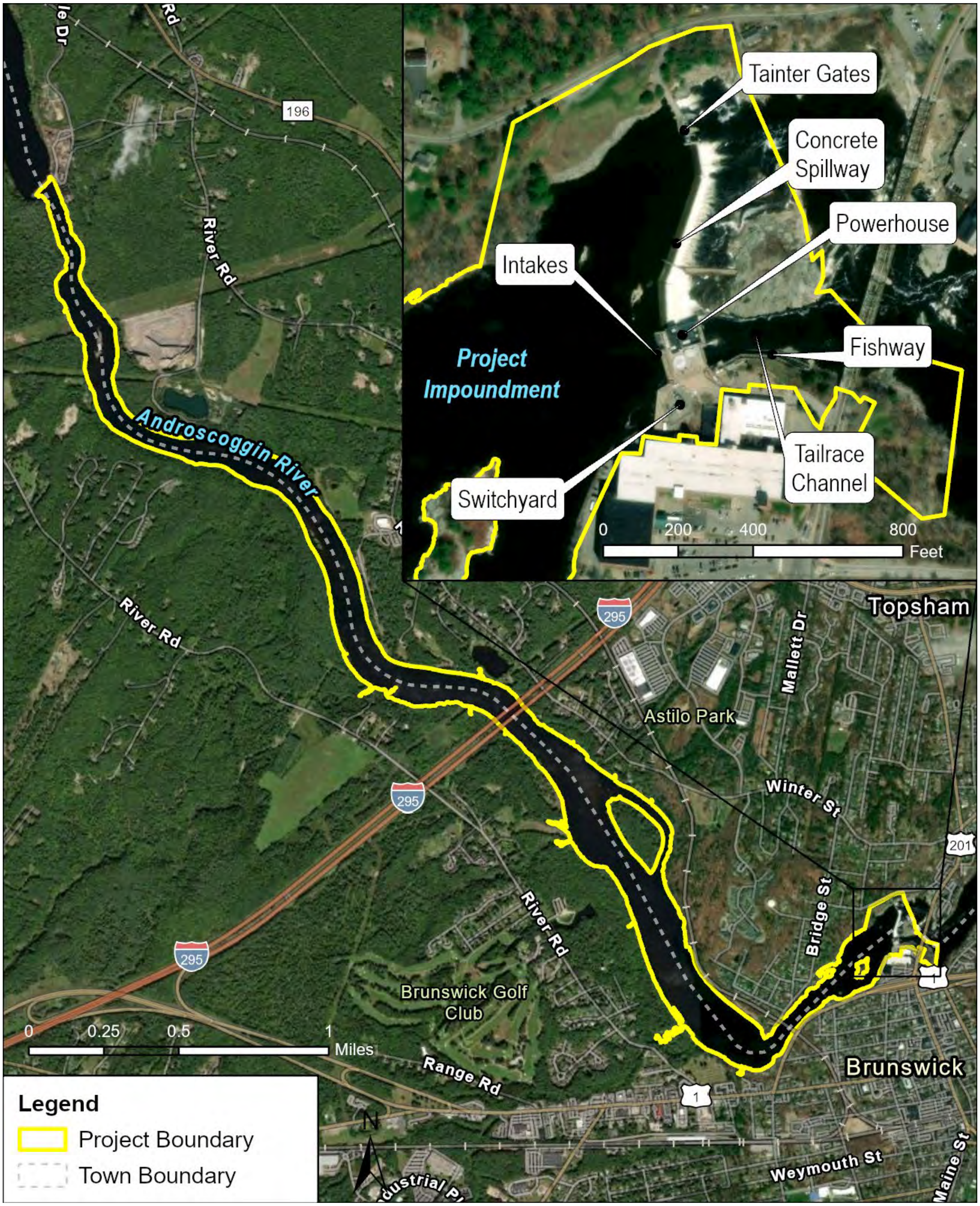


Figure 2: *Project Area Map of the Brunswick Hydroelectric Project*

Pursuant to 18 CFR 5.6(d)(5), BWPH has exercised its due diligence in determining what information exists relevant to the existing environment and potential impacts by contacting appropriate agencies and Native American tribes that may have relevant information pertinent to the Project.

Table A-1: Summary of Contacts and Correspondence

Date	Correspondence From	Correspondence To	Description
September 29, 2023	Luke Anderson	Distribution list	BWPH request for information for the Pejepscot relicensing
October 2, 2023	Kristen Chamberlain	Luke Anderson	MaineDOT response to information request
October 11, 2023	Kirk Mohney	Kirk Smith	Maine Historic Preservation Commission response to information request
October 30, 2023	Andrew Fisk	Kirk Smith	American Rivers response to information request
December 12, 2023	Charlie Spies	Luke Anderson	Merrymeeting Bay Chapter of Trout Unlimited response to information request

Brunswick Hydroelectric Project (FERC No. 2284)
FERC Relicensing Pre-Application Document Questionnaire

1. Contact Information for person completing the questionnaire:

Name & Title	*Kristen Chamberlain* *NEPA Coordination & Permits Manager*
Organization	MaineDOT Environmental Office
Address	16 State House Station Augusta, ME 04344
Phone	(207) 557-5089
Email Address	kristen.chamberlain@maine.gov

2. Do you or your organization know of existing, relevant, and reasonably available information that describes the existing Project environments (i.e., information regarding the Androscoggin River near the Project)?

   X Yes *(If yes, please complete 2a through 2e)* __ No *(If no, please go to 3)*

   a. If yes, please indicate the specific resource area(s) that the information relates to:

   [x] geology and soils
   [x] water resources
   [x] fish & aquatic resources
   [x] wildlife & botanical resources
   [x] wetlands, riparian, & littoral habitat
   [x] threatened or endangered species
   [x] recreation and land use
   [ ] aesthetic resources
   [x] cultural resources
   [ ] socioeconomic resources
   [x] tribal resources
   [ ] other resource information.

Other Contact Information	
Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)?

[X] Yes *(please list specific issues below)* [ ] No

Resource Area	**Specific Issue**
Endangered Species	see EA and appendices
Cultural Resources	See EA and appendices

3. Do you or your organization plan to participate in the Brunswick Hydroelectric Project relicensing proceedings? ☐ Yes ☒ No

4. We are interested in your comments. If you have comments and/or questions regarding the Brunswick Hydroelectric Project, PAD, or relicensing, please add below:

Please return this questionnaire and any pertinent information within 30 days of receipt, to;

Kirk Smith
Gomez and Sullivan Engineers, D.P.C.
PO Box 2179
Henniker, NH 03242
ksmith@gomezandsullivan.com

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

JANET T. MILLS
GOVERNOR

KIRK F. MOHNEY
DIRECTOR

October 11, 2023

Mr. Kirk Smith
Gomez and Sullivan Engineers
PO Box 2179
Henniker, NH 03242

Project: MHPC #1477-23 Brunswick Hydroelectric Project; FERC # 2284
New License Existing Dam
Town: Brunswick- Topsham, ME

Dear Mr. Smith:

In response to your recent request, I have reviewed the information received September 29, 2023 to initiate consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended.

An architectural survey is recommended to identify and record information on all resources within the area of potential effect (APE) that are at least 50 years old. Survey must be completed according to our "Revised Above Ground Cultural Resource Survey Manual Project Review Specific." All surveys must be submitted electronically via our on-line CARMA database. See our website for more information:
https://www.maine.gov/mhpc/quick-links/forms-instructions

The area of potential effects for the project, for architectural resources, should be defined in accordance with Section 106 and in consultation with MHPC. The Project APE is defined as the lands enclosed by the Project's boundary and the lands or properties outside of the Project's boundary where project construction and operation or project-related recreational development or other enhancements may cause changes in the character or use of historic properties, if any historic properties exist.

A list of historic preservation consultants who are qualified to conduct architectural survey and have been trained in the use of the CARMA database may be found at the following page of our website:
https://www.maine.gov/mhpc/programs/survey/approved-consultants/carma-trained-consultants

With regards to archaeological resources, the Brunswick Hydroelectric project impoundment margins must be subject to a Phase I archaeological survey including subsurface testing in appropriate locations to identify all archaeological sites around the impoundment margin that might erode over the term of the license. Phase II (site assessment) field work might also be necessary depending on the results from the Phase I survey. Less than a quarter of the impoundment margin has been subjected to archaeological survey already, and some of that has been unsystematic. Three prehistoric archaeological sites are known. This project has great archaeological potential for historic archaeological sites as well, including 17th century European historic and Contact period sites.

A list of qualified prehistoric archaeologists and historic archaeologists can be found on our website:
https://www.maine.gov/mhpc/programs/survey/approved-consultants/prehistoric
https://www.maine.gov/mhpc/programs/survey/approved-consultants/historic

When it comes to archaeological studies of hydro-power impoundments, the Commission defines the APE (area of potential effect) as all land around the margin of the impoundment that may be affected by erosion during the term of the future license. When the Project boundary is defined as an elevation, for example, the APE may extend above that elevation and laterally outside the Project boundary, if there is a potentially eroding land form that extends above the Project boundary elevation.

Please submit a draft APE for our office to concur with for architectural and archaeological properties prior to commencing either study.

If you have any questions regarding archaeology, please contact Dr. Arthur Spiess of this office at Arthur.
Spiess@maine.gov.

Please contact Megan M. Rideout of our staff at 287-2992 or megan.m.rideout@maine.gov if you have any questions regarding above ground resources.

Sincerely,

Kirk F. Mohney
State Historic Preservation Officer

Brunswick Hydroelectric Project (FERC No. 2284)
FERC Relicensing Pre-Application Document Questionnaire

1. Contact Information for person completing the questionnaire:

Name & Title	Andrew Fisk, NE Regional Director
Organization	American Rivers
Address	118 Madison Ave Holyoke, MA 01040
Phone	413-407-6484
Email Address	afisk@americanrivers.org

2. Do you or your organization know of existing, relevant, and reasonably available information that describes the existing Project environments (i.e., information regarding the Androscoggin River near the Project)?

   X Yes *(If yes, please complete 2a through 2e)* __ No *(If no, please go to 3)*

   a. If yes, please indicate the specific resource area(s) that the information relates to:

   - [ ] geology and soils
   - [ ] water resources
   - [X] fish & aquatic resources
   - [ ] wildlife & botanical resources
   - [ ] wetlands, riparian, & littoral habitat
   - [X] threatened or endangered species
   - [ ] recreation and land use
   - [ ] aesthetic resources
   - [ ] cultural resources
   - [ ] socioeconomic resources
   - [ ] tribal resources
   - [ ] other resource information.

Other Contact Information	
Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)?

☒ Yes *(please list specific issues below)* ☐ No

Resource Area	Specific Issue
Fish & aquatic habitat / T&E species	Inadequate up and downstream fish passage for all life stages of migratory fish.

3. Do you or your organization plan to participate in the Brunswick Hydroelectric Project relicensing proceedings? ☒ Yes ☐ No

4. We are interested in your comments. If you have comments and/or questions regarding the Brunswick Hydroelectric Project, PAD, or relicensing, please add below:

Please return this questionnaire and any pertinent information within 30 days of receipt, to;

Kirk Smith
Gomez and Sullivan Engineers, D.P.C.
PO Box 2179
Henniker, NH 03242
ksmith@gomezandsullivan.com

Type text here

From:	Charlie Spies
To:	Luke.Anderson@brookfieldrenewable.com; Kirk Smith
Cc:	Jeff Bush; Stephen Heinz; Charlie Spies
Subject:	EXTERNAL EMAIL -MMBTU response to Request for Information for the Brunswick Hydroelectric Project (FERC No. 2284) FERC Relicensing
Date:	Tuesday, December 12, 2023 3:35:54 PM
Attachments:	2019 Weaver et al Shad passage copy.pdf Androscoggin River Watershed Comprehensive Plan for Diadromous Fishes, NMFS 2020.pdf Draft Fisheries Management Plan for the Lower Androscoggin River.pdf Hall-et-al.-2010-The historic influence of dams on diadromous fish habitat with a focus on river herring and hydrologic longitudinal connectivity.pdf MMBTU response to Brunswick PAD Request for Information.docx

Dear Mr. Anderson and Mr. Smith,

The questionnaire for the Pre-Application Document (PAD) for the FERC relicensing of the Brunswick Dam (Docket P-2284) recently came to my attention. I am a member of the board and the Conservation Committee for the Merrymeeting Bay Chapter of Trout Unlimited (MMBTU).

Our chapter's catchment area covers much of the Lower Androscoggin River, including the Brunswick Dam. While I understand that I have missed the response filing deadlines described in the cover letter originally sent out in late September with the PAD questionnaire, I was not included on the contact list and I am hoping Brookfield Renewable via its subsidiary, Brookfield White Pine Hydro LLC, will accept the attached completed questionnaire and consider our comments. We intend to follow the relicensing process closely over the coming years and hope to work with all parties in a positive and constructive manner.

I left a voicemail to this effect on Mr. Anderson's phone earlier today. Please let me know if there are any concerns about getting our comments included. As I also requested in the questionnaire, please include me on your contact list for any future notifications.

Finally, we noted that the name of the Appalachian Mountain Club representative has changed. The role of the club’s Director of Conservation Policy Engagement is now filled by Mark Zakutansky.

Thank you for your consideration.

Best regards,

Chip Spies

Mobile: 207-837-3929

Brunswick Hydroelectric Project (FERC No. 2284)

FERC Relicensing Pre-Application Document Questionnaire

1. Contact Information for person completing the questionnaire:

Name & Title	Charles Spies, Board Member and member of the Conservation Committee
Organization	Merrymeeting Bay Chapter of Trout Unlimited
Address	64 Water Street, Brunswick, Maine 04011
Phone	207-837-3929
Email Address	chipspies@gmail.com

2. Do you or your organization know of existing, relevant, and reasonably available information that describes the existing Project environments (i.e., information regarding the Androscoggin River near the Project)?

   _X_ Yes *(If yes, please complete 2a through 2e)* __ No *(If no, please go to 3)*

   a. If yes, please indicate the specific resource area(s) that the information relates to:

   - [ ] geology and soils
   - [X] water resources
   - [X] fish & aquatic resources
   - [ ] wildlife & botanical resources
   - [ ] wetlands, riparian, & littoral habitat
   - [X] threatened or endangered species
   - [X] recreation and land use
   - [ ] aesthetic resources
   - [ ] cultural resources
   - [ ] socioeconomic resources
   - [ ] tribal resources
   - [ ] other resource information.

   b. Please briefly describe the information or list available documents.

I, personally, am one source of observational information because, in addition to being an active member of Merrymeeting Bay Trout Unlimitted, I live adjacent to the river at 64 Water Street in Brunswick approximately ¼ mile downstream from the Brunswick Dam. I witness river flows, animal behavior, recreational uses, and other activities below head of tide everyday by simply living where I live. I can see the river as I write this and often travel on the river by boat.

FERC Relicensing Pre-Application Document Questionnaire

Other sources are myriad as much work has been done to study diadromous fish populations, their presence above and below head of tide, and their ability to successfully use the fishway at the Brunswick Dam.

I cite four relevant sources here that describe the need to significantly improve the fish passage at the Brunswick Dam for improved upstream and downstream alosine species passage as well as the endangered Atlantic Salmon, the American Eel and Sea Lampreys. Two of these sources should be in your possession already but are also attached here:

1) NOAA Fisheries. 2020. Androscoggin River Watershed Comprehensive Plan for Diadromous Fishes. Greater Atlantic Region Policy Series 20-01. NOAA Fisheries Greater Atlantic Regional Fisheries Office - www.greateratlantic.fisheries.noaa.gov/policyseries/. 136 pp.

2) Maine Department of Marine Resources. 2017. Draft Fisheries Management Plan for the Lower Androscoggin River, Little Androscoggin River, and Sabattus River. Prepared by Michael Brown, Paul Christman, and Gail Wippelhauser

The third is not as commonly available but is an important study of the history and impacts of dam construction on rivers related to diadromous fish habitat. It includes detailed information on the Androscoggin River that is relevant to the Brunswick Dam and its role as an impediment to fish passage.

3) Hall, C.J., Jordaan, A. & Frisk, M.G. The historic influence of dams on diadromous fish habitat with a focus on river herring and hydrologic longitudinal connectivity. Landscape Ecol 26, 95–107 (2011). https://doi.org/10.1007/s10980-010-9539-1

The fourth provides recent data specific to the Brunswick fishway and impairment of upstream American Shad passage.

4) Weaver, D.M., Brown, M., Zydlewski, J.D., 2019. Observations of American Shad Alosa sapidissima Approaching and Using a Vertical Slot Fishway at the Head-of-Tide Brunswick Dam on the Androscoggin River, Maine. North American Journal of Fisheries Management.

These four documents and many others point to the need for this FERC relicensing cycle to consider and require significantly improved fish passage at the Brunswick Dam site either by dam removal or proven fish passage designs that allow for successful diadromous fish passage that restores populations to historically known abundance.

c. If you are not attaching the information, where can BWPH obtain this information?

See citations above.

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by BWPH's representative for the resource area(s) checked above. If you know of others who are not part of your organization but who may have relevant information, please provide their name(s) and contact information as well.

Representative Contact Information	
Name	Charles Spies
Address	64 Water Street Brunswick, Maine o4o11
Phone	207-837-3929
Email Address	chipspies@gmail.com

Other Contact Information	
Name	Jeff Bush, President Merrymeeting Bay TU Chapter
Address	801 Mere Point Road Brunswick, ME 04011
Phone	(856) 448-1925
Email Address	jbush@tumaine.org

FERC Relicensing Pre-Application Document Questionnaire

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)?

[_X_] Yes *(please list specific issues below)* [ ] No

Resource Area	Specific Issue
Fish and aquatic resources and endangered species	As noted in the notes around the citations provided, fish passage, especially for diadromous fish, including the endangered Atlantic Salmon is not effective at the Brunswick Dam site and is impairing reproduction and reducing population numbers by blocking access to spawning habitat or impairing travel by immature fish downstream to the ocean.

3. Do you or your organization plan to participate in the Brunswick Hydroelectric Project relicensing proceedings? [_X_] Yes [ ] No

FERC Relicensing Pre-Application Document Questionnaire

4. We are interested in your comments. If you have comments and/or questions regarding the Brunswick Hydroelectric Project, PAD, or relicensing, please add below:

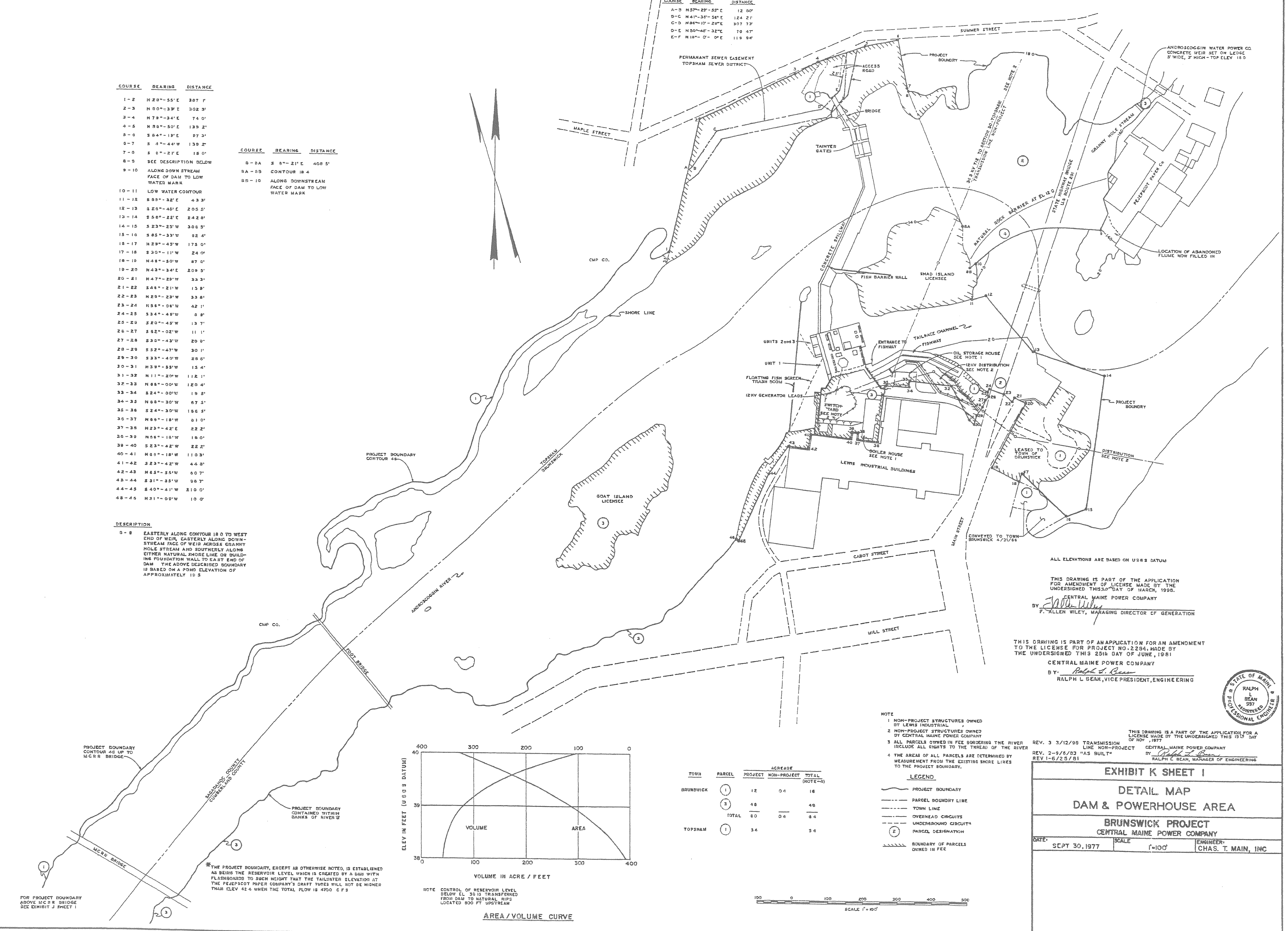
We request that my name and contact information now be included on the contact list used to originally distribute this questionnaire and on any other list for public distribution of information relating to the Brunswick Dam relicensing process. I have already registered on the FERC website for this Docket (P-2248).

Thank you.

Please return this questionnaire and any pertinent information within 30 days of receipt, to; Kirk Smith PO Box 2179 Henniker, NH 03242 ksmith@gomezandsullivan.com

Gomez and Sullivan Engineers, D.P.C.

APPENDIX C – PROJECT BOUNDARY DRAWINGS



COURSE	BEARING	DISTANCE
1 - 2	N 20° - 55' E	307 1'
2 - 3	N 60° - 33' E	302 3'
3 - 4	N 79° - 34' E	74 0'
4 - 5	N 58° - 50' E	139 2'
5 - 6	S 84° - 19' E	97 3'
6 - 7	S 4° - 44' W	139 2'
7 - 8	S 6° - 21' E	18 0'
8 - 9	SEE DESCRIPTION BELOW	
9 - 10	ALONG DOWN STREAM FACE OF DAM TO LOW WATER MARK	
10 - 11	LOW WATER CONTOUR	
11 - 12	S 89° - 32' E	43 3'
12 - 13	S 26° - 48' E	205 5'
13 - 14	S 56° - 22' E	242 8'
14 - 15	S 23° - 25' W	306 5'
15 - 16	S 85° - 33' W	82 4'
16 - 17	N 29° - 45' W	175 0'
17 - 18	S 30° - 11' W	24 0'
18 - 19	N 48° - 50' W	87 0'
19 - 20	N 43° - 34' E	209 5'
20 - 21	N 47° - 29' W	33 3'
21 - 22	S 48° - 21' W	13 9'
22 - 23	N 29° - 23' W	33 8'
23 - 24	N 56° - 06' W	42 1'
24 - 25	S 34° - 46' W	8 9'
25 - 26	S 20° - 45' W	13 7'
26 - 27	S 62° - 02' W	11 1'
27 - 28	S 30° - 43' W	20 9'
28 - 29	S 52° - 47' W	30 1'
29 - 30	S 33° - 40' W	28 6'
30 - 31	N 39° - 53' W	15 4'
31 - 32	N 11° - 20' W	112 1'
32 - 33	N 66° - 00' W	120 4'
33 - 34	S 24° - 00' W	19 5'
34 - 35	N 68° - 30' W	87 5'
35 - 36	S 24° - 30' W	186 5'
36 - 37	N 69° - 18' W	81 0'
37 - 38	N 23° - 42' E	22 2'
38 - 39	N 66° - 18' W	18 0'
39 - 40	S 23° - 42' W	22 2'
40 - 41	N 66° - 18' W	110 3'
41 - 42	S 23° - 42' W	44 3'
42 - 43	N 65° - 55' W	60 7'
43 - 44	S 31° - 35' W	98 7'
44 - 45	S 40° - 41' W	210 0'
45 - 46	N 31° - 09' W	10 0'

DESCRIPTION

8 - 9 EASTERLY ALONG CONTOUR 18 0 TO WEST END OF WEIR, EASTERLY ALONG DOWN-STREAM FACE OF WEIR ACROSS GRANNY HOLE STREAM AND SOUTHERLY ALONG EITHER NATURAL SHORE LINE OR BUILDING FOUNDATION WALL TO EAST END OF DAM THE ABOVE DESCRIBED BOUNDARY IS BASED ON A POND ELEVATION OF APPROXIMATELY 19 5

COURSE	BEARING	DISTANCE
8 - 8A	S 6° - 21' E	408 5'
8A - 8B	CONTOUR 18 4	
8B - 10	ALONG DOWNSTREAM FACE OF DAM TO LOW WATER MARK	

COURSE	BEARING	DISTANCE
A - B	N 37° - 29' - 55" E	12 80'
B - C	N 41° - 38' - 38" E	124 21'
C - D	N 86° - 10' - 29" E	307 73'
D - E	N 50° - 48' - 32" E	70 47'
E - F	N 18° - 0' - 0" E	119 94'

*THE PROJECT BOUNDARY, EXCEPT AS OTHERWISE NOTED, IS ESTABLISHED AS BEING THE RESERVOIR LEVEL WHICH IS CREATED BY A DAM WITH FLASHBOARDS TO SUCH HEIGHT THAT THE TAILWATER ELEVATION AT THE PEJEPSCOT PAPER COMPANY'S DRAFT TUBES WILL NOT BE HIGHER THAN ELEV 42 4 WHEN THE TOTAL FLOW IS 4700 C F S

NOTE CONTROL OF RESERVOIR LEVEL BELOW EL 38 IS TRANSFERRED FROM DAM TO NATURAL RIPS LOCATED 800 FT UPSTREAM

AREA / VOLUME CURVE

TOWN	PARCEL	ACREAGE PROJECT	ACREAGE NON-PROJECT	ACREAGE TOTAL (NOTE-4)
BRUNSWICK	1	12	04	16
	3	48		48
	TOTAL	60	04	64
TOPSHAM	1	34		34

NOTE

1 NON-PROJECT STRUCTURES OWNED BY LEWIS INDUSTRIAL

2 NON-PROJECT STRUCTURES OWNED BY CENTRAL MAINE POWER COMPANY

3 ALL PARCELS OWNED IN FEE BORDERING THE RIVER INCLUDE ALL RIGHTS TO THE THREAD OF THE RIVER

4 THE AREAS OF ALL PARCELS ARE DETERMINED BY MEASUREMENT FROM THE EXISTING SHORE LINES TO THE PROJECT BOUNDARY.

LEGEND

PROJECT BOUNDARY
PARCEL BOUNDRY LINE
TOWN LINE
OVERHEAD CIRCUITS
UNDERGROUND CIRCUITS
2 PARCEL DESIGNATION
BOUNDARY OF PARCELS OWNED IN FEE

ALL ELEVATIONS ARE BASED ON U S G S DATUM

THIS DRAWING IS PART OF THE APPLICATION FOR AMENDMENT OF LICENSE MADE BY THE UNDERSIGNED THIS 20th DAY OF MARCH, 1998.

CENTRAL MAINE POWER COMPANY

BY F. Allen Wiley

F. ALLEN WILEY, MANAGING DIRECTOR OF GENERATION

THIS DRAWING IS PART OF AN APPLICATION FOR AN AMENDMENT TO THE LICENSE FOR PROJECT NO. 2284, MADE BY THE UNDERSIGNED THIS 25th DAY OF JUNE, 1981

CENTRAL MAINE POWER COMPANY

BY: Ralph L. Bean

RALPH L BEAN, VICE PRESIDENT, ENGINEERING

STATE OF MAINE RALPH L BEAN 937 REGISTERED PROFESSIONAL ENGINEER

THIS DRAWING IS A PART OF THE APPLICATION FOR A LICENSE MADE BY THE UNDERSIGNED THIS 15th DAY OF NOV, 1977

CENTRAL MAINE POWER COMPANY

BY Ralph L. Bean

RALPH L BEAN, MANAGER OF ENGINEERING

REV. 3 3/12/98 TRANSMISSION LINE NON-PROJECT
REV. 2-9/6/83 "AS BUILT"
REV 1-6/25/81

EXHIBIT K SHEET 1

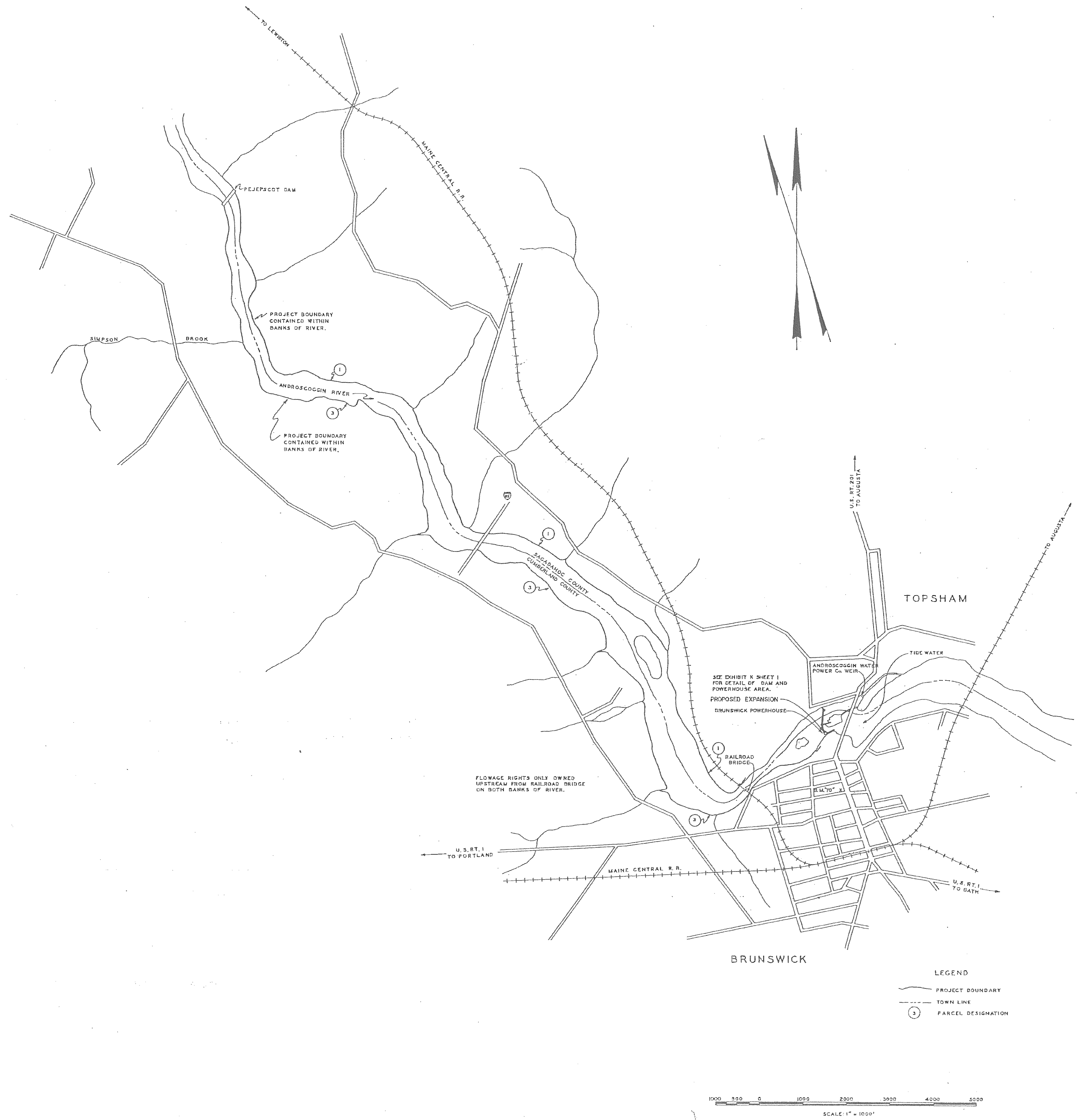
DETAIL MAP
DAM & POWERHOUSE AREA

BRUNSWICK PROJECT
CENTRAL MAINE POWER COMPANY

DATE:	SCALE	ENGINEER:
SEPT 30, 1977	1" = 100'	CHAS. T. MAIN, INC

FERC NO. 2284-36

CMP No 607-01-05



THIS DRAWING IS A PART OF THE APPLICATION FOR AN AMENDMENT TO THE LICENSE FOR PROJECT NO. 2284, MADE BY THE UNDERSIGNED THIS 25TH DAY OF JUNE 1981.

CENTRAL MAINE POWER COMPANY

BY *Ralph L. Bean*

RALPH L. BEAN, VICE PRESIDENT ENGINEERING

THE PROJECT BOUNDARY, EXCEPT AS OTHERWISE NOTED, IS ESTABLISHED AS BEING THE RESERVOIR LEVEL WHICH IS CREATED BY A DAM WITH FLASHBOARDS TO SUCH HEIGHT THAT THE TAILWATER ELEVATION AT THE PEJEPSCOT PAPER COMPANY'S DRAFT TUBES WILL NOT BE HIGHER THAN ELEV. 42.4 WHEN THE TOTAL FLOW IS 4700 CFS.

THIS MAP WAS ENLARGED FROM CORPS OF ENGINEERS, U.S. ARMY DRAWINGS ENTITLED, ANDROSCOGGIN RIVER, MILES 1 TO 10, AND MILES 10 TO 20, FILE NOS. A100-27/1 AND A100-27/2.

ALL ELEVATIONS BASED ON U.S.G.S. DATUM ESTABLISHED FROM B.M. STAMPED "70" LOCATED ON FOUNDATION OF BRUNSWICK TOWN HALL.

THIS DRAWING IS A PART OF THE APPLICATION FOR A LICENSE MADE BY THE UNDERSIGNED THIS 15TH DAY OF NOV , 1977.

CENTRAL MAINE POWER COMPANY

BY: *Ralph L. Bean*

RALPH L. BEAN, MANAGER OF ENGINEERING

STATE OF MAINE
RALPH L. BEAN
997
REGISTERED
PROFESSIONAL ENGINEER

REV. 1 - 6/25/81

EXHIBIT J SHEET 1

GENERAL MAP
FLOWAGE, DAMS & POWER PLANT AREAS

BRUNSWICK PROJECT

CENTRAL MAINE POWER COMPANY

DATE:	SCALE:	ENGINEER:
SEPT. 30, 1977	1" = 1000'	CHAS. T. MAIN, INC.

Dwg. No. 607-1-3

mflm 9/81

FERC NO. 2284-20

APPENDIX D – EXHIBIT F DRAWINGS AND SINGLE-LINE DIAGRAM (CEII)

This appendix constitutes Critical Energy Infrastructure Information (CEII) in accordance with 18 C.F.R. § 388.113(c) and has been removed from the public version of this PAD.

The material is contained in Volume 2 (CEII), the non-public version filed with the Commission.

Procedures for obtaining access to CEII may be found at 18 C.F.R. § 388.113.

APPENDIX E – CURRENT LICENSE AND AMENDMENT ORDERS

6 FERC P 61122 (F.E.R.C.), 1979
****1** Commission Opinions, Orders and Notices

Central Maine Power Company

Project Nos. 2284 and 2834
Order Amending License and Issuing New Major License
February, 9, 1979

***61222** Before Commissioners: Charles B. Curtis, Chairman; Matthew Holden, Jr. and George R. Hall.

Central Maine Power Company (CMP) has filed two related applications affecting the existing Brunswick-Topsham Project No. 2284.[1] One application seeks to amend the license for Project No. 2284 by accelerating its expiration date. The other application seeks relicensing of the project, after extensive redevelopment.[2] In view of the extensive redevelopment proposed, the applicant has requested a new 50-year license for the project. CMP proposes that the expiration date of the current license for Project No. 2284 be advanced to coincide with shutdown of the existing powerhouse, approximately five months after the start of redevelopment.

No protests or petitions to intervene in this proceeding have been filed.

Background

In late 1973 a 150-foot wood crib section of the dam at the Topsham development of Project No. 2284 washed out. Subsequently, this development could generate only during periods of high river flows. The applicant studied what could be done to rehabilitate or redevelop the project and determined that the most comprehensive use of the site could be accomplished by eliminating the lower development (Brunswick), eliminating both existing powerhouses, and constructing a single new dam and new powerhouse with an installed capacity of 12 MW. This redevelopment would be a significant increase over the installed capacities of the Brunswick and Topsham developments as licensed, which are 1,473 kW and 900 kW respectively. The applicant was reluctant, however, to undertake investment in this extensive redevelopment[3] considering the shortness of the remaining term of the existing license. That license has an expiration date of December 31, 1993[4] and the proposed redevelopment is not scheduled to be completed until 1981.

The Proposed Redevelopment

The existing project includes two dams and two powerhouses. One powerhouse is located adjacent to the upper (Topsham) dam, on the left bank of the river (facing downstream). Approximately 500 feet downstream lies the lower (Brunswick) dam, which has two sections, divided by an island (Shad Island), with the second powerhouse on the righthand side of the island (facing downstream).

Under the proposed redevelopment plan, CMP would build a new dam at the approximate location of the old Topsham dam. A new powerhouse would be constructed adjacent to the new dam to replace both the Topsham and Brunswick powerhouses. The old powerhouses would be removed. CMP would also remove the section of the Brunswick dam on the right side of Shad Island. The section of the dam on the left side of the island would be lowered to serve as a fish barrier. A fishway would be built adjacent to the new powerhouse, and an additional fish barrier would be built between the new dam and Shad Island.

The reservoir impounded by the new dam would be approximately 4.5 miles in length, be contained within the present river banks, and have a surface area of approximately 300 acres. This is essentially the same size as the reservoir that existed prior to the breach of the old Topsham dam.

Safety and Adequacy

****2** Our staff reports that the new project structures were checked for stability under various assumed conditions, including combinations of normal ***61223** reservoir water surface elevation, ice, earthquake, and flood conditions. The new powerhouse was found to be safe against sliding and overturning under all loading conditions.

The proposed uncontrolled main spillway structure, however, would begin to develop tension at the heel when overtopped by about five feet of water. The staff states that the spillway structures would be marginally safe with the reservoir surcharged 14 feet above the spillway crest, but the higher reservoir levels would produce increased instability and possible structural failure. A 14-foot surcharge would occur with a flood of 143,000 cfs, which would be expected to occur once every 180 years.

The maximum flood of record at the project site is estimated at 139,000 cfs. The new Brunswick dam could pass this flow with the reservoir surcharged to elevation 55.0 feet m.s.l., 15.6 feet above normal headwater. The applicant's engineering consultant, however, has calculated a probable maximum flood (PMF) of the Androscoggin River at the new Brunswick Dam with a peak discharge of about 225,000 cfs. The PMF would surcharge the reservoir to elevation 59.0 m.s.l., 19.6 feet above normal headwater. The application states that the project is designed to withstand a PMF. During a PMF, the flow of water at the abutments, where bedrock occurs at shallow depths, would cause some localized erosion. Our staff's analysis also indicates that the spillway structures would be subject to failure during a PMF. For these reasons, the staff has recommended that the dam be redesigned to be made safe from sliding and overturning during a PMF.

CMP has been notified of the deficiencies in the spillway design. It has informed us that these project works will be redesigned for structural integrity as well as stability.

Accordingly, we are approving Exhibit L, which shows the dam elevations and sections, only to the extent that it shows the general layout of the project. Article 33 of the license requires CMP to file a revised Exhibit L for approval prior to construction of the dam.

Transmission Facilities

The application shows that power from the proposed 12-MW unit would be transmitted by 12-kV underground generator leads to a 12/34.5-kV step-up transformer located in a substation near the new powerhouse. Exhibits K and L show two lines emanating from the 12/34.5-kV Brunswick substation: a one-quarter mile long 34.5-kV line to the existing Topsham substation, and a 12-kV distribution line. The Applicant would not include either of these power lines as part of the project.

Our staff reports that the 12-kV distribution line would serve a local distribution load of 5 MW. Staff therefore agrees with CMP that this line is not a primary transmission line. The 34.5-kV line, however, would carry the remaining 7 MW of project generation to the Topsham substation, the point of junction with CMP's interconnected system. Staff therefore believes the 34.5-kV line is a primary transmission line within the meaning of Section 3(11) of the Federal Power Act, which should be included within the license as a project work.

**3 We agree with staff's analysis and will include the 34.5-kV line as a project work. Since this line was not included in Exhibit M of the application, Article 37 below provides for the filing of an 'as built' Exhibit M including it.

Navigation and Flood Control

The Corps of Engineers (Coprs) reviewed the application and concluded that the proposed project would not conflict with any existing or proposed flood control, navigation, or other program within their jurisdiction. The Corps also approved the plans for the project works, in accordance with Section 4(e) of the Act.

Historical and Archeological Preservation

The Maine State Historical Preservation Office informed the applicant that the proposed construction would have no effect upon any structure or site of historic, architectural, or archeological significance. It is possible, however, that archeological or historic sites or artifacts may be unearthed during construction. Article 29 of this license will assure the protection of any cultural resources discovered.

Recreation

There are no recreational facilities at the existing project, although there are a number of recreational facilities in the two adjacent towns. Lands adjoining the project have already been developed for residential, industrial, and commercial purposes. CMP owns only two small parcels of land that are suitable for recreation there. These lands are located near the existing powerhouse, and have been designated for future development as picnic areas. The Department of the Interior (Interior) stated that the Exhibit R is adequate. Our staff states that the Exhibit R generally complies with our Regulations. Accordingly, the Exhibit R will be approved and made a part of the license. Article 17 of the license provides for future recreational development at the project when needed.

Fish and Wildlife Resources and Minimum Flows

The Exhibit S contains plans for a vertical slot fish ladder that would be built by CMP and operated by the Maine Department of Marine Resources (DMR). This fishway is the first step in the restoration of anadromous fish to the Androscoggin River. CMP does not propose to maintain a continuous minimum flow at the project, except through the fishway during periods of anadromous fish migrations. A flow of 30 cfs will be maintained when the generating station is shut down, and a flow of 100 cfs will be maintained when it is ***61224** operating. Our staff reports that a continuous minimum flow is not necessary at this time. The relatively small storage capacity of the reservoir (about 250 acre-feet) will not allow for extended periods of shut down except during extremely low flow conditions. The tailrace and river below the proposed project are tidal, with a fluctuation of up to five feet immediately below the project. It is therefore unlikely that the tailrace or river downstream would ever become dry. License Article 12 provides for modification of the project operation for the maintenance of minimum flows in the future, if it should become necessary.

Interior stated that the Exhibit S adequately addresses its concerns pertaining to fish and wildlife. DMR supported CMP's proposals in the Exhibit S and noted the cooperation CMP had already shown in developing plans for the fishway. The United States Fish and Wildlife Service, the Maine Department of Inland Fisheries and Wildlife, and the Maine Atlantic Sea-Run Salmon Commission also participated in the planning of the proposed fishway. On the basis of staff's analysis and comments from other agencies, the Exhibit S will be approved and made a part of the license. Article 30 provides for the filing of 'as built' Exhibits S drawings showing the fish passage facilities within six months after completion of construction. It also provides for the submittal of annual reports for the purpose of monitoring the operation of the fishway.

Other Environmental Impact

****4** Our staff reports that the construction and operation of the redeveloped Brunswick project will not cause any significant adverse impact on recreation, fish and wildlife resources of the lower Androscoggin River. Adverse impact would be limited to short-term increases in turbidity during construction, and possibly a minor loss of terrestrial habitat for small birds and mammals. The proposed fish ladder will have a beneficial effect by contributing to the restoration of anadromous fish runs to the river. For these reasons, we conclude that our action here is not a major Federal action significantly affecting the quality of the human environment.

Need, Economic Feasibility, and Energy Conservation

Our staff estimates that, based on CMP's current annual rate of load increase and a 19 percent reserve, CMP will need an additional 117,000 kW of installed capacity to meet its load requirements in 1980 and 1981. The increased capacity of Project No. 2284 will meet a part of that demand. The value of the project's 90,200,000 kWh average annual generation has been estimated on the basis of the estimated annual cost of providing an equivalent amount of energy from a 355-MW fossil fuel (coal) steam-electric plant which CMP plans to add to the existing W. F. Wyman Steam Plant. The estimated annual cost of equivalent steam-electric energy would be $4,193,000. In contrast, the estimated annual cost of producing that energy by the Brunswick Hydroelectric Plant is $3,005,000. We conclude that redevelopment of the Brunswick Project is economically justified.

The redeveloped project, with its average annual generation of 90,200,000 kWh, will utilize a renewable resource that will save the equivalent of approximately 148,000 barrels of oil, or 47,000 tons of coal, annually.

Comprehensive Development

Our staff's analysis shows that the redeveloped project will utilize all the available head between tidewater and an upstream industrial project of the Pejebscot Paper Company and will make efficient use of the available streamflow.

By redevelopment, the project's hydraulic capacity would increase from 2,150 cfs (which river flows exceed about 80 percent of the time) to more than 5,800 cfs (which river flows exceed only 30 percent of the time). Average annual energy generation for the project would increase from 17,800,000 kWh to 90,200,000 kWh through the proposed redevelopment.

The staff has also reviewed the Androscoggin River Basin Planning Status Report and states that the redeveloped project is not in conflict with any proposed or potential water power projects. We find that the redeveloped Brunswick Project will make efficient use of the flow and fall of the Androscoggin River and, as conditioned in the license issued here, be best adapted to the comprehensive development of the Androscoggin River Basin.

Federal Takeover

Section 14 of the Act, 17 U.S.C. § 807(a), reserves to the United States the right to take over a nonpublicly owned project upon the expiration of the license. No commenting agency has recommended Federal takeover or redevelopment of the project, nor has our staff. We know of no reason which would support Federal takeover or redevelopment, and conclude that the project should not be taken over or redeveloped by the United States.

Terms of Licenses

****5** Project redevelopment is scheduled to begin before actual shutdown of the existing Brunswick powerhouse, since that development will be able to continue to generate during the initial period of new construction (CMP estimates about five months). To accommodate temporary operation of the existing generation, CMP requested in its applications that the amended expiration date of the existing license and the effective date of the new license be tied to the date the existing powerhouse is shut down.

Rather than leave the periods of the initial and new licenses for Project No. 2284 contingent, for the purpose of effective and efficient administration ***61225** we are amending the existing license to terminate on the last day of the month in which this order is issued, and are making the first day of the following month the effective date of the new license.

As CMP has requested and in accordance with our established policy for relicensing involving extensive project redevelopment,[5] we are making the new license effective for a period of 50 years.

Conclusion

The Commission concludes that it is in the public interest and consistent with the provisions of the Federal Power Act to amend the license for Project No. 2284 by advancing its expiration date as described above and to issue a new license for the project, to be redeveloped in accordance with the provisions of the new license.[6]

The Commission orders:

(A) The current license for the Brunswick-Topsham Project No. 2284 is amended by changing its expiration date from December 31, 1993, to the last day of the month in which this order is issued.

(B) A new license is issued to Central Maine Power Company, under Part I of the Federal Power Act (Act), for a term of fifty years, commencing the first day of the month following the month in which it is issued, for the redevelopment and operation of the Brunswick Project FERC No. 2284, located on the Androscoggin River, a navigable water of the United States, in the towns of Brunswick and Topsham, the counties of Cumberland and Sagadahoc, Maine. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and subject to the rules and regulations the Commission issues under the provisions of the Act.

(C) The Brunswick Project No. 2284 consists of:

(1) all lands to the extent of the Licensee's interests in those lands, constituting the project area and enclosed by the project boundary, the project boundary being shown and described by certain exhibits which form part of the application for license and are designated and described as:

Exhibit	FERC Drawing No. 2284 -	Titled
J-1	11 General Map, Flowage, Dams and Power Plant Areas	
J-2	12 General Map, Transmission System	
K-1	13 Detail Map, Dam and Powerhouse Area	

(2) project works consisting of: (a) a wood crib fish barrier, located between Shad Island and Topsham, with a crest at elevation 14.2 feet m.s.l., (b) a 3-foot-high, 20-foot-long concrete fish barrier weir across Granny Hole Stream; (c) a concrete

dam, 40 feet high and 605 feet long; (d) a reservoir having a surface area of 300 acres at a normal water surface elevation of 39.4 feet m.s.l. and extending 4.5 miles upstream; (e) a powerhouse and intake structure integral with the dam, located adjacent to the Brunswick shoreline, containing a single turbine and generator having an installed capacity of 12 MW; (f) a fishway adjacent to the new powerhouse; (g) a 21-foot high fish barrier wall between the dam and Shad Island; (h) the 12-kV generator leads, the 12/34.5-kV Brunswick switchyard, and the 34.5-kV transmission line from the Brunswick switchyard to the Topsham substation; and (i) appurtenant facilities.

****6** The location, nature, and character of these project works are generally shown and described by the exhibits cited above and specifically shown and described by certain other exhibits which also form a part of the application for license and which are designated as:

Exhibit	FERC Drawing No.2284 -	Titled
L-1	14	General Plan
L-2	15	Elevations, Section and Hydraulic Charts
L-3	16	Powerhouse

Exhibit M

'General Descriptions of Mechanical, Electrical, and Transmission Equipment and Appurtenances,' consisting of one page.

Exhibit R

Consisting of two pages of text and one drawing (FERC No. 2284-17).

Exhibit S

Consisting of 54 pages of text and two drawings (FERC Nos. 2284-18 and -19).

(3) all of the structures, fixtures, equipment, or facilities which may be employed in connection with the project, including portable property, whether located within or outside the project boundary, as approved by the Commission, and all riparian or other rights necessary or appropriate for the operation or maintenance of the project.

(D) (1) Exhibits J, K, R and S, designated in Ordering Paragraph (C) above, are approved and made a part of the license.

(2) Exhibit L, designated and described in Ordering Paragraph (C) above, is approved only to the extent that it shows the general location and layout of the project and its works.

(3) Exhibit M, designated and described in Ordering Paragraph (C) above, is approved except to the extent that it fails to show the 34.5-kV transmission line from the Brunswick switchyard to Topsham substation.

(E) The Licensee may continue to operate and maintain the existing project works until they must ***61226** be shut down, altered, or removed in accordance with the redevelopment of the project under the license issued here.

(F) This license is also subject to the terms and conditions designated Articles 1-19 and 21-28 in Form L-4 (revised October 1975) entitled 'Terms and Conditions of License for Unconstructed Major Project Affecting Navigable Waters of the United States,' attached to (See 54 FPC 1824) and made a part of this license. This license is also subject to the following special conditions set forth as additional articles:

Article 29. If any previously unrecorded archeological or historic sites are discovered during the course of construction or development of any project works or other facilities at the project, construction activity in the vicinity shall be halted, a qualified archeologist shall be consulted to determine the significance of the sites, and the Licensee shall consult with the State Historic Preservation Officer (SHPO) to develop a mitigation plan for the protection of significant archeological or historic resources. If the Licensee and the SHPO cannot agree on the amount of money to be expended on archeological or historic work related to the project, the Commission reserves the right to require the Licensee to conduct, at its own expense, any such work found necessary.

Article 30. Within six months from the date of the completion of construction of fish passage facilities, the Licensee shall file with the Commission 'as built' drawings. The Licensee shall also submit annual reports to the Commission on results of fish passage facilities operation, including the numbers and species of fish counted and an assessment of the effectiveness of the facilities.

****7** *Article 31.* The Licensee shall, to the satisfaction of the Commission's authorized representative, install and operate any signs, lights, sirens, or other safety devices that may reasonably be needed to warn the public of fluctuations in flow from the project and protect the public in its recreational use of project lands and waters.

Article 32. In the interest of protecting and enhancing the scenic, recreational, and other environmental values of the project, Licensee shall (1) supervise and control the use and occupancy of project lands and waters; (2) shall prohibit, without further Commission approval, the further use and occupancy of project lands and waters other than specifically authorized by this license; (3) may authorize without further Commission approval, the use and occupancy of project lands and waters for landscape plantings and the construction, operation, and maintenance of access roads, power and telephone distribution lines, piers, landings, boat docks, or similar structures and facilities, and embankments, bulkheads, retaining walls, or other similar structures for erosion control to protect the existing shoreline; (4) shall require, where feasible and desirable, the multiple use and occupancy of facilities for access to project lands and waters; and (5) shall ensure to the satisfaction of the Commission's authorized representative that all authorized uses and occupancies of project lands and waters (a) are consistent with shoreline aesthetic values, (b) are maintained in a good state of repair, and (c) comply with State and local health and safety regulations. Under item (3) of this Article, Licensee may, among other things, institute a program for issuing permits to a reasonable extent for the authorized type of use and occupancy of project lands and waters. Under appropriate circumstances, permits may be subject to the payment of a fee in a reasonable amount. Before authorizing construction of bulkheads or retaining walls, Licensee shall: (a) inspect the site of the proposed construction, (b) determine that the proposed construction is needed, and (c) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site. If an authorized use or occupancy fails to comply with the conditions of this Article, or with any reasonable conditions imposed by the Licensee for the protection of the environmental quality of project lands and waters, the Licensee shall take appropriate action to correct the violations, including, if necessary cancellation of the authorization and removal of any non-complying structures or facilities. The Licensee's consent to an authorized use or occupancy of project lands and waters shall not, without its express agreement, place upon the Licensee any obligation to construct or maintain any associated facilities.

Article 33. Before beginning construction of the project, the Licensee shall submit and obtain approval from the Director, Office of Electric Power Regulation, of revised Exhibit L drawings conforming to the Commission's Regulations and showing the final design to the project dam. The dam shall be designed to be stable, structurally sound, and safe under probable maximum flood conditions.

****8** *Article 34.* Pursuant to Section 10(d) of the Act, the rate as computed below shall be the specified rate of return on the net investment in the project for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. One-half of the project surplus earnings, if any, accumulated under the license, in excess of the specified rate of return per annum on the net investment, shall be set aside in a project amortization reserve account as of the end of each fiscal year, with the exception that, if there is a deficiency of project earnings below that specified rate of return per annum for any fiscal year under the license, the amount of any surplus earnings accumulated thereafter until absorbed, and one-half of the remaining surplus earnings, if any, thus cumulatively computed, shall be set aside in the project amortization reserve account; the amounts thus established in the project amortization reserve account shall be maintained until further order of the Commission. The annual specified reasonable ***61227** rate of return shall be sum of the weighted cost components of long-term debt, preferred stock, and the cost of common equity, as defined below. The weighted cost component for each element of the reasonable rate of return is the product of its capital ratios and cost rate. The current capital ratios for each of the above elements of the rate of return shall be calculated annually based on an average of 13 monthly balances of amounts properly includable in the Licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rates for such ratios shall be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall be the interest rate on 10-year government bonds (reported as the Treasury Department's 10-year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

Article 35. For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, the Licensee shall pay the United States a reasonable annual charge, effective the first day of the month following the month in which this license is issued, as determined by the Commission in accordance with the provisions of its Regulations in effect from time to time. The authorized installed capacity for that purpose is 16,000 horsepower.

Article 36. Licensee shall file with the Commission, implement, and modify when appropriate, an emergency action plan designed to provide an early warning to upstream and downstream inhabitants and property owners if there should be an impending or actual sudden release of water caused by an accident to, or failure of, project structures. That plan shall be submitted within one year of the date of issuance of this license, and shall include: instructions to be provided on a continuing basis to operators and attendants for actions they are to take in the event of an emergency; detailed and documented plans for notifying law enforcement agents, appropriate Federal, state, and local agencies, operators of water-related facilities, and those residents and owners of properties that could be endangered; actions that would be taken to reduce the inflow to the reservoir, if possible, by limiting the outflow from upstream dams or control structures; and actions to reduce downstream flows by controlling the outflow from dams located on tributaries to the stream on which the project is located. Licensee shall also submit a summary of the study used as a basis for determining the area that may be affected by an emergency, including criteria and assumptions used. Licensee shall monitor any changes in upstream or downstream conditions which may influence possible flows or affect areas susceptible to damage, and shall promptly make and file with the Commission appropriate changes in such emergency action plan. The Commission reserves the right to require modifications to the plan.

****9** *Article 37.* Within five years following the effective date of this license the Licensee shall file a revised Exhibit F and, for Commission approval, an ‘as built‘ Exhibit K to show the project as finally constructed and located, and an ‘as built‘ Exhibit M revised to include the 34.5-kV transmission line between the Brunswick switchyard and the Topsham substation.

Article 38. The Licensee shall commence construction of the project works within one year of the effective date of this license, and, in good faith and with due diligence, shall prosecute and complete project works within four years of commencing construction.

Article 39. The Licensee shall clear and keep clear to an adequate width all lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which result from maintenance, operation, or alteration of the project works. In addition, all trees along the periphery of the project reservoir which die during operation of the project shall be removed. All clearing of lands and disposal of unnecessary material shall be done with due diligence to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, state, and local statutes and regulations.

(G) This order shall become final 30 days from the date of issuance unless application for rehearing is filed as provided in Section 313(a) of the Act. Failure of the Licensee to file such an application shall constitute acceptance of this amendment and license. In acknowledgment of the acceptance of this amendment and license, it shall be signed for the Licensee and returned to the Commission within 60 days from the date of issuance of this order.

Federal Energy Regulatory Commission

Footnotes

1 Project No. 2284 is located on the Androscoggin River, a navigable waterway, in the towns of Brunswick (Cumberland County) and Topsham (Sagadahoc County), Maine. See, *New Hampshire Water Resources Board,* Docket No. E-6807, 20 FPC 99 (1958) for a determination of navigability.

2 The application for license has been processed as Project No. 2834. Because we are relicensing an existing project, however, even though extensively redeveloped, we will retain the designation of Project No. 2284 for this licensed project, rather than renumber it.

3 CMP estimates that redevelopment will cost $17 million.

4 Order Issuing License (Major), 28 FPC 302 (1962).

5 *The Montana Power Co.,* Project No. 2301, 56 FPC 2008, Order Issuing License (Major) (issued October 5, 1976).

6 CMP’s application for new license states that its application for amendment of license is ‘contingent upon receipt of a satisfactory [new] license.‘ The application for amendment has already been processed despite this statement that it was contingent. In view of the lack of competing applications for license, recommendations for Federal takeover, or any opposition to the proposed redevelopment, and our conclusion that the amendment and new license we are authorizing here are in the public interest, we need not reach the question of whether we should entertain such contingent applications for amendment. Our action here should not be construed as an indication of any position on that question, which we expressly for future disposition in a suitable proceeding.

STATE OF MAINE

DEPARTMENT OF ENVIRONMENTAL PROTECTION

AUGUSTA, MAINE 04330

BOARD ORDER

IN THE MATTER OF

CENTRAL MAINE POWER CO.	)	COASTAL WETLANDS ALTERATION ACT
Topsham, Maine, Sagadahoc County	)	AND WATER QUALITY CERTIFICATION
Brunswick, Maine, Cumberland County	)	
POWERHOUSE & RIVER CROSSING	)	
#03-4458-05030	)	FINDINGS OF FACT AND ORDER

After reviewing the project file which includes the application with its supportive data, agency review comments, staff summary and other related materials on file with regard to the above noted project, under provisions of Title 38, M.R.S.A. Sec. 474 and Section 401 of P.L. 92-500, the Federal Water Pollution Control Act Amendments of 1972, the Board finds the following facts:

1. Applicant proposes to remove the existing facility, excavate 36,700 cubic yards for a tailrace channel in river bottom, construct a fish barrier from Shad Island to existing dam, construct a new powerhouse and a fishway adjacent to powerhouse.

2. The project will not unreasonably interfere with existing recreational and navigational uses.

3. The project will not cause unreasonable soil erosion.

4. The project will not unreasonably harm wildlife or freshwater, estuarine, or marine fisheries provided that excess excavated ledge is disposed of in an upland area.

5. The project will not unreasonably interfere with the natural flow of any waters.

6. There is reasonable assurance that the activity will not lower the quality of any waters or violate applicable Water Quality Standards.

THEREFORE, the Board approves the application of Central Maine Power Co. to remove the existing hydro-electic facility, excavate 36,700 cubic yards for a tailrace channel and construct a fish barrier, new powerhouse and fishway in Brunswick and Topsham, Maine subject to the following conditions:

1. All excess excavated ledge shall be placed in an upland disposal area.
2. Applicant shall abide by the Bureau of Public Lands Lease, attached.

DONE AND DATED AT AUGUSTA, MAINE, THIS 23RD DAY OF AUGUST, 1978.

BOARD OF ENVIRONMENTAL PROTECTION

BY: H E Warren

Henry E. Warren, Chairman

PLEASE NOTE ATTACHED SHEET FOR APPEAL PROCEDURES....

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
AUGUSTA, MAINE 04333

STAFF ORDER

IN THE MATTER OF

CENTRAL MAINE POWER CO.) Water Quality Certification
Topsham, Maine, Sagadahoc County)
Brunswick, Maine, Cumberland County)
POWERHOUSE, FISHWAY & STREAM ALTERATIONS)
#03-4458-05030) SUMMARY, FINDINGS OF FACT AND ORDER

After review of the request and related materials submitted by the applicant under the provisions of Section 401 of P.L. 92-500, the Federal Water Pollution Control Act Amendments of 1972, the Department finds that:

1. Applicant proposes several alterations in connection with construction of 12,000 kw hydroelectric generating plant and fishway. Approximately 47,000 cubic yards of ledge will be excavated. Approximately 13,500 cubic yards of this ledge will be used to fill new switchyard area. Shot rock, gravel, sand and impervious membrane cofferdams will be used during construction. Work is scheduled for 1979-1981. Project will alter approximately 1500' of riverbank. The Maine Department of Environmental Protection has issued a Coastal Wetlands Alteration Permit #03-4458-05030 for other parts of this project.

2. The project was approved by the Department of Inland Fisheries and Wildlife by permit #1543-23080 issued March 8, 1979,

3. Water Quality Standards will be adversely affected during the construction stages only.

THEREFORE, the Department orders that this project be granted certification that there is reasonable assurance that the activity will not violate applicable Water Quality Standards, subject to the following conditions:

1. This certification is conditional upon the applicant's continual compliance with all laws, statutes and regulations of the State of Maine, its agencies, municipalities or quasi-municipal organizations relating to the enhancement and protection of the environment.

DONE AND DATED AT AUGUSTA, MAINE, THIS 11TH DAY OF APRIL, 1979.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: ______________________
Henry E. Warren, Commissioner

PLEASE NOTE ATTACHED SHEET FOR APPEAL PROCEDURES....

(C) This order is final unless a petition appealing it to the Commission is filed within 30 days from the date of its issuance, as provided in Section 1.7(d) of the Commission's regulations, 18 C.F.R. 1.7(d) (1979), *as amended*, 44 Fed. Reg. 46449 (1979). The filing of a petition appealing this order to the Commission or an application for rehearing as provided in Section 313(a) of the Act does not operate as a stay of the effective date of this permit or of any other date specified in this order, except as specifically ordered by the Commission.

— **Footnotes** —

[1] In this, "Permittee" refers to the applicant or applicants named in the caption for this proceeding.

[2] Authority to act on this matter is delegated to the Director, Division of Hydropower Licensing, Office of Electric Power Regulation, under § 375.308 of the Commission's regulations, 45 Fed. Reg. 21216 (1980), as amended by order No. 112 in Docket No. RM81-5, issued November 21, 1980 (45 Fed. Reg. 79024).

Appendix A

Notice of Application for Preliminary Permit

(Issued June 5, 1981)

Take notice that Middlebury College (Applicant) filed on May 4, 1981, an application for preliminary permit [pursuant to the Federal Power Act, 16 U.S.C. §§ 791(a)—825(r)] for proposed Project No. 4631 known as Battell Project located on the Otter Creek in the towns of Weybridge and New Haven, Addison County, Vermont. The application is on file with the Commission and is available for public inspection. Correspondence with the Applicant should be directed to: James D. Ross, Business Manager, Middlebury College, Middlebury, Vermont 05753. Any person who wishes to file a response to this notice should read the entire notice and must comply with the requirements specified for the particular kind of response that person wishes to file.

Project Description—The proposed run-of-the-river project would be an entirely new development and would consist of: (1) a 15 to 17-foot high, 200-foot long concrete dam in two sections straddling an island; (2) a reservoir with a surface area of 30 acres at an elevation of 238 feet M.S.L.; (3) an 1,800-foot long penstock; (4) a powerhouse containing 2 turbine-generator units with a rated capacity of 750-kW each and a tailwater elevation of 218 feet M.S.L.; (5) a transmission line; and (6) appurtenant facilities. The project would generate up to 8,000,000 kWh annually.

[Note: Remainder of Notice omitted in printing.]

[¶ 62,496]

Central Maine Power Company, Project No. 2284-004 BAUNSWICK

Order Amending License

(Issued September 21, 1981)

William W. Lindsay, Director, Office of Electric Power Regulation.

On June 30, 1981, Central Maine Power Company (Licensee) filed an application for amendment of license for the Brunswick Project No. 2284 on the Androscoggin River, in the towns of Brunswick and Topsham, Cumberland and Sagadahoc Counties, Maine.[1]

Licensee proposes that its project license be amended to authorize the addition of two turbine-generator units with a total rated capacity of 7.0 MW. The project is presently under construction pursuant to its new license issued February 9, 1979. The units would be located in an extension of the project powerhouse in place of two stanchion-stop-log structures. The turbine-generators would allow the production of an additional 15,000,000 kWh annually and would allow a more flexible operating range for the project. The project would continue to be operated as a run-of-the-river facility.

Safety and Adequacy and Comprehensive Development of the Project:

The staff has determined that the proposed installation of additional generating units at the Brunswick Project is economically feasible. No changes have been proposed that would affect the safety of project structures. The proposed installation of the two 3.5-MW turbine-generators at Brunswick would make more efficient use of the water resources of the Androscoggin River, in particular during seasonal high flows. It is concluded that the project, as modified, is best adapted to the comprehensive development of the Androscoggin River Basin.

Public notice of the filing of the application was given with August 29, 1981, as the last date to file comments, protests, or petitions to intervene. No adverse comments, protests or petitions to intervene were received.

Environmental Matters:

The shortnose sturgeon, a Federally-listed endangered species, occurs in the lower Androscoggin River and Merrymeeting Bay downstream of the project site. In the spring of 1980 and 1981, adult shortnose sturgeon in spawning condition were collected immediately downstream of the site, indicating that there is a shortnose sturgeon spawning area in the vicinity. The National Marine Fisheries Service (NMFS) requested in its letter of comment that the Commission staff initiate the consultation process pursuant to Section 7 of the Endangered Species Act of 1973, and assess the effects of the installation of the two additional turbine-generators. Staff's assessment concluded that construction and operation of the additional units would not adversely affect the shortnose sturgeon population downstream of the project. Staff, however, recommended that Article 43 be added to the license to require the Licensee to consult with NMFS and the Maine Department of Marine Resources in developing a plan to ensure the continued protection of the shortnose sturgeon spawning habitat immediately downstream from the project. NMFS concurred with staff's finding of no effect on the shortnose sturgeon by letter dated September 16, 1981.

The U.S. Fish and Wildlife Service, and the Maine Department of Marine Resources had no objection to the construction of the additional turbine-generators, provided that the intakes are screened to protect downstream migrant anadromous fishes. The Licensee has proposed in the application to install screens on the intakes for Units 1, 2, and 3.

The Maine Historic Preservation Officer advised Licensee that the proposed action would have no effect on an cultural resources. The proposed addition of the two turbine-generators at the same time as the licensed facilities, already authorized, would not result in any long-term adverse environmental impacts not previously assessed in the approved application for license. Any short-term adverse impacts would be minor in nature and would end with the completion of construction. For these reasons, approval of the application would not constitute a major Federal action significantly affecting the quality of the human environment.[2]

It is ordered that:

(A) The amendment of license for the Brunswick Project as proposed in the application filed on June 30, 1981, is approved.

(B) Ordering Paragraph (C) of the license is amended as follows:

(2) Project works consisting of: (a) a wood crib fish barrier, located between Shad Island and Topsham, with a crest elevation 14.2 feet m.s.l.; (b) a 3-foot high, 20-foot-long concrete fish barrier weir across Granny Hole Stream; (c) a concrete dam, 40 feet high and 605 feet long; (d) a gate section containing two taintor gates; (e) a reservoir having a surface area of 300 acres at a normal water surface elevation of 39.4 feet m.s.l. and extending 4.5 miles upstream; (f) a powerhouse and intake structure integral with the dam, located adjacent to the Brunswick shoreline, containing three turbine generators having an installed capacity of 19 MW; (g) a fishway adjacent to the new powerhouse; (h) a 21-foot-high fish barrier wall between the dam and Shad Island; (i) the 12-kV generator leads, the 12/34.5-kV Brunswick Switchyard, and the 34.5-kV transmission line from the Brunswick switchyard to the Topsham substation; and (j) appurtenant facilities.

(C) Ordering Paragraph (F) of the license is revised to include the following Articles:

Article 40. The Licensee shall file with the Commission's Regional Engineer and the Director, Office of Electric Power Regulation, one copy of each of the contract drawings and specifications prior to the start of construction and installation of the turbine-generator units at the Project. The Director, Office of Electric Power Regulation, may require changes in the plans and specifications to assure a safe and adequate project.

Article 41. The Licensee shall submit, within 60 days of completion of construction, revised Exhibit L drawings and a revised Exhibit M showing the project works at the Brunswick Project as constructed.

Article 42. The Licensee shall review and approve the design and construction procedures for contractor-designed cofferdams and deep excavations prior to the start of construction. The Licensee shall file with the Commission's New York Regional Engineer and Director, Office of Electric Power Regulation, one copy of the approved construction drawings and specifications, and a copy of the letter of approval.

Article 43. The Licensee shall consult with the National Marine Fisheries Service and Maine Department of Marine Resources, and develop a plan to ensure the continued protection of the shortnose sturgeon spawning habitat immediately downstream from the project. This plan shall be filed with the

Commission within 6 months of the date of issuance of this order.

(D) Order Paragraph (F) Article 35 of the license is revised to read as follows:

Article 35. For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, the Licensee shall pay the United States a reasonable annual charge, effective the first day of the month following the month in which this license is issued, as determined by the Commission in accordance with the provisions of its regulations in effect from time to time. The authorized installed capacity for that purpose is 25,300 horsepower.

(E) The following Exhibit drawings are approved and made a part of the License for FERC Project No. 2284:

Exhibit	*FERC No. 2284*	*Showing*	*Superseding FERC No. 2284*
J Sheet 1	20	General Map	11
K Sheet 1	21	Dam and Powerhouse Area	13
L Sheet 1	22	General Map	14
L Sheet 2	23	Elevations, Sections, and Hydraulic Charts	15
L Sheet 4	24	Powerhouse Plan and Sections	—
L Sheet 5	25	Powerhouse Plan and Sections	—
L Sheet 6	26	Powerhouse Elevations	—

(E) This order is final unless a petition appealing it to the Commission is filed within 30 days from the date of its issuance, as provided in § 1.7(d) of the Commission's Regulations, 18 CFR 1.7(d) (1979), *as amended* 44 Fed. Reg. 46449 (1979). The filing of a petition appealing this order to the Commission or an application for rehearing as provided in § 313(a) of the Act does not operate as a stay of the effective date of this license or any other date specified in this order, except as specifically ordered by the Commission. The Licensee's failure to file a petition appealing this order to the Commission shall constitute acceptance of this license. In acknowledgement of acceptance of this license and its terms and conditions, it shall be signed by the Licensee and returned to the Commission within 60 days from the date of this order.

— **Footnotes** —

[1] Authority to act on this matter is delegated to the Director, office of Electric Power Regulation under 18 C.F.R. § 375.308 (1980), *as amended by* 46 Fed. Reg. 14119 (1981).

[2] The State of Maine Environmental Board issued a water Quality Certificate on August 31, 1981.

[¶ 62,497]

Ohio Power Company, Project No. 2570-002

Order Amending License

(Issued September 21, 1981)

William W. Lindsay, Director, Office of Electric Power Regulation.

On June 12, 1981, Ohio Power Company (Licensee) filed an application for amendment of license Articles 51 and 52 for its Racine Project No. 2570 under construction at the Corps of Engineers Racine Lock and Dam on the Ohio River in Meigs County, Ohio and Jackson County, West Virginia.[1]

Licensee requests amendment of Article 52 for an extension of time of one year in which to complete construction of the project. Article 52 currently requires construction to be completed by November 30, 1981. Licensee cites construction delays due to weather, labor problems and late completion of the contract for the concrete work as the reason for the request.

Licensee also requests amendment of Article 51 for an extension of time of one year in which to file a revised exhibit S for the project.

After consideration, it is concluded that granting the extensions of time requested would be in the public interest.

It is ordered that:

(A) Article 51 of the license for Project No. 2570 is modified to read:

Article 51. Licensee shall file, for Commission approval within three years after completion of construction, a revised Exhibit S, prepared in accordance with the Commission's

83 FERC ¶ 62,253

FEDERAL ENERGY REGULATORY COMMISSION

Central Maine Power Company	)	Project No. 2142-026 Project No. 2284-017 Project No. 2335-017

ORDER AMENDING LICENSES

JUN 22 1998

On March 23, 1998, Central Maine Power Company (CMP) filed amendment applications for three of its licensed projects; the Indian Pond (Harris) Project, FERC No. 2142, the Brunswick Project, FERC No. 2284, and the Williams Project, FERC No. 2335. 1/ CMP filed the applications to revise the projects' boundaries. The Indian Pond Project is located on Kennebec River, Somerset and Piscataquis Counties, Maine. The Brunswick Project is located on Androscaggin River, Cumberland and Sagadahoc Counties, Maine. The Williams Project is located on Kennebec River, Somerset County, Maine.

In the filing, CMP proposes to delete transmission lines that are no longer considered primary lines from the projects' boundaries.

BACKGROUND

The Indian Pond Project was licensed in 1954 with a 115-kV, 29.5-mile-long transmission line. The Brunswick Project was licensed in 1979 with a 34-kV, 0.25-mile-long transmission line. The Williams Project was licensed in 1988 with a 115-kV, 3,900-foot-long transmission line. CMP has since added distribution circuits to the switchyards of the projects, which changed the points of interconnection with CMP's transmission and distribution systems.

Since the projects' points of interconnection with the transmission system have changed to the switchyards, CMP is requesting the removal of the lines from the licenses.

THE AMENDMENTS

CMP is proposing to delete from the licenses the transmission lines of the projects as follows:

Harris Project: About 29.5 miles of transmission line and related facilities from the project's boundary. This line is now part of the licensee's interconnected transmission system.

1/ 13 FPC 1076 (1954), 6 FERC ¶ 61,122 (1979), and 42 FERC ¶ 62,035 (1988), respectively.

Brunswick: About 0.25 mile of transmission line and related facilities from the project's boundary. This line is now part of the licensee's interconnected transmission system.

Williams: About 3,900 feet of transmission line and related facilities from the project's boundary. This line is now part of the licensee's interconnected transmission system.

DISCUSSION

Section 3(11) of the Federal Power Act defines "project" to consist among other things of "... the primary line or lines transmitting power therefrom to the point of junction with the distribution system or with the interconnected primary transmission system..." When CMP added distribution circuits at the switchyards of the projects, the points of interconnection with the distribution system became at the switchyards. The subject transmission lines are no longer the primary lines for the project, but rather part of the distribution system. Therefore, the lines are no longer considered project features.

In addition, while reviewing the current exhibit drawings on file, we found that exhibit J-1 drawing for the Brunswick Project was incorrectly labeled and several drawings should have been deleted by a previous order. 2/ We will correct these administrative errors under ordering paragraph (C) of this order.

This order approves CMP's amendment applications to delete the subject transmission lines from the boundaries of the projects.

The Director orders:

(A) The amendment applications for the Indian Pond (Harris) Project, FERC No. 2142, the Brunswick Project, FERC No. 2284, and the Williams Project, FERC No. 2335, are approved as provided for in this order.

(B) The exhibits G, J, K, and M for the Indian Pond Project, FERC No. 2142, are amended as follows:

Revised Exhibit Drawings: The following revised exhibit drawings are approved and made part of the license:

2/ 16 FERC ¶ 62,496, issued September 21, 1981.

Exhibit	FERC No.	Showing	Superseding
G-1	2142-31	Detail Map, Dam & Powerhouse Area	2142-29
K-6	2142-32	Detail Map, 115-kV Transmission Line & Access Right of Way	2142-25

Deleted Exhibit Drawings: The following exhibit drawings are deleted from the license:

Exhibit	FERC No.	Showing
J-2	2142-2	General Map, Transmission System
K-7	2142-26	Detail Maps of Transmission Section 222
K-8	2142-27	Detail Maps of Transmission Section 222

Exhibit M: Consisting of 7 pages, titled "General Description of Equipment", filed on March 23, 1998, is approved and made a part of the license, superseding the Exhibit M approved on August 8, 1996. The new exhibit M indicates that the 29.5-mile-long transmission line and related facilities are not project features.

(C) The exhibits J, K, L and M for the Brunswick Project, FERC No. 2284, are amended as follows:

Revised Exhibit Drawings: The following revised exhibit drawings are approved and made part of the license:

Exhibit	FERC No.	Showing	Superseding
K-1	2284-36	Detail Map, Dam & Powerhouse Area	2284-27
L-1	2284-37	General Plan	2284-28

Deleted Exhibit Drawings: The following exhibit drawing is deleted from the license:

Exhibit	FERC No.	Showing
J-2	2284-12	General Map, Transmission System

Correcting Exhibit Drawings Labeling:

- Exhibit J-1 from the September 21, 1981 order was assigned a duplicate FERC drawing No. 2284-20. Therefore, we are correcting this administrative error by assigning to J-1 FERC drawing No. 2284-35.

- The September 21, 1981 order neglected to delete exhibits L-1 and L-2, FERC drawing Nos. 2284-20 and 2284-21, from the license. These exhibits were superseded by exhibit L FERC drawing Nos. 2284-22 and 2284-23. Therefore, FERC drawing Nos. 2284-20 and 2284-21 are deleted from the license. 3/

Exhibit M: Consisting of 2 pages, titled "General Description of Mechanical, Electrical, and Transmission Equipment and Appurtenances", filed on March 23, 1998, is approved and made a part of the license, superseding the Exhibit M approved on February 9, 1979. The new exhibit M excludes the 0.25-mile-long transmission line and related facilities from being project features.

(D) The exhibits A and G, for the Williams Project, FERC No. 2335, are amended as follows:

Exhibit A: Consisting of 5 pages, titled "Project Description", filed on March 23, 1998, is approved and made a part of the license, superseding the Exhibit A approved on May 2, 1991. The new exhibit A excludes the 3,900-foot-long transmission line and related facilities from being project features.

Revised Exhibit Drawings: The following revised exhibits are approved and made part of the license:

Exhibit	FERC No.	Showing	Superseding/ Deleted
G-1	2335-19	General Map, Flowage, Dam & Power Plant Area	2335-7
G-3	2335-20	Detail Map - Reservoir Williams Station	2335-9

3/ The L-1 and L-2 exhibits were approved by order issued October 29, 1979, 9 FERC ¶ 62,049.

<u>Deleted Exhibits</u>: The following exhibit drawing is deleted from the license:

Exhibit	FERC No.	Showing
G-7	2335-7	General Map, Transmission System

(E) Within 90 days of the date of issuance of this order, the licensee shall file, for each of the three projects (Indian Pond (Harris) Project, FERC No. 2142, the Brunswick Project, FERC No. 2284, and the Williams Project, FERC No. 2335), three original sets of aperture cards of the approved drawings. All aperture cards should be reproduced on silver or gelatin 35 mm microfilm. All microfilm should be mounted on a Type D (3 1/4" x 7 3/8") aperture card.

Prior to microfilming, the FERC Drawing Number (2142-31 through 2142-32, 2284-36 through 2284-37, and 2335-19 through 2335-20) shall be shown in the margin below the title block of the approved drawings. After mounting, the FERC Drawing Number should be typed in the upper right corner of each aperture card. Additionally, the Project Number, FERC exhibit (i.e., G-1), Drawing Title, and date of this order should be typed in the upper left corner of each aperture card. See Figure 1.

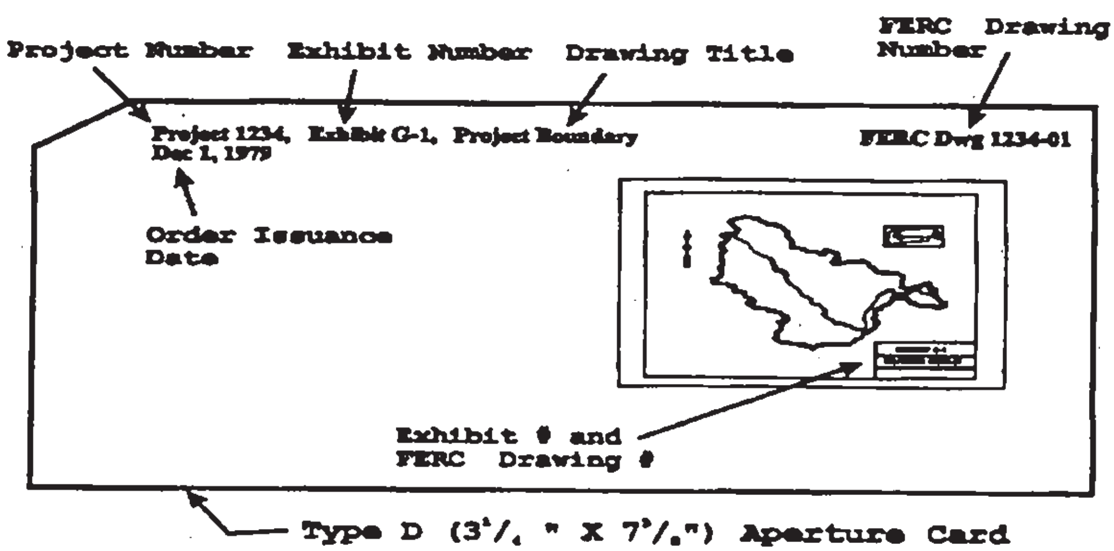


Figure 1. Sample Aperture Card Format

Two original sets of aperture cards should be filed with the Secretary of the Commission. The remaining set of aperture cards should be filed with the Commission's New York Regional Office.

(F) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. § 385.713.

Joseph D Morgan

Carol L. Sampson
Director,
Office of Hydropower Licensing

144 FERC ¶ 62,075
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

FPL Energy Maine Hydro, LLC Brookfield White Pine LLC	Project Nos.	2142-079, 2194-048, 2283-086, 2284-043, 2302-073, 2322-059, 2325-088, 2329-093, 2335-037, 2519-066, 2527-083, 2528-100, 2529-102, 2530-051, 2531-069, 2612-027, and 11834-064

ORDER AMENDING LICENSES

(July 29, 2013)

1. On May 1, 2013, FPL Energy Maine Hydro, LLC (Maine Hydro or licensee) filed a notice advising the Commission that Maine Hydro, licensee for the seventeen captioned projects,[1] had changed its name to Brookfield White Pine Hydro LLC effective May 1, 2013. FPL Energy Maine Hydro, LLC states that this is a name change only and that there has been no change in the legal entity.

2. The name change does not affect the licensee's qualifications to be a licensee under the Federal Power Act. The request to approve a change in a corporate name will, therefore, be approved.

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[1] The project numbers, names of the projects, and license order citations are: Project No. 2142, Indian Pond, 106 FERC ¶ 62,021 (2004); Project No. 2194, Bar Mills, 124 FERC ¶ 62,153 (2008); Project No. 2283, Gulf Island – Deer Rips, 116 FERC ¶ 62,159 (2006); Project No. 2284, Brunswick, 6 FERC ¶ 61,122 (1979); Project No. 2302, Lewiston Falls, 36 FERC ¶ 62,353 (1986); Project No. 2322, Shawmut, 14 FERC ¶ 62,004 (1981); Project No. 2325, Weston, 81 FERC ¶ 61,251 (1997); Project No. 2329, Wyman, 81 FERC ¶ 61,256 (1997); Project No. 2335, Williams, 42 FERC ¶ 62,035 (1988); Project No. 2519, North Gorham, 65 FERC ¶ 62,154 (1993); Project No. 2527, Skelton, 82 FERC ¶ 61,190 (1998); Project No. 2528, Cataract, 47 FERC ¶ 62,296 (1989); Project No. 2529, Bonny Eagle, 82 FERC ¶ 62,255 (1998); Project No. 2530, Hiram, 21 FERC ¶ 62,483 (1982); Project No. 2531, West Buxton, 42 FERC ¶ 62,063 (1988); Project 2612, Flagstaff Storage, 106 FERC ¶ 62,233 (2004); Project No. 11834, Upper & Middle Dams Storage, 101 FERC ¶ 62,179 (2002).

<u>The Director orders</u>:

(A) The licensee for the seventeen projects identified herein are amended to change the licensee's name from FPL Energy Maine Hydro, LLC to Brookfield White Pine Hydro LLC.

(B) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the FPA, 16 U.S.C. §825*l* (2006), and the Commission's regulations at 18 C.F.R. § 385.713 (2012). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order.

Charles K. Cover, P. E.
Chief, Project Review Branch
Division of Hydropower Administration
and Compliance

145 FERC ¶ 62,187
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Brookfield White Pine Hydro, LLC Project No. 2284-038 and 041

ORDER APPROVING INTERIM SPECIES PROTECTION PLAN AND HANDLING AND PROTECTION PLAN FOR SHORTNOSE AND ATLANTIC STURGEON

(Issued December 13, 2013)

1. On February 21, 2013, Brookfield White Pine Hydro, LLC (licensee) filed an Interim Species Protection Plan (Interim SPP) describing measures it would take in the years 2013 through 2019 to avoid and minimize impacts to federally-listed endangered Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon during operation of the Brunswick Hydroelectric Project.[1] The Interim SPP is attached to a draft Biological Assessment (BA) that the licensee also filed with the Commission on February 21, 2013 as part of consultation with the National Marine Fisheries Service (NMFS) regarding ongoing project operation. The Interim SPP outlines specific actions developed pursuant to the Endangered Species Act (ESA) to protect federally-listed Atlantic salmon.

2. On March 29, 2013, the licensee filed an addendum to the Interim SPP and draft BA describing measures it would take to avoid and minimize impacts to federally-listed endangered shortnose sturgeon and the federally-listed threatened Gulf of Maine and New York Bight DPSs of Atlantic sturgeon. The addendum includes the licensee's proposed Handling and Protection Plan for Shortnose and Atlantic sturgeon (Sturgeon Protection Plan). The draft BA addendum and Sturgeon Protection Plan were also prepared as part of consultation with the NMFS regarding ongoing project operation.

3. The Brunswick Project is the first dam located on the Androscoggin River at river mile six, in Androscoggin County, Maine. The Androscoggin River is a tributary to the Kennebec River and joins the Kennebec River at Merrymeeting Bay.

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[1] Order Amending License and Issuing New License, issued February 9, 1979, (6 FERC ¶ 61,122).

BACKGROUND

4. The Brunswick Project consists of a 300-acre reservoir; a 605-foot-long and 40-foot-high concrete gravity dam consisting of a 128-foot-long right spillway section, topped with 2.6-foot-high flashboards; a concrete pier and 21-foot high barrier wall; a left spillway section; a gate section containing two Taintor gates and an emergency spillway; an intake and powerhouse integral to the dam; and a vertical slot fishway and associated trap, sort, and truck facility located adjacent to the powerhouse.

5. The vertical slot fishway and associated trap, sort, and truck facility were installed in 1983. The fishway is 570 feet-long and consists of 42 individual pools, with a one-foot drop between each pool. The trapping facility, located at the upstream end of the fishway, provides biologists the opportunity to collect data on migratory and resident fish species using the fishway. At the top of the fishway a fixed grating guides fish past a viewing window and into a 500-gallon capacity fish hoist (trap). The hoist elevates the fish to overhead sorting tanks where they are sorted and passed upstream. Atlantic salmon are passed upstream following the collection of biological data. The fishway operates between May 1 and October 31. When the fishway operates, an attraction flow of 100 cubic feet per second (cfs) is provided. To help guide fish to the fishway entrance, a 21-foot-high concrete barrier wall is located between the dam and small rocky island located immediately downstream of the dam to prevent fish from accessing the spillway section and to prevent spill from entering the tailrace and interfering with fish attraction to the fishway.

6. Downstream passage at the project is accomplished via a surface sluice and associated 18-inch pipe that discharges fish into the project tailrace. The existing sluice gate and pipe were installed in 1983. The sluice is located along the face of the powerhouse between units 1 and 2. The sluice is generally opened for smolt and kelt passage from April 1 through June 15 and again from November 1 through December 31, river and ice conditions permitting.

7. The Brunswick Project normally operates in a run-of-river mode. However, due to the limitations of the turbine/generator units and small impoundment size, the impoundment fluctuates to allow the units to operate efficiently. Impoundment fluctuations are generally limited to less than two feet below the top of the spillway. Downstream of the project, the Androscoggin River is under tidal influence, and tidal fluctuations of up to 5 feet occur immediately downstream of the Brunswick dam.

INTERIM SPECIES PROTECTION PLAN

8. The Interim SPP identifies measures necessary to avoid and minimize the effects of project operation on federally-listed Atlantic salmon. The Interim SPP covers a seven-year period, which began in 2013. Critical habitat in the mainstem of the Androscoggin

River begins at the confluence with the Kennebec River, and extends upstream to Lewiston Falls and includes the reach occupied by the Brunswick Project.

9. Under the Interim SPP, the licensee proposes to continue to have the Maine Department of Marine Resources (DMR) operate the upstream fishway including the trap and sort facility during the upstream salmon migration period from May 1 through October 31.[2] All Atlantic salmon would be released to the Brunswick impoundment to continue their upstream migration. The licensee would be responsible for all measures necessary to keep the fishway in good operating condition. If the fishway malfunctions or becomes inoperable during the critical months, the licensee would be responsible for the repair and restoration of the fishway to normal operations. The Maine DMR would maintain records of all passage via the fishway and would maintain detailed records of Atlantic salmon passing via the fish hoist, including an assessment of size, age, and condition.

10. While the existing vertical slot fishway appears to be effective in passing Atlantic salmon upstream, no studies have been conducted to fully evaluate the fishway's effectiveness. The licensee proposes to monitor and assess the effectiveness of the fishway between 2013 and 2015. The study would employ PIT tagging and would be conducted in cooperation with other dam owners on the Androscoggin River (including the owners of the Pejepscot and Worumbo Projects), to the extent practicable. The licensee would install PIT tag detection equipment at the Brunswick Project fishway entrance and exit to evaluate salmon success in using the fishway. This study would require all Atlantic salmon collected in the Brunswick fishway collection facility, over the three-year study period, to be PIT tagged. The licensee would develop a detailed study plan after consultation with NMFS.

11. To enhance downstream passage under the Interim SPP the licensee proposes to operate the existing bypass facility from April 1 through December 31, as river conditions allow. In addition, accommodation for downstream passage would be provided by vertical slot fishway which would be opened for downstream passage beginning on April 15 and extending until the end of the salmon migration period on October 31, river conditions permitting. If it is determined through consultation with the NMFS that addition spill is needed for passage, the licensee would provide additional spill flows to facilitate downstream passage.

12. The licensee would study up to three years of downstream passage from 2013 to 2015 at the Brunswick Project. The study would use between 100 and 200 smolts per

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[2] The Brunswick fishway and trap and sort facility are maintained by the licensee and operated by the Maine DMR under a prior agreement.

year obtained from the Great Lakes National Fish Hatchery. The licensee would use a paired release study design. Using smolts released upstream of the project and detections at the upstream side of the dam, the licensee would determine the number of smolts known to have arrived alive at the project. This group would be used to estimate survival through the dam spillway, turbines, or downstream fishway. Monitoring would continue sufficiently far enough downstream to avoid false positive detections due to dead, tagged fish. To estimate mortality unrelated to dam passage and occurring within the downstream river stretch, a paired release of tagged fish would be conducted in the project tailrace. A dam passage survival estimate would be calculated as the quotient of the survival estimate derived from the upstream group divided by the paired release survival estimate from the tailwater to the downstream detection station. The licensee would consult with NMFS, USFWS and Maine DMR on the development of a detailed study plan. In addition to the adult and smolt passage studies, the licensee also proposes to conduct downstream passage studies of kelts for up to three years between 2014 and 2016 to determine the downstream survival of Atlantic salmon kelts. The licensee proposes to consult with the NMFS on the development of a detailed study plan for this effort as well.

13. To protect Atlantic and shortnose sturgeon occurring downstream of the Brunswick Project, the license proposes to implement its proposed Sturgeon Protection Plan. The purpose of the plan is to protect sturgeon from affects associated with the operation and maintenance of the Brunswick Project and fishway.

14. Routine inspections and maintenance that require dewatering the generating units would be scheduled to occur outside the sturgeon spawning season, typically April and May when water temperatures are between 8.5 to 14.5 degrees Celsius, when sturgeon are less likely to be attracted to the turbine draft tubes. Prior to scheduled and emergency maintenance that requires dewatering of any of the three project generating units, the licensee would inspect the tailrace stop logs and inside the scroll case before lowering the stop logs into place. Prior to dewatering, areas upstream of the turbine tailrace stop logs and inside the scroll case accessible to personnel, would also be inspected. Upon lowering the tailrace stop logs, an inspection inside of the tailrace stop logs would be conducted to confirm that no sturgeon are present prior to dewatering. After the tailrace stop logs are in place and the turbine unit dewatered, the scroll case would be inspected for sturgeon.

15. If sturgeon are found to be present in the scroll case, fish rescue operation procedures would be implemented. Individuals would be removed from the scroll case with a dip net or other appropriate equipment. Each individual removed from the scroll case would be weighed, measured for length, and have its condition assessed and recorded on a data sheet. Fish would also be scanned for the presence of PIT tags. River flow, bypass reach minimum flow, and water temperature would also be recorded. Any

live, uninjured sturgeon would be returned to the Androscoggin River downstream of the project. The licensee would report to NMFS within 24 hours any live, uninjured sturgeon that are removed and relocated back to the river. If any injured sturgeon are found in the turbine units, the licensee would measure, photograph if possible, and report it within 24 hours to NMFS. Severely injured fish would be retained by the licensee, until notified by NMFS with instructions for potential rehabilitation. Any dead sturgeon would be recovered and preserved in a freezer. NMFS would then be notified of the incident.

16. Sturgeon found in the fishway would be removed by dip net or other appropriate equipment. Alive, injured, or dead sturgeon would be handled in generally the same manner as fish found in the scroll case as discussed above.

17. Adaptive management is an integral part of the Interim SPP wherein measures included in the Interim SPP would be subject to revision as a result of agency consultation and, if necessary, Commission approval. Toward that end, the licensee would prepare a draft annual report on the previous year's activities under the Interim SPP and its progress on implementing the Interim SPP's measures. A draft report would be provided to the agencies by January 31 of each year, after which time the licensee would meet with the agencies to discuss the draft report, the implementation of the Interim SPP, and any other issues related to the GOM DPS of Atlantic salmon restoration and management activities relevant to the Androscoggin River. A final report would be filed with the resource agencies and the Commission by March 31 of that year.

ENDANGERED SPECIES ACT CONSULTATION

18. Section 7(a)(2) of the ESA requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally-listed threatened and endangered species.[3]

19. On January 31, 2013, the licensee requested that the Commission designate it as the Commission's non-federal representative to informally consult with NMFS under section 7 of the ESA regarding effects of project operation on the federally-listed endangered GOM DPS of Atlantic salmon. The Commission designated the licensee as its non-federal representative in a February 7, 2013 letter to NMFS.

20. On March 4, 2013, the licensee requested that the Commission designate it as the Commission's non-federal representative to informally consult with NMFS under section 7 of the ESA regarding effects of project operation on the federally-listed endangered shortnose sturgeon and the federally-listed threatened Atlantic sturgeon. The

[3] 16 U.S.C. § 1536(a) (2006).

Commission designated the licensee as its non-federal representative in a March 25, 2013 letter to NMFS.

21. On February 21, 2013, the licensee filed with the Commission a draft BA for GOM DPS of Atlantic salmon and the licensee's proposed the Interim SPP. The licensee's draft BA and Interim SPP was prepared in coordination with NMFS. The Commission adopted the draft BA without modification and forwarded it to NMFS on March 14, 2013. Based on the analysis in the BA, the Commission concluded that operation of the project may adversely affect individual GOM DPS Atlantic salmon and the species' designated critical habitat.

22. On March 29, 2013, Brookfield filed a draft addendum to the March 14, 2013 BA and Interim SPP. The BA addendum for shortnose and Atlantic sturgeon supports the licensee's request to amend the project license to incorporate the proposed Interim SPP. The BA addendum includes the Sturgeon Protection Plan which was also developed in consultation with NMFS, FWS, and Maine DMR. The Commission adopted the BA addendum without modification and forwarded it to NMFS on March 14, 2013. Based on the analysis in BA, the Commission concluded that operation of the project is likely to adversely affect individual shortnose and Gulf of Maine and New York Bight DPSs of Atlantic sturgeon.

23. In response to the BA, NMFS issued a single Biological Opinion (BO) on July 19, 2013. In its BO, NMFS concluded that project operation with the Interim SPP may adversely affect, but is not likely to jeopardize, the continued existence of GOM DPS Atlantic salmon, and that, although operation will continue to affect essential features of designated critical habitat, the proposed Interim SPP is anticipated to improve the functioning of critical habitat in the Androscoggin River. NFMS also concluded that project operation under the Interim SPP may adversely affect, but is not likely to jeopardize, the continued existence of shortnose and New York Bight DPS of Atlantic sturgeon.

24. The incidental take statement included with NMFS's BO contains three reasonable and prudent measures (RPM) each with a number of implementing terms and conditions. Terms and conditions in incidental take statements are non-discretionary actions that the Commission must comply with in order to be exempt from prohibitions of section 9 of the ESA. On August 23, 2013, NMFS filed an addendum to its July 19, 2013 BO, clarifying its consideration of the effects of the continued operation of the Brunswick Project on Atlantic and shortnose sturgeon and appending an additional term and condition to the incidental take statement. The terms and conditions of the BO are set out in Appendix A, and those addressing the Brunswick Project are adopted as conditions of this order by ordering paragraph (E).

25. RPM No. 1 requires the Commission to ensure, through enforceable conditions of the project license, that the licensee conduct all in-water and near-water construction activities in a manner that minimizes incidental take of ESA-listed or proposed species and conserves the aquatic resources on which ESA-listed species depend. To implement RPM No. 1, the NMFS BO lists 17 terms and conditions related to: (a) contractor education; (b) timing of construction; (c) erosion control and protection of water quality; (d) storage and staging of materials and construction equipment, and; (e) riparian vegetation management.

26. Under RPM No. 2 the Commission must ensure, through enforceable conditions, that the licensee measures and monitors the provisions contained in the March 14, 2013 Interim SPP in a way that is adequately protective of listed Atlantic salmon, shortnose sturgeon and Atlantic sturgeon. To implement RPM No. 2, the BO includes 10 terms and conditions. Terms and conditions applicable to the Brunswick Project require the licensee to: (a) prepare plans to study the passage and survival of migrating salmon; (b) monitor migratory delay of pre-spawn salmon; (c) provide the opportunity for NMFS to comment on any fishway design at various design phases; (d) allow NMFS to inspect the fishways at least annually; (e) inspect the fishways each day between April 1 and December 31; (f) conduct maintenance requiring shut down of the fishways during the first two weeks of August; and (g) develop project specific adaptive management plans to address any downstream passage deficiencies at the project documented through site-specific survival studies during the period of the Interim SPP. Three of the 10 terms and conditions are not directly applicable to the Brunswick Project because they are measures pertaining to the operation of the Lewiston Falls Project No. 2302 or the Lockwood Project No. 2574, located on the Kennebec River. These terms and conditions have been removed from Appendix A.

27. Under RPM No. 3 the Commission must ensure, through enforceable conditions,that the licensee completes an annual monitoring and reporting program to confirm that the licensee is minimizing incidental take and reporting to NMFS all project-related observations of dead or injured salmon or sturgeon. To implement RPM No. 3 the Commission must require the licensee to: (a) notify NMFS of any changes in operation, maintenance activities, and debris management; and (b) contact NMFS within 24 hours of any interactions with Atlantic salmon or sturgeon, including any non-lethal and lethal takes, and, in the event of lethal take, to photograph, measure, and preserve any dead salmon or body parts until disposal is discussed with NMFS. A fourth term and condition contained in NMFS's August 23, 2013 addendum requires specific procedures when collecting fin clips of any sturgeon captured at the project.

28. NMFS also included four conservation recommendations in its July 19, 2012 BO. Conservation recommendations are discretionary agency activities designed to minimize or avoid effects to listed species or critical habitat, to help implement recovery plans, or

to develop information. The first conservation recommendation provides guidance for contaminant testing of any salmon involved in lethal take at the project. While the licensee may choose to pursue this recommendation, we will not require the license to do so, because there is no direct link between the recommendation and protection of salmon at the project. The last three recommendations broadly address operation of hydroelectric projects under Commission jurisdiction that are within the range of federally-listed Atlantic salmon. These last three recommendations are not specific to the Brunswick Project and will not be required either.

DISCUSSION AND CONCLUSIONS

29. Implementation of the licensee's proposed Interim SPP would help protect and enhance federally-listed Atlantic salmon using the Androscoggin River, and would help to ensure the licensee's compliance with the ESA. The licensee's Interim SPP should therefore be approved.

30. Operation of the Brunswick fishway and the collection of biological data on salmon using the fishway would contribute to the body of knowledge of GOM DPS salmon. Studying the effectiveness and efficiency of upstream and downstream fish passage under an adaptive management process would establish a baseline from which to guide the development of passage improvements over the term of the Interim SPP and for the development of a final SPP.

31. The operation and maintenance of the project and implementation of the Interim SPP may affect sturgeon through entrapment within the units when they are dewatered for inspection. Sturgeon may also become trapped during operation of the upstream fishway. Lastly, there is a remote chance that sturgeon could be stranded in the area downstream of the spillway. Implementation of the licensee's proposed Sturgeon Protection Plan would minimize any adverse effects associated with sturgeon becoming entrapped during unit inspection, encounters with the upstream fishway, and stranding in the area immediately downstream of the spillway.

32. On July 9, 2013, the Kennebec Coalition (Coalition)[4] filed comments on the licensee's Interim SPP for its five projects located on the Kennebec and Androscoggin

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[4] The Kennebec Coalition is comprised of the Atlantic Salmon Federation, American Rivers, the Natural Resources Council of Maine, Trout Unlimited and the Kennebec Valley Chapter of Trout Unlimited.

Rivers.[5] The Coalition is concerned that: 1) as a result of low adult numbers and unfavorable marine survival conditions very high smolt survival is essential for the recovery of GOM DPS Atlantic salmon; 2) because the resource agencies have concentrated their recovery efforts on the Sandy River, a tributary of the Kennebec River, the Merrymeeting Bay Salmon Habitat Recovery Unit (SHRU) is highly dependent on fish passage effectiveness at the four Kennebec River dams located downstream of the Sandy River; 3) the omission of a numeric survival rate for downstream fish passage enshrines the current survival rate for downstream fish passage for the term of the Interim SPP; and 5) any numeric performance standard must be at least as high as the 96 percent survival standard required at hydroelectric dams on the Penobscot River.

33. The Androscoggin River is a very small contributor to the GOM DPS. Between 2001 and 2013 a total of 13,000 fry have been planted in the Androscoggin River compared to a total of 2,772,500 stocked in the four other major GOM rivers in 2011. While the Androscoggin River contributes a larger proportion of the Merrymeeting Bay SHRU it still represents a small fraction (1.2 percent) of these fish. The Interim SPP proposes a seven year study, monitoring, adaptive management, and design process leading to the development of a Final SPP, similar to the process adopted for four projects located on the Penobscot River. However, the Penobscot River SPP is effective, depending on the specific project, for a period of 10 to as many as 35 years. We also recognize that far less information on Atlantic salmon and fish passage on the Androscoggin River exist. Therefore, we conclude that the lack of a performance standard for the Interim SPP is reasonable considering the small contribution the Androscoggin River makes to GOM DPS of Atlantic salmon and the lack of information regarding salmon and passage issues on the river. Further we find little significant difference in the process embodied in the Penobscot River SPP for other projects that may affect the GOM DPS of Atlantic salmon.

34. Term and condition (b) under NMFS's RPM No. 2 requires the licensee to monitor migratory delays of pre-spawn Atlantic salmon in the Androscoggin River. While not explicitly stated in the Interim SPP, data from studies on the upstream passage at the Brunswick Project when combined with data from upstream passage studies being conducted at the Pejepscot and Worumbo projects will provide information on migratory delay in the Androscoggin River.

35. The licensee proposes to prepare, and file with the Commission, annual Interim SPP reports detailing the licensee's progress in implementing measure contained

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[5] The projects are the Lewiston Falls Project No. 2302 and Brunswick Project located on the Androscoggin River and the Lockwood, Shawmut, and Weston Projects Nos. 2574, 2322, and 2325, respectively, located on the Kennebec River.

in the Interim SPP after consultation with NMFS, FWS, and Maine DMR. Each annual report would contain the results of the previous year's implementation of the elements of the Interim SPP. To keep Commission staff apprised of its progress in implementing the measures in the Interim SPP, the licensee should include, at minimum, the following information in its annual reports to the agencies: 1) a summary of consultation with NMFS and other resource agencies regarding progress under the Interim SPP, and any other pertinent issues regarding Atlantic salmon including any modifications to studies undertaken as part of the Interim SPP; 2) a summary of the licensee's actions under the Sturgeon Protection Plan for the previous year; and 3) a schedule for implementing the elements associated with the Interim SPP for the next year. The last Interim SPP report should contain a schedule for developing a Final SPP, which should be filed for Commission approval.

36. The terms and conditions in NMFS's incidental take statement include requirements for contacting NMFS under certain circumstances, including any interactions with Atlantic salmon. The licensee should inform Commission staff, via telephone or email, as soon as possible after contacting NMFS regarding any issue pursuant to the terms and conditions. The licensee should then file a written report on the issue with the Commission within 15 days.

37. The licensee must follow the terms and conditions of the incidental take permit included with NMFS's July 19, 2013 BO that apply to the Brunswick Project and the supplemental term and condition filed September 3, 2013 to ensure exemption from the take prohibitions of Section 9 of the ESA. Therefore, the terms and conditions that apply to the project, which are attached to this order as Appendix A, are incorporated into the project license through ordering paragraph (E).

The Director orders:

(A) Brookfield White Pine Hydro, LLC's (licensee) Interim Species Protection Plan for the Brunswick Project, filed February 21, 2013, is approved.

(B) Brookfield White Pine Hydro, LLC's Handling and Protection Plan for Shortnose and Atlantic sturgeon for the Brunswick Project, filed on March 29, 2013, is approved.

(C) The licensee shall file annual Interim Species Protection Plan (Interim SPP) reports with the Commission. Each annual Interim SPP report shall include, at minimum, the following information: 1) a summary of the licensee's actions undertaken the previous year to implement the Interim SPP, a summary of its consultation with the National Marine Fisheries Service (NMFS) and other resource agencies regarding progress under the Interim SPP, and any other pertinent issues regarding Atlantic salmon; 2) a summary of the licensee's actions undertaken the previous year to implement the Handling and Protection Plan for Shortnose and Atlantic sturgeon; and 3) a proposed schedule for implementing the elements associated with the Interim SPP . The first annual Interim SPP report, for 2013, shall be filed by March 31, 2014. Copies of the annual Interim SPP reports should be provided to NMFS, U.S. Fish and Wildlife Service (FWS), and the Maine Department of Marine Resources (Maine DMR) at the same time they are filed with the Commission. Subsequent annual Interim SPP reports shall be filed by March 31 of each year. The last annual Interim SPP report shall also include a schedule for preparing a Final SPP. This final report shall be filed for Commission approval.

(D) The licensee shall file its detailed plan to study the passage and survival of migrating Atlantic salmon kelts at the Brunswick Project with the Commission for approval prior to the start of the study. The plans filed with the Commission shall include documentation of consultation with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service and the Maine Department of Marine Resources including copies of any comments received. The licensee shall address all comments and recommendations in its filing. If the licensee does not adopt a recommendation from the resource agencies, the licensee shall include its reasons based on project-specific information. The Commission reserves its authority to require the licensee to modify the plans, project structures, or operations in order to protect and enhance aquatic resources

(E) The terms and conditions of the incidental take permit included with the National Marine Fisheries Service's July 19, 2013 Biological Opinion and August 23, 2013 addendum are incorporated into the license to the extent these terms and conditions apply to the Brunswick Project. The terms and conditions are attached to this order as Appendix A.

(F) The licensee shall inform Commission staff, via telephone or email, as soon as possible after contacting the National Marine Fisheries Service (NMFS) regarding any issue pursuant to the terms and conditions of the incidental take statement included with the NMFS July 19, 2013 Biological Opinion and August 23, 2013 addendum. The licensee shall then file a written report on the issue with the Commission within 15 days of the issue.

(G) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 825*l* (2012), and the Commission's regulations at 18 C.F.R. § 385.713 (2013). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Steve Hocking
Chief, Environmental Review Branch
Division of Hydropower Administration
and Compliance

APPENDIX A

DEPARTMENT OF COMMERCE
NATIONAL MARINE FISHERIES SERVICE

REASONABLE AND PRUDENT MEASURES
AND TERMS AND CONDITIONS OF THE INCIDENTAL TAKE STATEMENT
INCLUDED IN THE BIOLOGICAL OPINION FOR THE
BRUNSWICK HYDROELECTRIC PROJECT (FERC NO. 2284)

Filed July 19, 2013, and supplemented September 3, 2013

Reasonable and Prudent Measures

1. FERC and the ACOE must ensure, through enforceable conditions of the Project licenses, that the licensee conduct all in-water and near-water construction activities in a manner that minimizes incidental take of ESA-listed or proposed species and conserves the aquatic resources on which ESA-listed species depend.

2. FERC must ensure, through enforceable conditions of the Project licenses, that the licensee measure and monitor the provisions contained in the March 14, 2013 Interim Species Protection Plan (SPP) in a way that is adequately protective of listed Atlantic salmon.

3. FERC must ensure, through enforceable conditions of the Project licenses, that the licensee complete an annual monitoring and reporting program to confirm that they are minimizing incidental take and reporting all project-related observations of dead or injured salmon or sturgeon to NMFS.

Terms and Conditions

1. To implement reasonable and prudent measure #1, FERC and ACOE must require the licensee to do the following:

    a. Hold a pre-construction meeting with the contractor(s) to review all procedures and requirements for avoiding and minimizing impacts to Atlantic salmon and to emphasize the importance of these measures for protecting salmon.

    b. Timing of in-water work: Work below the bankfull elevation should occur outside of the smolt outmigration period (April 1 to June 15) or within a dewatered cofferdam. The licensee must notify NMFS one week before in-water work begins.

c. Use Best Management Practices that will minimize concrete products (dust, hips, larger chunks) mobilized by construction activities from entering flowing or standing waters. Best practicable efforts shall be made to collect and remove all concrete products prior to rewatering of construction areas.

d. Employ erosion control and sediment containment devices at the Lockwood, Shawmut, and Weston Dams during in-water construction activities. During construction, all erosion control and sediment containment devices shall be inspected weekly, at a minimum, to ensure that they are working adequately. Any erosion control or sediment containment inadequacies will be immediately addressed until the disturbance is minimized.

e. Provide erosion control and sediment containment materials (e.g., silt fence, straw bales, aggregate) in excess of those installed, so they are readily available on site for immediate use during emergency erosion control needs.

f. Ensure that vehicles operated within 150 feet (46 m) of the construction site waterways will be free of fluid leaks. Daily examination of vehicles for fluid leaks is required during periods operated within or above the waterway.

g. During construction activities, ensure that BMPs are implemented to prevent pollutants of any kind (sewage, waste spoils, petroleum products, etc.) from contacting water bodies or their substrate.

h. In any areas used for staging, access roads, or storage, be prepared to evacuate all materials, equipment, and fuel if flooding of the area is expected to occur within 24 hours.

i. Perform vehicle maintenance, refueling of vehicles, and storage of fuel at least 150 feet (46 m) from the waterway, provided, however, that cranes and other semi-mobile equipment may be refueled in place.

j. At the end of each work shift, vehicles will not be stored within, or over, the waterway.

k. Prior to operating within the waterway, all equipment will be cleaned of external oil, grease, dirt, or caked mud. Any washing of equipment shall be conducted in a location that shall not contribute untreated wastewater to any flowing stream or drainage area.

l. Use temporary erosion and sediment controls on all exposed slopes during any hiatus in work exceeding seven days.

m. Place material removed during excavation only in locations where it cannot enter sensitive aquatic resources.

n. Minimize alteration or disturbance of the stream banks and existing riparian vegetation to the greatest extent possible.

o. Remove undesired vegetation and root nodes by mechanical means only. No herbicide application shall occur.

p. Mark and identify clearing limits. Construction activity or movement of equipment into existing vegetated areas shall not begin until clearing limits are marked.

q. Retain all existing vegetation within 150 feet (46 m) of the edge of the bank to the greatest extent practicable.

2. To implement reasonable and prudent measure #2, FERC must require the licensee to do the following:

a. Prepare in consultation with NMFS a plan to study the passage and survival of migrating Atlantic salmon (adults, smolts, and kelts) at the Lockwood, Shawmut, Weston, and Brunswick Projects.

b. Migratory delay of pre-spawn Atlantic salmon should be monitored downstream of the Lewiston Falls Project as part of the upstream passage studies on the Androscoggin River.

c. The licensee should seek comments from NMFS on any fish passage design plans at the 30%, 60%, and 90% design phase.

d. The licensee should allow NMFS staff to inspect fishways at the Projects at least annually.

e. The licensee should inspect the upstream and downstream fish passage facilities at the Lockwood, Shawmut, Weston, and Brunswick Projects daily during from April 1 to December 31, annually. Submit summary reports to NMFS weekly during the fish passage season.

f. Annual maintenance requiring the shutdown of upstream fish ways should be conducted during the first two weeks of August. The fishway should not be inoperable for any longer than it takes to make the necessary repairs. If water temperatures make it unsafe to sample Atlantic salmon, they should be allowed to volitionally swim through the fishway without being handled.

g. Require that the licensee develop, in consultation with NMFS, project specific adaptive management plans to address any downstream passage deficiencies at the Weston, Shawmut, Lockwood, and Brunswick Projects as documented through site-specific survival studies during the period of the ISPP. The plans should include descriptions of: (1) potential measures to be implemented at each project to improve survival, (2) the statistical methodology that will be used to interpret study results, and (3) the monitoring studies that will be implemented to verify the efficacy of the permanent downstream fish passage facilities. These plans should be completed no later than January 1, 2014.

3. To implement reasonable and prudent measure #3, FERC must require the licensee to do the following:

h. Notify NMFS of any changes in operation including maintenance activities and debris management at the project during the term of the ISPP.

i. Contact NMFS within 24 hours of any interactions with Atlantic salmon, shortnose sturgeon or Atlantic sturgeon including non-lethal and lethal takes (Dan Tierney: by email (Dan.Tiemey@noaa.gov) or phone (207) 866-3755 and the Section 7 Coordinator (incidental.take@noaa.gov).

j. In the event of any lethal takes, any dead specimens or body parts must be photographed, measured, and preserved (refrigerate or freeze) until disposal procedures are discussed with NMFS.

k. Ensure that fin clips are taken from any at the Brunswick and Lockwood Projects and that the fin clips are submitted to the NOAA repository in Charleston, SC for genetic analysis. A 1 cm^2 fin clip from one of the pelvic fins from living sturgeon should be taken and placed in a labeled vial with an o-ring caps containing 95% nondenatured ethyl alcohol (EtOH) for genetic analysis (the pelvic fin is regarded at the least intrusive, particularly for small individuals) (following the procedures described in Damon-Randall et al. 2010). Fin clips of mortalities must be taken prior to preservation of other fish parts or whole bodies.

178 FERC ¶ 62,095
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Brookfield White Pine Hydro, LLC Project No. 2284-048

ORDER MODIFYING AND APPROVING NON-PROJECT USE OF PROJECT LANDS AND WATERS

(February 16, 2022)

1. On November 16, 2021, Brookfield White Pine Hydro, LLC, licensee for the Brunswick Hydroelectric Project No. 2284,[1] filed an application to convey an easement to the Maine Department of Transportation (Maine DOT) to facilitate replacement of the Frank J. Wood Bridge within the project boundary. The Brunswick Project is located on the Androscoggin River in Sagadahoc and Cumberland counties, Maine, and does not occupy federal lands.

I. Licensee's Proposal

2. Since 2016, the Maine DOT has been discussing with the licensee its need to replace the Frank J. Wood Bridge which is located downstream of the Brunswick Dam due to the bridge's numerous structural deficiencies and safety issues (i.e., bicycle and pedestrian traffic).[2] The Maine DOT worked with the Federal Highway Administration (FHA) to develop an Environmental Assessment (EA) for the bridge replacement,[3]

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[1] Order Amending License and Issuing New Major License (6 FERC ¶ 61,122), issued February 9, 1979.

[2] According to the Maine DOT website, the current bridge has weight restrictions and commercial vehicle traffic is prohibited due to its poor condition (https://www.maine.gov/mdot/projects/brunswick/frankjwoodbridge/).

[3] The Maine DOT maintains a website that serves as a repository of information regarding the bridge replacement work (https://www.maine.gov/mdot/env/frankjwood/). The website describes public meetings, public comments, meeting minutes, stakeholder and Tribal consultation efforts, and other documents, including a biological opinion (BO) issued by the National Marine Fisheries Service (NMFS) on March 30, 2018; Essential Fish Habitat (EFH) conservation recommendations provided by NMFS on July 27, 2018; and a memorandum of agreement (MOA) among the FHA, Advisory Council on Historic Preservation, Maine DOT, and Maine State Historic Preservation Officer (Maine SHPO)

considered several alternatives for bridge replacement, and ultimately proposes to construct a new bridge located upstream of the existing bridge, which is closer to the Brunswick Dam. The bridge replacement work would not result in any changes to project structures or operations but would require placement of bridge piers downstream of the dam and within the project boundary. As such, the licensee is proposing to convey an easement to the Maine DOT to facilitate construction of the bridge and placement of bridge piers. In April 2019, the FHA and Maine DOT completed the final EA for the bridge replacement work, which found that the work would result in no significant impact to the environment.

3. Pursuant to its responsibilities under the National Environmental Policy Act (NEPA),[4] the FHA performed substantial environmental review and stakeholder consultation. As a result, the Maine DOT's website describes numerous best practices and environmental avoidance and mitigation measures, including 18 Avoidance and Minimization Measures incorporated by NMFS's BO and 9 Stipulations required by the MOA. These practices, mitigation measures, and stipulations apply to the bridge replacement work as a whole, which would apply to lands both inside and outside the project boundary. The Maine DOT's website also includes details of the various federal, state, and local permits that are pending for the proposed bridge replacement (e.g., section 404 of the Clean Water Act, sections 9 and 10 of the Rivers and Harbors Act, Maine's National Pollutant Discharge Elimination System program, etc.).

4. Finally, the licensee's application notes that, since it was initially approached by Maine DOT about the bridge replacement, it has raised concerns about the effects of any bridge realignment on existing and future fish passage requirements at the project. Regarding Maine DOT's selected alternative, the licensee is concerned that noise, vibration, and shadowing from the realigned bridge, may negatively affect upstream fish passage for American shad, alewife, and blueback herring, and that the bridge realignment may limit the licensee's ability to enhance fish passage in the future, if required. In response, after the NEPA process concluded, Maine DOT conducted a shadow modeling study, noise and vibration study, and hydraulic modeling study, and altered the bridge design to minimize effects on fish passage and fish habitat in the project boundary (i.e., removing the planned southernmost pier from the tailrace area).

II. <u>Consultation and Public Notice</u>

5. As noted above, the Maine DOT and FHA performed a substantial environmental review and stakeholder consultation as part of the NEPA process. In addition, in an

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executed on December 21, 2018.

[4] 42 U.S.C. §§ 4321 et seq.; *see also* 18 C.F.R. pt. 380 (2021) (Commission's regulations implementing NEPA).

email dated April 24, 2020, the licensee consulted NMFS, U.S. Fish and Wildlife Service (FWS), Maine SHPO, Maine Department of Inland Fisheries and Wildlife, Maine Division of Marine Resources, and Maine Department of Environmental Protection – Bureau of Land Resources. In an email dated June 10, 2020, the FWS stated that it does not intend to provide comments on the proposal. With the exception of the comment from NMFS, noted below, none of the consulting agencies responded to the licensee's request for comments.

6. In an email dated May 26, 2020, and again on March 5, 2021, NMFS reiterated its concerns previously stated in its April 11, 2018 letter to the FHA and Maine DOT and forwarded that letter to be included in the consultation record for this proceeding.[5] The letter primarily provided NMFS's determination of effects on federally-protected species, but also expressed concern that the bridge construction may limit options for future improvements to the project's fishway. NMFS recommended that the FHA and Maine DOT monitor fish passage effectiveness before and after bridge construction and develop a plan to mitigate any documented impacts. The FHA and Maine DOT's 2019 EA acknowledges that future relicensing proceedings[6] could result in the need to modify the project's fishway structures but states that the nature and type of modifications have not been defined, are not reasonably foreseeable, and are speculative. Nonetheless, the FHA and Maine DOT have committed to coordinate and cooperate with the licensee during final design as well as monitor fish passage effectiveness before and after bridge construction.

7. The Commission issued a public notice of the application on December 8, 2021, which established a deadline of January 7, 2022, for filing comments, motions to

[5] The April 11, 2018 letter from NMFS to the FHA and Maine DOT referenced the March 30, 2018 BO issued by NMFS, which found that the bridge construction is likely to adversely affect, but not likely to adversely modify or destroy critical habitat for the Gulf of Maine Distinct Population Segment (DPS) of Atlantic sturgeon, and may affect, but is not likely to adversely affect, the Gulf of Maine DPS of Atlantic sturgeon, shortnose sturgeon, Gulf of Maine DPS of Atlantic salmon, or critical habitat for the Gulf of Maine DPS of Atlantic salmon. The letter also described NMFS's concerns over the effect of bridge construction on the efficacy of the existing fishway as well as any future fishway modifications that may be needed or considered in the future for Atlantic salmon and other species (e.g., river herring and American shad). In conclusion, NMFS recommended that, if the FHA and Maine DOT proceed with the bridge construction, they include provisions to monitor pre- and post-construction fish passage effectiveness to determine the magnitude of effects on the diadromous fish community and associated ecosystem and develop a plan to mitigate any documented impacts.

[6] The current license expires February 28, 2029.

intervene, and protests. No responses to the public notice were filed.

III. Discussion and Conclusion

8. The proposed bridge replacement has undergone substantial environmental review by state and federal natural resource agencies and additional public review by stakeholders and the Maine DOT has either obtained or is in progress of obtaining various permits for the proposed work, most of which would occur outside the project boundary.[7] The Maine DOT has worked in cooperation with the FHA, who is the lead agency for the purposes of complying with the National Historic Preservation Act (NHPA),[8] Endangered Species Act (ESA),[9] NEPA, and the Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act.[10] As noted above, this prior review process has resulted in an MOA pursuant to Section 106 of the NHPA, a BO pursuant to Section 7 of the ESA, an EA pursuant to NEPA, and agreed upon conservation recommendations to protect EFH. We have reviewed these materials and concur with the Maine DOT and FHA that the bridge replacement work within the project boundary would result in no significant impact to the environment. The permittee's proposed and required environmental mitigation measures would serve to protect the project's environmental resources during construction and operation of the bridge.

9. We note, however, the concerns raised by the licensee and NMFS related to the effects the bridge construction may have on any modifications to the project's fishway that may be needed in the future. At the same time, we agree with the Maine DOT and FHA's analysis, which concluded that the nature and type of such modifications have not been defined, are not reasonably foreseeable, and are speculative at this time. The need for, and extent of, any future fishway modifications is not known at this time. Given the fact that the proposed bridge is an element of public infrastructure nearby the project that serves the public interest and the bridge is currently in poor condition, we do not find that delaying the bridge replacement until fish passage needs are fully assessed at relicensing

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[7] We note that the licensee's application states that certain aspects of its project boundary (Exhibit G) maps would change due to the relocation of bridge piers and so it proposes to file revised Exhibit G drawings after Commission approval of its application. Because the bridge is not a project work, its exact location does not need to be updated on the approved Exhibit G drawings.

[8] 54 U.S.C. § 306108.

[9] 16 U.S.C. § 1536(a).

[10] 16 U.S.C. § 1855(b)(2).

would be prudent.

10. In its April 11, 2018 letter, NMFS recommended that, if the FHA and Maine DOT proceed with the bridge construction, they include provisions to monitor pre- and post-construction fish passage effectiveness to determine the magnitude of effects on the diadromous[11] fish community and develop a plan to mitigate any documented impacts. In response, Maine DOT states that it will work with the licensee and NMFS to identify baseline condition parameters (e.g., noise and vibration) at the fishway to measure pre- and post- construction conditions, but Maine DOT did not agree to develop a plan to mitigate any documented impacts to fish passage effectiveness. Given the importance of fish passage to aquatic resources at the project, ordering paragraph (B) requires the licensee to include, as a condition of its proposed conveyance, a requirement for the Maine DOT to work with NMFS to identify the effects of the bridge construction on the diadromous fish community as well as mitigate any such effects.

11. We have reviewed the licensee's application, as well as the Maine DOT and FHA's various environmental documents and we have not identified any additional environmental effects within the project boundary. Given the lack of environmental effects of the proposed easement, and lack of opposition by any consulted parties, the licensee's application should be approved.

12. The licensee has an overall obligation to ensure that any non-project uses and occupancies of project lands and waters that it permits are not inconsistent with the purposes of the project, including public recreation and resource protection.[12] In this regard, the licensee should ensure that the proposed project meets the following conditions: (1) the use of the project lands and waters must not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (2) the construction, operation, and maintenance of the use must occur in a manner that protects the scenic, recreational, and other environmental values of the project; and (3) the licensee must not unduly restrict public access to project lands and waters. Additionally,

[11] Diadromous fishes are those species that regularly migrate between freshwater and ocean environments. According to NMFS, the area downstream of the project is known to support several diadromous fish species, including Atlantic salmon, alewife, blueback herring, rainbow smelt, American shad, sea lamprey, American eel, and striped bass.

[12] As noted in its application, Article 32 of the project license states that, "If an authorized use or occupancy fails to comply … with any reasonable conditions imposed by the Licensee for the protection of the environmental quality of project lands and waters, the Licensee shall take appropriate action to correct the violations, including, if necessary cancellation of the authorization and removal of any noncomplying structures or facilities."

the licensee is reminded that it is responsible for ensuring that all necessary local, state, and federal permits have been obtained for the proposed bridge before construction begins. Ordering paragraph (C) requires these covenants be included in the permittee's authorization.

The Director orders:

(A) Brookfield White Pine Hydro, LLC's November 16, 2021 application to convey an easement to the Maine Department of Transportation to facilitate replacement of the Frank J. Wood Bridge within the project boundary of the Brunswick Hydroelectric Project No. 2284, is approved, as modified by paragraphs (B) and (C), below.

(B) The licensee must include a condition in any easement it issues for the bridge replacement approved in ordering paragraph (A) above a requirement for the Maine Department of Transportation to work with the National Marine Fisheries Service to monitor fish passage effectiveness before and after bridge construction to determine the magnitude of effects of the bridge on the diadromous fish community and mitigate any documented effects due to the bridge.

(C) The licensee must include the following conditions in any easement it issues for the bridge replacement approved in ordering paragraph (A) above: (1) Maine Department of Transportation's (Maine DOT) use of project lands and waters must not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (2) Maine DOT must take all reasonable precautions to ensure that the construction, operation, and maintenance of the permitted non-project use will occur in a manner that protects the scenic, recreational, and other environmental values of the project; and (3) Maine DOT must not unduly restrict public access to project lands and waters. Additionally, the licensee must ensure that all necessary local, state, and federal permits have been obtained for the proposed bridge replacement before construction begins.

(D) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 825*l*, and the Commission's regulations at 18 CFR § 385.713 (2021). The filing of a request for hearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Robert J. Fletcher
Land Resources Branch
Division of Hydropower Administration
and Compliance

180 FERC ¶ 61,097
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Richard Glick, Chairman;
James P. Danly, Allison Clements,
Mark C. Christie, and Willie L. Phillips.

Brookfield White Pine Hydro, LLC — Project Nos. 2284-038, 2284-041

ORDER AMENDING LICENSE TO MODIFY AND APPROVE FINAL SPECIES PROTECTION PLAN FOR ATLANTIC SALMON, ATLANTIC STURGEON, AND SHORTNOSE STURGEON

(Issued August 16, 2022)

1. On December 31, 2019, Brookfield White Pine Hydro, LLC (Brookfield) filed a request to amend its license for the Brunswick Project No. 2284 on the Androscoggin River in Androscoggin County, Maine. Brookfield requests that the Commission approve a Final Species Protection Plan (Final Protection Plan), which would replace a 2013 Interim Species Protection Plan (Interim Protection Plan) and require permanent measures to avoid and minimize impacts to the federally listed Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon, and the species' designated critical habitat.[1] For the reasons discussed below, we modify and approve the Final Protection Plan.

I. Background

A. Project Description and Existing Fish Passage Facilities and Operation

2. On February 9, 1979, the Commission issued a new license for the Brunswick Project, for a term of 50 years.[2] The project is the first dam on the mainstem Androscoggin River at river mile six. The project is located within the range of the endangered Gulf of Maine Distinct Population Segment of Atlantic salmon, the known range for endangered shortnose sturgeon, and the designated critical habitat for the

[1] The request and proposed Final Protection Plan are attached to a draft Biological Assessment (BA) that Brookfield developed with the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA).

[2] *Cent. Me. Power Co.*, 6 FERC ¶ 61,122 (1979).

threatened Gulf of Maine Distinct Population Segment of Atlantic sturgeon.[3] The project is equipped with upstream and downstream fish passage facilities, which are operated to pass Atlantic salmon and other fishes.[4]

3. Upstream fish passage is provided at the project by a vertical slot fishway and associated trap, sort, and truck facility. The fishway is 570 feet-long and consists of 42 individual pools, with a one-foot drop between each pool. The trapping facility, located at the upstream end of the fishway, provides biologists the opportunity to collect data on migratory and resident fish species using the fishway. Fixed grating guides fish past a viewing window and into a 500-gallon capacity fish hoist. The hoist elevates the fish to overhead sorting tanks where they are sorted and passed upstream, following the collection of biological data. The fishway operates between May 1 and November 15. When the fishway is operating, an attraction flow of 100 cubic feet per second (cfs) is provided. To help guide fish to the fishway entrance, the concrete barrier wall located between the dam and Shad Island, an island immediately downstream of the dam, prevents fish from accessing the spillway and prevents spill from entering the tailrace and interfering with the fish attraction flow to the fishway. Upstream passage facilities also include a 3-foot-high by 20-foot-long concrete fish barrier weir.

4. Downstream fish passage is provided at the project by a sluice gate and associated 18-inch pipe. The sluice gate is located at the water surface along the face of the powerhouse between turbine/generator units 1 and 2. The associated pipe discharges fish into the project's tailrace. The sluice gate is generally opened for smolt and kelt passage from April 1 through June 15, and November 1 through December 31, river and ice conditions permitting. In addition, when flows exceed the project's hydraulic capacity, downstream fish passage is provided over the spillway.

B. <u>Previous ESA Consultation and Interim Protection Plan</u>

5. The U.S. Fish and Wildlife Service (FWS) listed shortnose sturgeon as endangered on March 11, 1967,[5] and the species remained on the endangered list with the enactment of the ESA in 1973. In December 1998, NMFS issued a final recovery plan for the species. Regarding Atlantic salmon, on November 17, 2000, NMFS and FWS listed the species as endangered.[6] At the time, the listing range did not include areas where the

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[3] For purposes of this order, unless otherwise specified, we refer to these population segments as Atlantic salmon and Atlantic sturgeon.

[4] The upstream and downstream fish passage facilities were installed in 1983.

[5] 32 Fed. Reg. 4001 (Mar. 11, 1967).

[6] 65 Fed. Reg. 69,459 (Nov. 17, 2000).

project is located. However, on June 19, 2009, NMFS and FWS expanded the listing range for the species to include the project area,[7] and NMFS designated critical habitat for the species that includes the location of the project.[8] Regarding Atlantic sturgeon, on February 26, 2012, NMFS listed the species as threatened.[9]

6. Concerned that the project might affect federally listed Atlantic salmon and Atlantic and shortnose sturgeon, Brookfield requested, and Commission staff granted, Brookfield's designation as the Commission's non-federal representative to informally consult with NMFS under section 7 of the ESA.[10] On February 21, 2013, and March 29, 2013, Brookfield filed its proposed Interim Protection Plan for the species, which included a Sturgeon Handling and Protection Plan, and a draft Biological Assessment (BA) for the plan, and requested that the Commission initiate formal consultation with NMFS on the Interim Protection Plan and incorporate the proposed measures in the project license. Commission staff adopted the draft BA without modification and by letter issued March 14, 2013, supplemented on May 1, 2013, provided a copy of the final BA to, and began formal consultation with, NMFS. Based on the analysis in the BA, Commission staff concluded that project operation may adversely affect individual Atlantic salmon and critical habitat and is likely to adversely affect individual Atlantic sturgeon and individual shortnose sturgeon.

7. On July 19, 2013, NMFS issued a Biological Opinion (2013 BO) for the proposed Interim Protection Plan. Regarding Atlantic salmon, the 2013 BO concluded that project operation with the interim plan may adversely affect, but is not likely to jeopardize, the continued existence of the species and that, although operation will continue to affect essential features of the species' designated critical habitat, the plan would improve the functioning of critical habitat for the species in the Androscoggin River. With respect to Atlantic sturgeon and shortnose sturgeon, the 2013 BO concluded that project operation

[7] 74 Fed. Reg. 29,344 (June 19, 2009).

[8] 74 Fed. Reg. 29,300 (June 1, 2009).

[9] 77 Fed. Reg. 5914 (Feb. 6, 2012). NMFS also listed Atlantic sturgeon as endangered in the New York Bight Distinct Population Segment on February 26, 2012. 77 Fed. Reg. 5880 (Feb. 6, 2012). The New York Bight Atlantic sturgeon was included in consultation on the Interim Protection Plan in 2013 but not the Final Protection Plan. In its December 28, 2021 Biological Opinion on the final plan, NMFS states that "only individuals from the Gulf of Maine [Distinct Population Segment] are expected to occur in the action area." NMFS December 28, 2021 Biological Opinion at 44 (2021 BO). Accordingly, consultation for the New York Bight Atlantic sturgeon is not required.

[10] Brookfield January 31, 2013 Request; Commission Staff February 7, 2013 Letter.

with the plan may adversely affect, but is not likely to jeopardize, the continued existence of species.

8. On December 13, 2013, Commission staff issued an order approving the Interim Protection Plan,[11] and Brookfield implemented the plan protocols.

II. Proposed Final Protection Plan

9. Brookfield proposes to implement measures to avoid and minimize the effects of project operation on federally listed Atlantic salmon and Atlantic and shortnose sturgeon, and the species' designated critical habitat. The Final Protection Plan includes provisions for continued operation of upstream and downstream fish passage facilities, a Sturgeon Handling and Protection Plan, and an annual report and meeting with resource agencies.

A. Upstream Passage

10. For upstream passage, Brookfield proposes to:

- continue to operate the vertical slot fishway as conditions allow during upstream migration periods for Atlantic salmon (as well as river herring and American shad) from May 1[12] through November 15, the time of day of which would continue to be determined in consultation with Maine Department of Marine Resources (Maine DMR);

- trap and sort all fish species, including Atlantic salmon, and release all Atlantic salmon upstream into the impoundment so that they may continue their upstream migration;

- undertake measures necessary to keep the fishway in good operating condition;

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[11] *Brookfield White Pine Hydro, LLC*, 145 FERC ¶ 62,187 (2013).

[12] The Final Protection Plan, filed on December 31, 2019, proposes to begin operating the upstream fishway on April 15; however, Brookfield's April 12, 2021 revised Fishway Operations and Maintenance (FO&M) Plan—requested by NMFS to initiate formal ESA section 7 consultation and integrated into the final plan—proposes that operation begin on May 1. Commission staff subsequently confirmed the May 1 start date with Brookfield, NMFS, FWS, and Maine Department of Marine Resources (Maine DMR).

- if the fishway malfunctions or becomes inoperable during the migration period, repair the fishway and return it to service as soon as it can safely and reasonably be done;

- maintain records of all Atlantic salmon moved by the fishway, including an assessment of size, age, and condition;

- if an Atlantic salmon is observed while Maine DMR is not on site, utilize trained fishway tour staff to operate the fishway gates; and

- at such time as more than 40 adult Atlantic salmon return to Androscoggin River and are observed at the project for two consecutive years, consult with NMFS, FWS, and Maine DMR to conduct an upstream passage and survival study.[13]

11. In addition, Brookfield proposes a brief annual shutdown of the upstream fishway for inspection and maintenance, including dewatering of the fishway, during the first two weeks of August. Brookfield also notes that the project's turbine/generator units are shut down annually for routine inspection and maintenance, which may require dewatering all or portions of the units. To minimize the potential for impacts to sturgeon, Brookfield will schedule routine unit inspections or maintenance activities to occur outside the sturgeon spawning season.

B. <u>Downstream Passage</u>

12. For downstream passage, Brookfield proposes to:

- continue to operate the existing bypass as conditions allow for passage of adult and juvenile Atlantic salmon from April 1 through December 31;

- operate the project in accordance with the following river flow/unit operations protocols during the Atlantic salmon smolt downstream passage season from April 1 through June 15 and from November 1 through December 31, as river and ice conditions allow;

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[13] On January 5, 2017, Commission staff issued an Order Modifying and Granting Extension of Time for Atlantic Salmon Upstream Passage Study, which required a progress report by May 31, 2020. In its amendment request, Brookfield reports, following consultation with NMFS, FWS, and Maine DMR, that there are still insufficient returning adult Atlantic salmon at the project to conduct upstream adult passage studies. Brookfield December 31, 2019 Amendment Request at 6-1.

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 to 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

- conduct a bathymetry[14] study to investigate potential for, and possible solutions to, fish stranding;[15]

- at such time as 40 adult Atlantic salmon return to Androscoggin River and are observed at the project for more than two consecutive years, conduct a downstream passage and survival study; and

- if additional smolt studies are conducted at the upstream Pejepscot Project No. 4784, consult with NMFS, FWS, and Maine DMR on whether and how to include the project in those studies.

C. <u>Sturgeon Handling and Protection</u>

13. Atlantic and shortnose sturgeon are not passed at the project because the dam location is thought to be the historical upper limit of upstream migration for sturgeon on the Androscoggin River. To protect Atlantic and shortnose sturgeon downstream of the project, Brookfield developed a Sturgeon Handling and Protection Plan and proposes to implement it as part of the Final Protection Plan. The purpose of the plan is to protect sturgeon from effects associated with the operation and maintenance of the project and fishways.[16]

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[14] Bathymetry is the study of underwater depth, the underwater equivalent to topography.

[15] Fish stranding is the phenomenon whereby fish are restricted to poor habitat, often as a result of anthropogenic rapid decreases in water level.

[16] Brookfield reports that no sturgeon species were captured or handled, nor were any observed stranded below the project during implementation of the Interim Protection Plan in the years 2014 through 2018, including during annual inspection and maintenance

14. Specifically, Sturgeon may become trapped within the turbine/generator units when they are dewatered annually for routine inspection and maintenance and during operation of the upstream fishway. For each sturgeon found in the upstream fishway or other project facilities, Brookfield would scan the fish for an existing tag and record the fish's weight, length, and condition, river flow, bypass reach minimum flow, and water temperature. Any live, uninjured sturgeon would be reported to NMFS within 24 hours and returned to the Androscoggin River downstream of the project using specified handling techniques. If any injured sturgeon are found, Brookfield would measure, photograph if possible, and report them to NMFS within 24 hours. Brookfield would retain any badly injured fish until notified by NMFS of instructions for potential rehabilitation. Any dead sturgeon or body parts would be recovered and reported to NMFS within 24 hours and photographed, measured, scanned for tags, and preserved in a refrigerator until NMFS can obtain them for analysis.

15. There is also a remote chance that sturgeon may become stranded in the area downstream of the spillway as a result of project operation and maintenance. Implementation of Brookfield's Sturgeon Handling and Protection Plan as part of the final plan would minimize these potential adverse effects. Alive, injured, or dead sturgeon found in the pools would be handled in generally the same manner as fish found in the upstream fishway or other project facilities, as discussed above.

D. Annual Meetings and Report

16. As part of the Final Protection Plan, Brookfield proposes to meet annually with NMFS, FWS, Maine DMR, and Maine Department of Inland Fisheries and Wildlife to review draft annual reports, and to consult on fishway operations and study activities planned for the coming year. The annual meetings would also be used to consult with the agencies on specific aspects of the final plan, including:

- results of the bathymetry study and adjustments to project operation and controlled spill to enhance downstream migration routes below the project's dam;
- any additional Atlantic salmon smolt studies to be conducted at the Pejepscot Project to determine whether and how the project should also be included in the evaluation; and
- development of detailed study plans for upstream passage and survival studies at the project when required or if there are sufficient returns of adult

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activities. Still, operation and maintenance of the project and fishways and implementation of the Final Protection Plan may adversely affect sturgeon.

Atlantic salmon of Androscoggin origin to conduct a meaningful evaluation of upstream passage at the project.

17. Measures included in the final plan would be subject to revision after agency consultation and, if necessary, Commission approval. To that end, Brookfield would prepare an annual report, describing the previous year's activities under the final plan and its progress in implementing the plan's measures. Brookfield proposes to provide a draft report to the agencies by January 31 of each year and would then meet with the agencies to discuss the report, implementation of the final plan, and any other issues related to the Atlantic salmon restoration and management activities in the Androscoggin River. Brookfield would file a final report with the agencies and the Commission by March 31 of each year.

III. Endangered Species Act Consultation

18. Section 7(a)(2) of the ESA requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species or result in the destruction or adverse modification of designated critical habitat.[17]

19. On February 11, 2019, Brookfield requested that the Commission designate it as the Commission's non-federal representative to informally consult with NMFS under ESA section 7 on the effects of project operation on the Atlantic salmon and Atlantic and shortnose sturgeon. Commission staff granted Brookfield's request in a June 13, 2019 letter to NMFS.

20. On December 31, 2019, Brookfield filed its proposed Final Protection Plan for the species and a draft BA for the plan, and requested the Commission to initiate formal consultation with NMFS and incorporate the proposed measures in the project license. Commission staff adopted the BA without modification and provided a copy of the document to NMFS on June 26, 2020, along with a request for formal consultation. Based on the analysis in the BA, Commission staff concluded that operation of the project may adversely affect individual Atlantic salmon and the species' designated critical habitat.

21. On July 30, 2020, NMFS requested additional information before formal consultation could begin, including a revised Fishway Operations and Maintenance (FO&M) Plan from Brookfield. On August 11, 2020, Commission staff responded, clarifying the requirements for upstream fish passage studies and acknowledging the need for a revised FO&M Plan.

[17] 16 U.S.C. § 1536(a)(2).

22. On April 12, 2021, following consultation with FWS, NMFS, Maine DMR, Maine Department of Inland Fisheries and Wildlife and Maine Department of Environmental Protection, Brookfield filed a revised FO&M Plan for integration into the Final Protection Plan along with the other additional information requested by NMFS. By letter dated April 29, 2021, Commission staff provided copies of the BA and revised FO&M Plan and additional information filed by Brookfield and again requested formal consultation with NMFS.

23. On December 28, 2021, NMFS issued a Biological Opinion (2021 BO), which includes an Incidental Take Statement with Reasonable and Prudent Measures (RPM) and associated terms and conditions to avoid or minimize incidental take of the species. The 2021 BO found that implementation of the Final Protection Plan through the end of the license term may adversely affect, but is not likely to jeopardize, the continued existence of Atlantic salmon, Atlantic sturgeon, or shortnose sturgeon. NMFS also found that implementation of the final plan is not likely to destroy or adversely modify critical habitat designated for Atlantic salmon or Atlantic sturgeon.

24. The 2021 BO includes an Incidental Take Statement, which specifies the amount of incidental take of Atlantic salmon and Atlantic and shortnose sturgeon that can occur through the remainder of the license term as a result of project operations and the activities that will take place under the Final Protection Plan. In order to monitor the effect of incidental take, Brookfield must report to NMFS the progress of the action and its effect on Atlantic salmon, Atlantic Sturgeon, and shortnose sturgeon.[18]

25. The Incidental Take Statement includes two reasonable and prudent measures (RPM) to avoid or minimize incidental take of the species, as well as terms and conditions to implement those measures.[19] These terms and conditions are in addition to the measures provided in the Final Protection Plan and BA.[20] Brookfield must follow the terms and conditions of the Incidental Take Statement to ensure exemption from the take

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[18] NMFS December 28, 2021 Biological Opinion at 145 (2021 BO) (citing 50 C.F.R. § 402.14(i)(3) (2021)).

[19] The 2021 BO analyzes Final Protection Plans for both the Brunswick Project and Lewiston Falls Project No. 2302 and includes RPMs and associated terms and conditions for both projects. However, because the Commission has issued a separate Order Amending License to Modify and Approve Final Species Protection Plan for Atlantic Salmon for the Lewiston Falls Project, *Brookfield White Pine Hydro, LLC*, 180 FERC ¶ 61,098 (2022), this order only addresses those RPMs and terms and conditions applicable to the Brunwick Project.

[20] 2021 BO at 148.

prohibitions of Section 9 of the ESA.[21] These terms and conditions are attached to this order as Appendix A and are incorporated in the project licenses by ordering paragraph (B).

26. RPM 1 requires the Commission to ensure that Brookfield implement the Final Protection Plan in a manner that is adequately protective of listed species.[22] To implement the RPM, the 2021 BO includes five terms and conditions requiring Brookfield to: (1) adequately monitor take and prepare, in consultation with NMFS, a plan to measure the survival of downstream migrating Atlantic salmon smolts at the project if and when similar studies are conducted at the upstream Pejepscot Project and/or Worumbo Project No. 3428; (2) prepare in consultation with NMFS a plan to evaluate adult Atlantic salmon upstream and downstream passage at the project's dam; (3) operate the upstream and downstream fishways to ensure that passage of Atlantic salmon is safe, timely, and effective; (4) actively monitor stranding of federally listed fish downstream of the project's dam; and (5) update the Sturgeon Handling and Protection Plan to incorporate requirements specified in the 2021 BO.[23]

27. RPM 2 requires the Commission ensure, through enforceable conditions, that Brookfield complete an annual monitoring and reporting program to confirm that they are minimizing incidental take and reporting all project-related observations of dead or injured salmon to NMFS.[24] To implement RPM 2, the 2021 BO includes nine terms and conditions for the Brunswick Project requiring Brookfield to: (1) inspect the upstream and downstream fish passage facilities daily when they are open and submit summary reports to NMFS weekly during the fish passage season; (2) notify NMFS of any changes in operation at the project, including maintenance activities and debris management, during the term of the amended license; (3) submit as-built drawings to NMFS for the current configuration of the upstream and downstream fishways; (4) allow NMFS staff to inspect the upstream and downstream fishways; (5) review and update the FO&M Plan a minimum of every three years in cooperation with NMFS; (6) in the event of a serious

[21] Section 9 of the ESA prohibits any taking of listed species unless the take is authorized in an Incidental Take Statement after formal consultation under ESA section 7 or in an incidental take permit issued under ESA section 10. 16 U.S.C. § 1538(a)(1)(B).

[22] 2021 BO at 148.

[23] *Id.* at 148-51. RPM 1, Term and Condition 5 requires that Brookfield update the Sturgeon Handling and Protection Plan to: (a) record the weight, length, and condition of all sturgeon that are handled, scan sturgeon for PIT tags, and take genetic samples from all captured Atlantic sturgeon alive or dead; and (b) refrigerate or place on ice any dead sturgeon and immediately contact NMFS for further instructions.

[24] *Id.* at 148.

injury or mortality of any ESA listed species, allow NMFS access to investigate the source of the mortality and work in cooperation with NMFS to correct the source of serious injury/mortality; (7) submit an annual report to NMFS by December 31 each year summarizing the results of the proposed action and any takes of listed sturgeon or Atlantic salmon; (8) contact NMFS within 24 hours of any interactions with Atlantic salmon or Atlantic sturgeon or shortnose sturgeon, including non-lethal and lethal take and, by December 31 of each year, submit an annual report to NMFS summarizing this information; and (9) in the event of any lethal take, any dead specimens or body parts must be photographed, measured, and preserved until disposal procedures are discussed with NMFS.[25]

28. The BO also includes one conservation recommendation.[26] NMFS recommends that the Commission require Brookfield to carry out activities that improve the environmental baseline in the Androscoggin River in order to compensate for unavoidable effects of their actions.[27] This could include removal of other barriers to fish migration in the watershed or the construction of fishways likely to contribute to the recovery of the species and their designated critical habitat.[28] Because the conservation recommendation is a regional river basin goal and would not provide mitigation for the impacts of the Brunswick Project, we do not adopt it. The Commission considers project-specific recommendations in its licensing and amendment proceedings and must review and balance a range of public interest considerations, both developmental and environmental. The implementation of the broad conservation recommendation would require Brookfield to incur substantial cost without improving the safe, timely, and effective passage of fish at the project. The Final Protection Plan includes provisions for upstream and downstream passage for Atlantic salmon and other species, a Sturgeon Handling and Protection Plan, and an annual report and meeting with resource agencies. We find that these measures, along with the RPMs discussed above, adequately protect Atlantic salmon and Atlantic and shortnose sturgeon and their habitat.

IV. Environmental Analysis

29. Because Brookfield's Final Protection Plan would not require any ground disturbing activity or changes to project works or operation, the plan will not have

[25] *Id.* at 151.

[26] 50 C.F.R. § 402.14(j) ("Conservation recommendations are advisory and are not intended to carry any binding legal force.").

[27] 2021 BO at 153.

[28] *Id.*

environmental impacts and environmental review of the proposed action is not necessary.[29]

V. **Discussion**

30. Brookfield's Final Protection Plan, including the revised FO&M Plan, will ensure compliance with the ESA, improve conditions for Atlantic salmon, and avoid or minimize incidental take of Atlantic salmon at the project. Additionally, Brookfield's Sturgeon Handling and Protection Plan, implemented as part of the plan, will provide protection for Atlantic and shortnose sturgeon that may be affected by the operation and maintenance of the project and fishways. Therefore, we modify and approve the final plan and amend the license to require its implementation by Brookfield.

31. RPM 2, Term and Condition 8 of the Incidental Take Statement provides requirements for contacting NMFS under certain circumstances, including any interactions with Atlantic salmon or Atlantic and shortnose sturgeon, including lethal and non-lethal take. After contacting NMFS following any such incident, Brookfield must file a written report with the Commission within 15 days, as required by ordering paragraph (D) of this order.

32. Brookfield proposes to prepare and file with the Commission annual reports detailing its progress in implementing measures contained in the final plan and Incidental Take Statement. The reports would provide information on fishway operation, discuss any monitoring and study results, and assess the need for any adjustments to fishway operations or any information regarding sturgeon handling and stranding. To keep Commission staff apprised of its progress, we modify the plan to require Brookfield to include, at minimum, the following information: (1) a summary of Brookfield's actions undertaken the previous year to implement the final plan, including a summary of its consultation with NMFS and other resource agencies regarding progress under the plan and any other pertinent issues regarding Atlantic salmon, including any modifications to studies undertaken as part of the plan; (2) a summary of Brookfield's actions undertaken the previous year to implement the Sturgeon Handling and Protection Plan; and (3) a proposed schedule for implementing the elements associated with the final plan for the next year.[30]

33. We note that there is a disagreement on annual reporting dates between the Final Protection Plan and RPM 2 of the Incidental Take Statement. The final plan proposes

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[29] 18 C.F.R. 380.4(a)(13).

[30] The reports should be combined with the information required to be filed by Brookfield for the Lewiston Falls Project. *Brookfield White Pine Hydro, LLC*, 180 FERC ¶ 61,098 at ordering para. (D).

submitting the report to NMFS each year by January 31, and RPM 2, Term and Condition 7 requires submitting the report by December 31. Because the downstream fishway operates through December 31, the January 31 deadline for submitting the report to resource agencies would enable Brookfield to include all potential passage season information. Nonetheless, because the terms and conditions included in the Incidental Take Statement are non-discretionary actions that the Commission must require in order to comply with the ESA, ordering paragraph (D) of this order approves the proposed reporting requirements with NMFS's December 31 deadline to submit the report to resource agencies.

The Commission orders:

(A) Brookfield White Pine Hydro, LLC's (Brookfield) December 31, 2019 Final Species Protection Plan (Final Protection Plan) for the Brunswick Project No. 2284 (Brunswick Project), including the Sturgeon Handling and Protection Plan and April 12, 2021 revised Fishway Operations and Maintenance Plan, is approved, as modified by paragraphs (D) and (E).

(B) The terms and conditions of the Incidental Take Statement included with the National Marine Fisheries Service's (NMFS) December 28, 2021 Biological Opinion are hereby incorporated into the license. The terms and conditions are attached to this order as Appendix A.

(C) Brookfield must inform the Commission after contacting the NMFS regarding any interactions with Atlantic salmon or sturgeon, including lethal and non-lethal take, pursuant to the terms and conditions of the Incidental Take Statement included in NMFS's December 28, 2021 Biological Opinion by filing a written report within 15 days of the occurrence of any issue.

(D) Brookfield must file an annual Final Protection Plan report with the Commission. Each report shall include, at minimum, the following information: (1) a summary of Brookfield's actions undertaken the previous year to implement the final plan, including a summary of its consultation with NMFS and other resource agencies regarding progress under the plan and any other pertinent issues regarding Atlantic salmon; (2) a summary of Brookfield's actions undertaken the previous year to implement the Sturgeon Handling and Protection Plan for Atlantic and shortnose sturgeon; and (3) a proposed schedule for implementing the elements associated with the final plan for the next year. A draft of the report must be provided to NMFS, U.S. Fish and Wildlife Service, Maine Department of Marine Resources, and Maine Department on Inland Fisheries and Wildlife by December 31 each year following implementation of the final plan. A final report, after consultation with the resource agencies, shall be filed with the Commission by March 31 each year following implementation of the final plan.

(E) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 825*l*, and the Commission's regulations at 18 C.F.R. § 385.713 (2021). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

By the Commission.

(S E A L)

Debbie-Anne A. Reese,
Deputy Secretary.

APPENDIX A

DEPARTMENT OF COMMERCE
NATIONAL MARINE FISHERIES SERVICE

REASONABLE AND PRUDENT MEASURES
AND TERMS AND CONDITIONS OF THE INCIDENTAL TAKE STATEMENT
INCLUDED IN THE BIOLOGICAL OPINION FOR THE
BRUNSWICK AND LEWISTON FALLS HYDROELECTRIC PROJECTS (FERC NOs. 2284 AND 2203)

Filed December 28, 2021

The following reasonable and prudent measures are necessary and appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02) and monitor that take incidental take of Atlantic salmon, shortnose sturgeon, and Atlantic sturgeon. These reasonable and prudent measures and terms and conditions are in addition to the measures contained in the December 31, 2019 SPP and BA, as well as the Brunswick Fishway Operations and Maintenance Plan filed on April 12, 2021, that the licensee has committed to implement and FERC is proposing to incorporate into the project licenses. As those measures will become requirements of the amended licenses, we do not repeat them here as they are considered to be part of the proposed action.

Reasonable and Prudent Measures

1. FERC must ensure, through enforceable conditions of the amended licenses, that the proposed fish passage measures are implemented and monitored in a manner that is adequately protective of listed species.

2. FERC must ensure, through enforceable conditions of the Project license, that the licensee complete an annual monitoring and reporting program to confirm that they are minimizing incidental take and reporting all project-related observations of dead or injured salmon to us.

Terms and Conditions

To implement reasonable and prudent measure #1, FERC must require the licensee to do the following:

1. To adequately monitor take, prepare in consultation with NMFS a plan to measure the survival of downstream migrating Atlantic salmon smolts at the Brunswick Project if and when similar studies are conducted at the Pejepscot and/or Worumbo Projects upstream.

a. Coordinate with the licensees of the Pejepscot and Worumbo Projects to ensure that passage at the Brunswick Project is evaluated if and when salmon studies are conducted at those upstream projects.

b. Require BWPH to measure the survival of downstream migrating Atlantic salmon smolts at the Brunswick Project using a scientifically acceptable methodology if/when studies are being conducted at upstream projects. BWPH must incorporate the Brunswick Project into these studies by installing telemetry receivers as necessary at the Project. The study must:

i. Measure the survival of downstream migrating smolts approaching within 200 meters of the dam downstream to the point where delayed effects of passage can be quantified.

ii. Use a Cormack-Jolly-Seber (CJS) model, or other acceptable approach, to determine if the survival estimate and associated error bounds are within the scope of published telemetry work for salmon in the region.

iii. BWPH must consult with us concerning the application of appropriate statistical methodology and must provide an electronic copy of model(s) and data to us.

c. All tags released in the system must have codes that are not duplicative of tags used by other researchers in the river, including university, state, federal and international tagging programs.

2. Prepare in consultation with NMFS a plan to evaluate adult Atlantic salmon upstream and downstream passage at the Brunswick Dam, as well as delay at the Lewiston Falls Project.

a. Conduct an upstream passage study at the Brunswick Project when either 1) more than 40 adult Atlantic salmon return per year in two consecutive years, or 2) sufficient stocking occurs upstream of the project such that NMFS determines it is likely to produce at least 40 returning adult Atlantic salmon. The study should be conducted in the year that sufficient adults are anticipated.

i. As a component of their upstream passage studies, BWPH must document the amount of migratory delay that occurs at the Brunswick Project.

ii. As a component of their upstream passage studies, BWPH must document the amount of migratory delay that occurs at the Lewiston Falls Dam.

iii. As a component of this study, BWPH must monitor the survival of downstream migrating kelts approaching within 200 meters of the dam downstream to the point where delayed effects of passage can be quantified. To make the best use of fish, this study must coincide with the proposed upstream passage study.

iv. A Cormack-Jolly-Seber (CJS) model, or other acceptable approach, must be used to determine if the survival estimate and associated error bounds are within the scope of published telemetry work for salmon in the region.

v. BWPH must consult with NMFS concerning the application of appropriate statistical methodology and must provide an electronic copy of model(s) and data to NMFS.

vi. All tags released in the system must have codes that are not duplicative of tags used by other researchers in the river, including university, state, federal and international tagging programs.

b. At the Brunswick Project, BWPH must install, operate, and maintain a PIT tag receiver near the entrance of the fishway to monitor movements of salmon and sturgeon in the project area annually throughout the term of the amended license. Provide all PIT tag data to NMFS annually by December

c. BWPH must insert a PIT tag into all ESA-listed Atlantic salmon that are trapped and handled at the Brunswick fishway.

3. Require that BWPH operate the upstream and downstream fishways at the Brunswick Project to ensure that passage of Atlantic salmon is safe, timely, and effective.

a. BWPH must take immediate action, regardless of whether the fishway is being observed in–person or remotely, to pass Atlantic salmon when they are observed in the fishway, regardless of the co-occurrence of an invasive species. If an invasive species is observed with an Atlantic salmon in the fishway, BWPH should attempt to pass the salmon upstream while preventing the passage of the invasive species.

b. BWPH staff must be onsite if the v-gate near the viewing window of the Brunswick fishway is being operated to ensure that salmon are not injured or killed by the closing of the gate. This gate must not be controlled remotely.

c. Position cameras to ensure that there are no blind spots where Atlantic salmon could hold without being observed when operating remotely.

d. Consult annually with NMFS regarding the appropriate timing for the initiation of the implementation of downstream spill measures.

e. Remove any debris that could affect the ability of fish to pass either the downstream or upstream fish passages immediately upon inspection.

f. Replace entrance gate actuator and upstream fishway handrail within one day of tailrace flows subsiding to safe levels after high water event during the fish passage season.

g. Annual maintenance requiring the shutdown of upstream fish ways should be conducted during the first two weeks of August. The fishway should not be inoperable for any longer than it takes to make the necessary repairs.

h. Consult with NMFS regarding the timing of the replacement of flashboards.

4. Require that BWPH actively monitor for the stranding of listed fish downstream of the Brunswick Dam and Lewiston Falls Dam.

a. Develop, in consultation with NMFS, an appropriate schedule for regularly surveying the pool downstream of the Brunswick dam for both stranded salmon and shortnose and Atlantic sturgeon.

b. Implement the Atlantic salmon Rescue and Handling Plan at the Lewiston Falls Project from May 1 to November 15 after significant spill events when salmon could be in the project area.

5. Require that BWPH update the sturgeon handling plan to incorporate the following conditions:

a. BWPH must record the weight, length, and condition of all sturgeon that are handled. Sturgeon must also be scanned for PIT tags. Genetic samples must be taken from all captured Atlantic sturgeon (alive or dead) to allow for identification of the DPS of origin of captured individuals and tracking of the amount of incidental take. This must be done in accordance with the Procedures for Obtaining Sturgeon Fin Clips:https://media.fisheries.noaa.gov/dammigration/sturgeon_genetics_sampling_revised_june_2019.pdf. All fin clips and the accompanying metadata form must be held and submitted to the Atlantic Coast Sturgeon Tissue Research Repository on a quarterly basis. The Sturgeon Genetic Sample Submission Form is available for download at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-take-reporting-programmatics-greater-atlantic. Captured sturgeon, regardless of the presence or scale of injury, must be safely returned to the Androscoggin River downstream of the project.

b. Dead sturgeon must be placed on ice or be refrigerated if possible. NMFS must be contacted immediately for further instructions.

To implement reasonable and prudent measure #2, FERC must require the licensee to do the following:

1. Inspect the upstream and downstream fish passage facilities at the Brunswick Project daily when they are open. The licensee must submit summary reports to NMFS weekly during the fish passage season.

2. Notify NMFS of any changes in operation including maintenance activities and debris management at the project during the term of the amended license.

3. Submit as-built drawings to NMFS for the current configuration of the upstream and downstream fishways.

4. Allow NMFS staff to inspect the upstream and downstream fishways at reasonable times, including but not limited to annual engineering inspection.

5. Review and update Fishway Operations and Maintenance Plan a minimum of every 3 years in cooperation with NMFS. The plan must be updated as soon as possible to ensure it is consistent with the terms and conditions of this Opinion, as well as with the State of Maine's most recent version of their Atlantic Salmon Trap Operating and Fish-Handling Protocols (except where it may conflict with the terms and conditions included with this Incidental Take Statement).

6. In the event of a serious injury or mortality of any ESA listed species, allow NMFS access to investigate the source of the mortality and work in cooperation with NMFS to correct the source of serious injury/mortality.

7. Submit annual reports at the end of each calendar year summarizing the results of proposed action and any takes of listed sturgeon or Atlantic salmon to NMFS by December 31.

8. Contact NMFS within 24 hours of any interactions with Atlantic salmon, shortnose sturgeon, or Atlantic sturgeon, including non-lethal and lethal takes (Matt Buhyoff: by email (Matt.Buhyoff@noaa.gov) or phone (207) 866-4238 and to: incidental.take@noaa.gov. By December 31 of each year, an annual report summarizing this information must be provided to NMFS to document the take level from all sources and all life stages.

9. In the event of any lethal takes, any dead specimens or body parts must be photographed, measured, and preserved (refrigerate or freeze) until disposal procedures are discussed with NMFS.