Brookfield

Brookfield Renewable
Topsham Hydro Partners Limited Partnership
150 Main Street
Lewiston, ME 04240

Tel 207.755.5600
Fax 207.755.5655
www.brookfieldrenewable.com

August 31, 2017

VIA E-FILING

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

Pejepscot Hydroelectric Project (FERC No. 4784)
Notice of Intent to File License Application and Pre-Application Document

Dear Secretary Bose:

Pursuant to Section 15(b)(1) of the Federal Power Act, 16 U.S.C. § 808(b)(1), Topsham Hydro Partners Limited Partnership (Topsham Hydro) herewith electronically files with the Commission, the Notice of Intent to File a License Application (NOI) and the Pre-Application Document (PAD) for the relicensing of the Pejepscot Hydroelectric Project (FERC No. 4784) (the Project). The current license for the Project expires on August 31, 2022.

In accordance with the Commission's regulations, 18 C.F.R. Sections 5.5(c) and 5.6(a)(1), Topsham Hydro is providing a copy of the NOI and PAD 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. In addition, Topsham Hydro is providing two courtesy paper copies of the NOI and PAD to Commission Staff in the Office of Energy Projects and Office of General Counsel – Energy Projects, as required by the Commission's filing guidelines.

Topsham Hydro 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 Topsham Hydro, within 30 days of the public scoping meeting.

In accordance with the Commission's regulations, 18 C.F.R. § 5.5(e), Topsham Hydro requests that the Commission authorize Topsham Hydro 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.

Topsham Hydro also requests that the Commission designate Topsham Hydro 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.

Volume 2 of the PAD includes the detailed drawings of the project works (Exhibit F drawings and single line electrical diagram), which information is deemed as Critical Energy Infrastructure Information (CEII) under 18 CFR § 388.112, and has not been included in the public version of the PAD. Topsham Hydro is concurrently filing Volume 2 under the Commission's e-filing guidelines for CEII.

If there are any questions or comments regarding the NOI or PAD, please contact me by phone at (207) 755-5603 or by email at Frank.Dunlap@brookfieldrenewable.com.

Sincerely,

Frank H. Dunlap
Licensing Specialist
Brookfield Renewable

Attachment: NOI and PAD for the Pejepscot Hydroelectric Project

cc: Distribution List
S. Murphy, Brookfield Renewable
K. Maloney, Brookfield Renewable

DISTRIBUTION LIST
Pejepscot Hydroelectric Project (FERC No. 4784)
Pre-Application Document and Notice of Intent to File License Application

I, Frank Dunlap, Licensing Specialist, Brookfield Renewable, hereby certify that copies of the foregoing document have been transmitted to the following parties on August 31, 2017.

Frank H. Dunlap
Licensing Specialist

August 31, 2017

One copy, via e-filing to:

Ms. Kimberly D. Bose
Federal Energy Regulatory Commission
888 First Street, N.E.,
Dockets Room
Washington, D.C. 20426

Via email or electronic link, or one copy on compact disc,
Regular mail, postage paid to:

Federal Agencies

Mr. Ryan Hansen
Federal Energy Regulatory Commission
888 First Street, NE,
Washington, DC 20426

Wendi Weber
Regional Director
U.S. Fish and Wildlife Service
300 Westgate Center Dr.
Northeast Regional Office
Hadley, MA 01035

Mr. John Spain
Regional Engineer
Federal Energy Regulatory Commission
Division of Dam Safety and Inspections
New York Regional Office
19 W 34th Street, Suite 400
New York, NY 10001

Mr. Antonio Bentivoglio
U.S. Fish and Wildlife Service
P.O. Box A
306 Hatchery Way
East Orland, ME 04431

Mr. Steve Shepard
Maine Hydro Licensing Coordinator
U.S. Fish and Wildlife Service
P.O. Box A
306 Hatchery Way
East Orland, ME 04431

Mr. Jeff Murphy
National Marine Fisheries Service
Maine Field Office
17 Godfrey Drive- Suite 1
Orono, ME 04473

Mr. Sean McDermott
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930

Mr. Andrew L. Raddant
Regional Environmental Officer
U.S. Fish and Wildlife Service
Office of Environmental Policy and Compliance
Northeast Region
15 State Street, Suite 400
Boston, MA 02109

Mr. Matt Buhyoff
National Marine Fisheries Service
Atlantic Salmon Recovery Coordinator
17 Godfrey Drive
Orono, ME 04473

Mr. John T. Eddins
Office of Project Review
Advisory Council on Historic Preservation
The Old Post Office
1100 Pennsylvania Ave NW Suite 809
Washington, DC 20004-2501

Mr. Ralph Abele
Instream Flow Coordinator
Region 1- Office of Ecosystem Protection
US Environmental Protection Agency
5 Post Office Square, Suite 100
Mail Code: OEP06-2
Boston, MA 02109-3912

Mr. Kevin Mendik
Hydro Program Manager
Northeast Region
National Park Service
15 State Street, 10th Floor
Boston, MA 02109-3572

Mr. Weldon Loudermilk
Director
Bureau of Indian Affairs
U.S. Department of the Interior
MS 4606 MIB
1849 C Street NW
Washington, DC 20240

Mr. Greg Stewart
Data Section Chief
U.S. Geological Survey
196 Whitten Rd.
Augusta, ME 04333

Mr. Harold Peterson
Bureau of Indian Affairs
Eastern Regional Office
545 Marriot Drive, Suite 700
Nashville, TN 37214

State Agencies

Ms. Kathy Howatt
Hydropower Coordinator
Maine Department of Environmental Protection
17 State House Station
28 Tyson Drive
Augusta, ME 04333-0017

Mr. Mark Bergeron, Director
Bureau of Land Resource Regulation
Maine Department of Environmental Protection
17 State House Station
28 Tyson Drive
Augusta, ME 04333-0017

Mr. Robert G. Marvinney
State Geologist
Maine Geological Survey
Maine Department of Agriculture, Conservation and Forestry
22 State House Station
18 Elkins Lane
Augusta, ME 04333-0022

Mr. Jim Vogel
Maine Department of Agriculture, Conservation and Forestry
Bureau of Parks and Lands
22 State House Station
18 Elkins Lane
Augusta, ME 04333-0022

Ms. Kathleen Leyden
Maine Coastal Program
Maine Department of Agriculture, Conservation and Forestry
22 State House Station
18 Elkins Lane
Augusta, ME 04333-0022

Mr. John Perry
Environmental Coordinator
Maine Department of Inland Fisheries and Wildlife
41 State House Station
284 State Street
Augusta, ME 04333-0041

Mr. James Pellerin
Regional Fisheries Biologist – Region A
Maine Department of Inland Fisheries and Wildlife
RR1, 358 Shaker Road
Gray, ME 04039

Mr. Scott Lindsay
Regional Wildlife Biologist – Region A
Maine Department of Inland Fisheries and Wildlife
RR1, 358 Shaker Road
Gray, ME 04039

Ms. Gail Wippelhauser
Maine Department of Marine Resources
21 State House Station
Augusta, ME 04333-0021

Mr. Paul Christman
Maine Department of Marine Resources
21 State House Station
Augusta, ME 04333

Mr. Kirk Mohney
Director and State Historic Preservation Officer
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333-0065

Dr. Arthur Spiess
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333-0065

Municipal Government

Town of Topsham
100 Main Street
Topsham, ME 04086

Town of Brunswick
85 Union Street
Brunswick, ME 04011

Town of Durham
630 Hallowell Road
Durham, ME 04222

Town of Lisbon
300 Lisbon Street
Lisbon, ME 04250

Cumberland County Government
142 Federal Street
Portland, ME 04101

Sagadahoc County Government
752 High Street
Bath, ME 04530

Androscoggin County Government
2 Turner Street
Auburn, ME 04210

Non-Governmental Organizations

Mr. Brian Graber
Director
American Rivers
Northeast Field Office
516 West Hampton Road
Southampton, MA 01062

Mr. Kevin Colburn
National Stewardship Director
American Whitewater
2725 Highland Avenue
Missoula, MT 59802

Mr. John R.J. Burrows
Atlantic Salmon Federation
Fort Andross, Suite 406
14 Maine Street
Brunswick, ME 04011

Mr. Bill Oleszczuk
Chair
Maine Council of Trout Unlimited
185 Tobey Road
New Gloucester, ME 04260

Mr. Jeffrey Reardon
Maine Brook Trout Program Director
Trout Unlimited
9 Union Street
Hallowell, ME 04347

Mr. Ed Friedman
Friends of Merrymeeting Bay
PO Box 233
Richmond, ME 04357

Ms. Landis Hudson
Executive Director
Maine Rivers
P.O. Box 782
Yarmouth, ME 04096

Native American Tribes

Chief Edward Peter Paul
Aroostook Band of Micmacs
Micmac Cultural, Community and
Educational Center
7 Northern Road
Presque Isle, ME 04769

Ms. Jennifer Pictou
THPO
Aroostook Band of Micmacs
7 Northern Road
Presque Island, ME 04769

Chief Kirk Francis
Penobscot Indian Nation
12 Wabanaki Way
Indian Island, ME 04468

Mr. Christopher Sockalexis
THPO
Penobscot Indian Nation
Cultural & Historic Preservation
Department
12 Wabanaki Way
Indian Island, ME 04468

Chief William J. Nicholas, Sr.
Passamaquoddy Tribe
Indian Township
P.O. Box 301
Princeton, ME 04668

Mr. Donald Soctomah
THPO
Passamaquoddy Tribe
PO Box 159
Princeton, ME 04668

Chief Brenda Commander
Houlton Band of Maliseet Indians
88 Bell Road
Littleton, ME 04730

Ms. Susan Young
Houlton Band of Maliseet Indians
88 Bell Road
Littleton, ME 04730

Licensee

Frank Dunlap
Licensing Specialist
Brookfield Renewable
150 Main Street
Lewiston, Maine 04240

Steven Murphy
Director, Licensing
Brookfield Renewable
33 West 1st Street South
Fulton, New York 13069

Kirk Smith
Gomez and Sullivan Engineers, DPC
41 Liberty Hill Road
PO Box 2179
Henniker, NH 03242

NOTICE OF INTENT
TO FILE A LICENSE APPLICATION
PEJEPSCOT HYDROELECTRIC PROJECT (FERC NO. 4784)

TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP

AUGUST 31, 2017

Pursuant to 18 C.F.R. Section 5.5 of the Federal Energy Regulatory Commission's (FERC) regulations, Topsham Hydro Partners Limited Partnership (Topsham Hydro) hereby gives notice and declares its intent to apply for a new license for the Pejepscot Hydroelectric Project (FERC No. 4784) (Project). In accordance with 18 C.F.R. Section 5.5 and Section 16.6(b), the following information is provided:

1. **The potential applicant or existing licensee's name and address:**

   Topsham Hydro Partners Limited Partnership
   150 Main Street
   Lewiston, Maine 04240

2. **Project Number:**

   Pejepscot Hydroelectric Project, FERC No. 4784

3. **License expiration date:**

   FERC issued a new license to operate the Pejepscot Hydroelectric Project to the Androscoggin Water Power Company by Order dated September 16, 1982 (20 FERC ¶ 62,483). The effective date of the new license was September 1, 1982. The term of the license is 40 years. The license has been transferred, in full and in part, several times since issuance.[1] Most recently, by order dated September 7, 2011 (136 FERC ¶ 62,201), FERC approved partial transfer of the project license from Brown Bear Power, LLC,

[1] See *Androscoggin Water Power Co.,* 34 FERC ¶ 62,266 (1986); *Topsham Hydro Partners Limited Partnership*, 41 FERC ¶ 62,132 (1987); *UtiliCo Group Inc.,* 106 FERC ¶ 62,091 (2004); *UtiliCo Group Inc.,* 107 FERC ¶ 62,163 (2004); *Teton Power Funding, LLC,* 110 FERC ¶ 62,175 (2005); *DaimlerChrysler Services North America LLC,* 115 FERC ¶ 62,047 (2006); *DaimlerChrysler Financial Services Americas LLC,* 1119 FERC ¶ 62,216 (2007); and *Brown Bear Power, LLC* 135 FERC ¶ 62,095 (2011).

Topsham Hydroelectric Generating Facility Trust No. 1, and Topsham Hydro Partners Limited Partnership, jointly, to Topsham Hydro Partners Limited Partnership, solely. The current license for the Project expires on August 31, 2022.

4. Applicant's statement of intention to file an application for a new license:

Topsham Hydro hereby unequivocally declares its intent to apply for a new license of the Pejepscot Hydroelectric Project, FERC Project No. 4784, on or before August 31, 2020. Topsham Hydro requests that FERC conduct the relicensing using the Integrated Licensing Process (ILP).

5. Principal Project Works:

The Pejepscot Project works consists of: (1) a 560-foot-long, 48-foot-high, rock- and gravel-filled, timber-crib, overflow structure that is topped with a 5-foot-thick reinforced concrete slab; 2) a spillway consisting of five, 96-foot-long by 3-foot-high bascule gates; 3) a 225-acre impoundment at a full pool elevation of 67.5 feet; 4) a powerhouse containing three horizontal Francis turbine-generator units with a combined rated capacity of approximately 1,580 kW and maximum hydraulic capacity of approximately 1,050 cfs; 4) a powerhouse containing a vertical-shaft, adjustable-blade, propeller type (Kaplan) turbine rated at 17,000 hp with a maximum hydraulic capacity of approximately 7,100 cfs and a generator rated at approximately 12,300 kW; 5) an upstream fish passage facility consisting of a vertical fish lift; 6) a downstream fish passage facility consisting of two 4-foot wide entry weirs that pass fish through 30-inch and 24-inch outlet pipes respectively; and 7) appurtenant facilities.

6. Project Location:

The Project is located approximately 4.7 miles above head-of-tide on the Androscoggin River in the village of Pejepscot and the Towns of Topsham, Lisbon, Durham, and Brunswick, in Cumberland, Sagadahoc, and Androscoggin Counties, Maine.

7. Installed plant capacity:

The Project has a total authorized installed capacity of 13.88 MW.

8. The names and mailing addresses of:

a. 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 Androscoggin, Cumberland, and Sagadahoc counties, Maine.

Androscoggin County Government
2 Turner Street, Unit 2
Auburn, Maine 04210

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.

b. 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 located in the towns of Brunswick, Durham, Lisbon, and Topsham:

Town of Brunswick
85 Union Street
Brunswick, Maine 04011

Town of Durham
630 Hallowell Road
Durham, Maine 04222

Town of Lisbon
300 Lisbon Street
Lisbon, Maine 04250

Town of Topsham
100 Main Street
Topsham, Maine 04086

There are no Federal facilities used by the Project.

c. 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:

City of Auburn
60 Court Street
Auburn, Maine 04210

City of Bath
55 Front Street
Bath, Maine 04530

Town of Brunswick
85 Union Street
Brunswick, Maine 04011

Town of Cumberland
290 Tuttle Road
Cumberland, Maine 04021

Town of Freeport
30 Main Street
Freeport, Maine 04032

Town of Gray
24 Main Street
Gray, Maine 04039

City of Lewiston
27 Pine Street
Lewiston, Maine 04240

Town of Lisbon
300 Lisbon Street
Lisbon, Maine 04250

Town of New Gloucester
385 Intervale Road
New Gloucester, Maine 04260

Town of Sabattus
190 Middle Road
Sabattus, Maine 04280

Town of Topsham
100 Main Street
Topsham, Maine 04086

Town of Yarmouth
200 Main Street
Yarmouth, Maine 04096

d. 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.

e. 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.

f. Affected Indian Tribes:

Topsham Hydro 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:

Aroostook Band of Micmacs
7 Northern Road
Presque Isle, Maine 04769

Penobscot Indian Nation
12 Wabanaki Way
Indian Island, Maine 04468

Passamaquoddy Native American Nation
Pleasant Point Reservation
Tribal Building Office
9 Sakom Road
Perry, Maine 04667

Houlton Band of Maliseet
88 Bell Road
Littleton, Maine 04730

9. Whether the application is for a power or a non-power license:

The application for new license for the Pejepscot Hydroelectric Project will be for a power license.

Furthermore, in accordance with 18 C.F.R. Section 5.5, Topsham Hydro 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 which are receiving this NOI is provided with the August 31, 2017 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 Pejepscot Hydroelectric Project, FERC No. 4784, is executed in the State of Maine, County of Androscoggin, by C. Todd Wynn, Vice President, Topsham Hydro Partners Limited Partnership, 150 Main Street, Lewiston, Maine 04240, 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 Topsham Hydro Partners Limited Partnership. The undersigned has signed this Notice of Intent this 31st day of August 2017.

TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP

By _____

C. Todd Wynn
Vice President

VERIFICATION

Subscribed and sworn to before me, a Notary Public of the State of Maine this 31st day of August 2017.

_____
(Notary Public)

(My Commission Expires 12/21/2019) / seal

TONYA ROBERT
Notary Public-Maine
My Commission Expires
December 21, 2019

PRE-APPLICATION DOCUMENT
VOLUME 1 OF 2: PUBLIC
PEJEPSCOT HYDROELECTRIC PROJECT
(FERC NO. 4784)

Submitted by:

Brookfield Renewable
Topsham Hydro Partners Limited Partnership
150 Main Street
Lewiston, ME 04240

Prepared by:

GOMEZ AND SULLIVAN ENGINEERS

August, 2017

Brookfield

This page intentionally left blank.

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND DEFINITIONS

AVCOG	Androscoggin Valley Council of Governments
Applicant	Topsham Hydro Partners Limited Partnership.
ASMFC	Atlantic States Marine Fisheries Commission
BBHP	Black Bear Hydro Partners
B.P.	Before present
BPL	Maine Department of Agriculture, Conservation and Forestry; Bureau of Parks and Lands
Brookfield	Brookfield Renewable
BWPH	Brookfield White Pine Hydro LLC
CARMA	MHPC Cultural and Architectural Research 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
DDT	dichloro-diphenyl-trichloroethane
DLA	Draft License Application
DMP	Dioxin Monitoring Program
DO	Dissolved Oxygen
DOI	United States Department of the Interior
DSSMP	Dam Safety Surveillance and Monitoring Program
EA	Environmental Assessment
EFH	Essential Fish Habitat
El.	Elevation
EOT	Extension of Time
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FOMB	Friends of Merrymeeting Bay
FLA	Final License Application

FOIA	Freedom of Information Act
FPA	Federal Power Act
Ft.	Foot
GIS	Geographic Information System
GOM DPS	Gulf of Maine Distinct Population Segment
HAPC	Habitats of particular concern
ILP	Integrated Licensing Process
Installed Capacity	Lesser nameplate rating of a turbine and generator set
Interested Parties	Broad group on individuals and entities that have an interest in a proceeding
IPaC	Information for Planning and Consultation
ISR	Initial Study Report
K factor	Erosion factor
Kf factor	Fine earth erosion factor
kV	Kilovolts
KVA	Kilovolt amps
kW	kilowatt
License Application	Application for New License submitted to FERC no less than two years in advance of expiration of an existing license. See FLA
Licensee	Topsham Hydro Partners Limited Partnership
m	Meter
MBEP	Maine Board of Environmental Protection
MDACF	Maine Department of Agriculture, Conservation and Forestry
MDDS	Maine Damselfly and Dragonfly Survey
MDEH	Maine Center for Disease Control and Prevention, Department of Environmental Health
MDEP	Maine Department of Environmental Protection
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDMR	Marine Department of Marine Resources
ME	Maine
mg/l	Milligrams per liter
mgd	Million gallons per day
MGS	Maine Geological Survey
MHPC	Maine Historic Preservation Commission

ml	Milliliter
MNAP	Maine Natural Areas Program
MPN	Most Probable Number
MRSA	Maine Revised Statutes Annotated
MSZA	Mandatory Shoreland Zoning Act
MW	Megawatt
MWh	Megawatt hour
NEPA	National Environmental Policy Act
NGO	Non-Government Organization
NH	New Hampshire
NMFS	National Oceanic and Atmospheric Administration; National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	United States Department of Agriculture; Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NWI	National Wetlands Inventory
OPM	State of Maine Office of Policy and Management
PAD	Pre-Application Document
PCBs	Polychlorinated Biphenyls
PLP	Preliminary License Proposal
PM&E	Protection, Mitigation and Enhancement Measures
POTW	Publicly Owned Treatment Works
Project	Pejepscot Hydroelectric Project (FERC No. 4784)
Project Area	The area within the FERC Project boundary for the Pejepscot Project
Project boundary	The boundary line defined in the Project license issued by FERC that surrounds those areas needed for operation of the Project. In the case of the Pejepscot Project, the Project boundary follows El. 75.0 (mean sea level) except in the vicinity of the dam and powerhouse and at the upstream limit of the reservoir.

Project Vicinity	The general geographic area in which the Project is located.
PSP	Proposed Study Plan
QHEI	Qualitative Habitat Evaluation Index
Relicensing	The process of acquiring a new FERC license for an existing hydroelectric Project upon expiration of the existing FERC license
Relicensing Participants	Individuals and entities that are actively participating in a relicensing proceeding
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 or Endangered species, which for purposes of this PAD is defined to include: (1) all botanical species listed as threatened or endangered identified as occurring within the Project boundary or immediate vicinity by the MNAP; (2) all wildlife species listed as threatened or endangered under the Maine Endangered Species Act identified as occurring within Sagadahoc and Cumberland County by the MDIFW; and (3) all federal wildlife species listed as threatened or endangered under the federal Endangered Species Act for Sagadahoc and Cumberland County identified by the USFWS and NMFS. Special status species includes the federally protected bald eagle (*Haliaeetus leucocephalus*) and Osprey (*Pandion haliaetus*).
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SD1	Scoping Document 1
Service List	A list maintained by FERC of parties who have formally intervened in a proceeding. In relicensing, there is no Service List established until the license application is filed and accepted by FERC. Once FERC establishes a Service List, any documents filed with FERC must also be sent to the Service List
SHRU	Salmon Habitat Recovery Unit
SPD	Study Plan Determination
sqm	Square mile
SWAT	Surface Water Ambient Toxics
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TP	Total Phosphorous

UMF ARC	University of Maine at Farmington Archaeological Research Center
us/cm	microSiemens/centimeter
U.S.	United States
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VRMP	Volunteer River Monitoring Program
WASP	Water Quality Analysis Simulation Program
WQC	Water Quality Certificate
WMROSP	Western Maine Regional Open Space Policy
7Q10	Lowest seven-day average stream flow with a 1 in 10 probability of occurring in any year

1 INTRODUCTION

Topsham Hydro Partners Limited Partnership (L.P.) (Topsham Hydro or Licensee), an indirect member of Brookfield Renewable (Brookfield), is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the 13.88 megawatt (MW) Pejepscot Hydroelectric Project (Project) (FERC No. 4784). The Project is located on the Androscoggin River in the village of Pejepscot and the Town of Topsham, Maine (ME) to the east, the Town of Lisbon to the north, and the Town of Durham and the Town of Brunswick, ME to the west. The Project straddles the border between Cumberland and Sagadahoc counties and extends into Androscoggin County. The original license was issued on September 16, 1982 and expires on August 31, 2022.

Topsham Hydro is filing with FERC a Notice of Intent (NOI) to relicense the Project, which generally consists of: the dam, spillway, fish passage facilities, two powerhouses, a sheet-pile floodwall, and ancillary equipment. The FERC-authorized installed capacity of the Project is 13.88 MW. As required by law, Topsham Hydro will be applying for a new license for the Project on or before August 31, 2020.

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 Topsham Hydro's Application for New License (License Application) that will be filed with FERC on or before August 31, 2020. 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, Topsham Hydro contacted appropriate federal and state resource agencies and parties who may be interested in the relicensing of the Project (Appendix A). Topsham Hydro 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.

Topsham Hydro 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

Topsham Hydro 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 impacts 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 August 31, 2020. FERC will then conduct its environmental analysis and processing of the license application.

The filing of the NOI and PAD by Topsham Hydro 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):

C. Todd Wynn
Vice President
Topsham Hydro Partners Limited Partnership
150 Main Street
Lewiston, ME 04240

Copies of all correspondence should also be sent to:

Frank H. Dunlap
Licensing Specialist
Brookfield Renewable
150 Main Street
Lewiston, ME 04240

Kirk Smith
Project Manager
Gomez and Sullivan Engineers, D.P.C.
PO Box 2179
Henniker, NH 03242

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

2 PLANS, SCHEDULE, AND PROTOCOLS

As discussed in the previous section, with the filing of the NOI and PAD, Topsham Hydro is initiating FERC's ILP for the relicensing of the Pejepscot 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 August 31, 2020.

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)	August 31, 2017
Hold Initial Tribal Consultation Meeting	FERC	Within 30 days of filing of NOI & PAD	18 CFR § 5.7	September 30, 2017
Notice NOI/PAD and Issue Scoping Document 1 (SD1)	FERC	Within 60 days of filing of NOI & PAD	18 CFR § 5.8(a)	October 30, 2017
Hold Scoping Meeting and Site Visit	FERC	Within 30 days of issuance of SD1	18 CFR § 5.8(b)(3)	November 29, 2017
Comment on PAD and SD1; Submit Study Requests	Stakeholders	Within 60 days of issuance of SD1	18 CFR § 5.9(a)	December 29, 2017
File Proposed Study Plan (PSP)	Licensee	Within 45 days of deadline for filing comments on PAD and SD1	18 CFR § 5.11	February 12, 2018
Hold Study Plan Meeting	Licensee	Within 30 days of deadline for filing PSP	18 CFR § 5.11(e)	March 14, 2018
Comment on Proposed Study Plan	Stakeholders	Within 90 days of filing PSP	18 CFR § 5.12	May 13, 2018
File Revised Study Plan (RSP)	Licensee	Within 30 days of deadline for filing comments on PSP	18 CFR § 5.13(a)	June 12, 2018
Comment on Revised Study Plan	Stakeholders	Within 15 days of filing of RSP	18 CFR § 5.13(b)	June 27, 2018
FERC Issues Study Plan Determination (SPD)	FERC	Within 30 days of filing of RSP	18 CFR § 5.13(c)	July 12, 2018
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)	August 1, 2018
File Response to Study Dispute(s) (if necessary)	Licensee	Within 25 days of Notice of Study Dispute	18 CFR § 5.14(i)	August 26, 2018
FERC Dispute Panel Issues Finding (if necessary)	Dispute Panel	Within 50 days of Notice of Study Dispute	18 CFR § 5.14(k)	September 20, 2018
FERC Issues Determination on Study Dispute (if necessary)	FERC	Within 70 days of Notice of Study Dispute	18 CFR § 5.14(l)	October 10, 2018
Conduct Field Studies	Licensee	Pursuant to approved SP	18 CFR § 5.15	2018 and 2019

Activity	Responsibility	Required Time Frame	Citation	Deadline
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)	July 12, 2019
Hold Initial Study Report Meeting	Licensee	Within 15 days of filing of initial study report	18 CFR § 5.15(c)(2)	July 27, 2019
File Initial Study Report Meeting Summary	Licensee	Within 15 days of study results meeting	18 CFR § 5.15(c)(3)	August 11, 2019
File Meeting Summary Disagreements (if necessary)	Stakeholders	Within 30 days of filing of study results meeting summary	10 CFR § 5.15(c)(4)	September 10, 2019
File Responses to Disagreements (if necessary)	Licensee	Within 30 days of filing of meeting summary disagreements	18 CFR § 5.15(c)(5)	October 10, 2019
Resolve Disagreements (if necessary)	FERC	Within 30 days of filing of responses to disagreements	18 CFR § 5.15(c)(6)	November 9, 2019
Conduct Second Season Field Studies (if necessary)	Licensee	Pursuant to approved Study Plan Determination	18 CFR § 5.15	2020
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)	April 3, 2020
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)	July 2, 2020
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)	July 12, 2020
Hold Updated Study Report Meeting (if applicable)	Licensee	Within 15 days of Updated Study Report	18 CFR § 5.15(c)(2)	July 27, 2020
File Updated Study Report Meeting Summary (if applicable)	Licensee	Within 15 days of Study Results Meeting	18 CFR § 5.15(c)(3)	August 11, 2020
File Meeting Summary Disagreements (if necessary)	Stakeholders	Within 30 days of filing of study results meeting summary	18 CFR § 5.15(c)(4)	September 10, 2020
File Responses to Meeting Summary Disagreements (if necessary)	Licensee	Within 30 days of filing of meeting summary disagreements	18 CFR § 5.15(c)(5)	October 10, 2020

Activity	Responsibility	Required Time Frame	Citation	Deadline
Resolve Updated Study Report Meeting Disagreements (if necessary)	FERC	Within 30 days of filing of response to disagreements	18 CFR § 5.15(c)(6)	November 9, 2020
File License Application	Licensee	No later than 24 months before existing license expires	18 CFR § 5.17(a)	August 31, 2020

2.2 Proposed Communications Protocol

Topsham Hydro 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, 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

Topsham Hydro 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 Frank Dunlap (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

Topsham Hydro 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, non-governmental organizations (NGO), 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

Topsham Hydro 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. Topsham Hydro 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-4784). 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 the Pejepscot 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, Topsham Hydro will work with the interested parties to schedule these meetings during times that are convenient for the participants and will provide adequate advance notice. Licensing meetings will typically occur during normal business hours at Brookfield's Lewiston, ME office (150 Main Street, Lewiston, ME) but may be relocated to another location within 15 miles of the Project. When possible, Topsham Hydro 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 Documents

Topsham Hydro 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. Topsham Hydro prefers to receive all documents electronically, in an appropriate format. Electronic documents can be emailed to Frank.Dunlap@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. Distribution of information will follow the guidelines presented in Table 2.2.3-1.

Documents submitted to and issued by the FERC for the Project are available through eLibrary under Docket P-4784 (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.

Public Reference File

Topsham Hydro will maintain a public reference file at Brookfield's Lewiston, ME offices (address provided in Section 1.3). The file will contain pertinent information and documents related to the Project relicensing (e.g., source materials, FERC licensing documents, consultation record, etc.). The public may view the reference file during normal business hours. Hard copies or electronic copies of public documents will be made available upon written request for a nominal fee. The reference file will be updated throughout the licensing process to ensure that it remains current.

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.

Topsham Hydro 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.

Table 2.2.3-1: Document Distribution for the Pejepscot Relicensing (FERC Project No. 4784)

Document	Method	Distribution
Pre-Application Document (PAD) Questionnaire	Email or US Mail	Potential Interested Parties
Public Meeting Notices	U.S. Mail, Email and Newspapers (where required)	Public and all Potential Interested Parties
Meeting Agendas	Email	Interested Parties
Meeting Summaries	Email	Notice of ILP required meeting summary availability by Email to Interested Parties
Process Plan & Schedule	Email	On Request
Major Documents: Proposed Study Plans, Study Reports, Draft License Application, Final License Application, etc.	Email or link to FERC e-library, or US Mail	Notice of availability by US Mail or Email to Interested Parties; Major documents via email, link to FERC e-library, or on CD to Relicensing Participants
PAD and License Application support documents (as part of the Public Reference Files)	Brookfield's Lewiston, ME corporate office	On Request
Written Communications	Email	On Request

2.3 Study Requests

Topsham Hydro has identified areas where there is little or no information relevant to issues of potential concern for 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 Indian 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 in light of 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

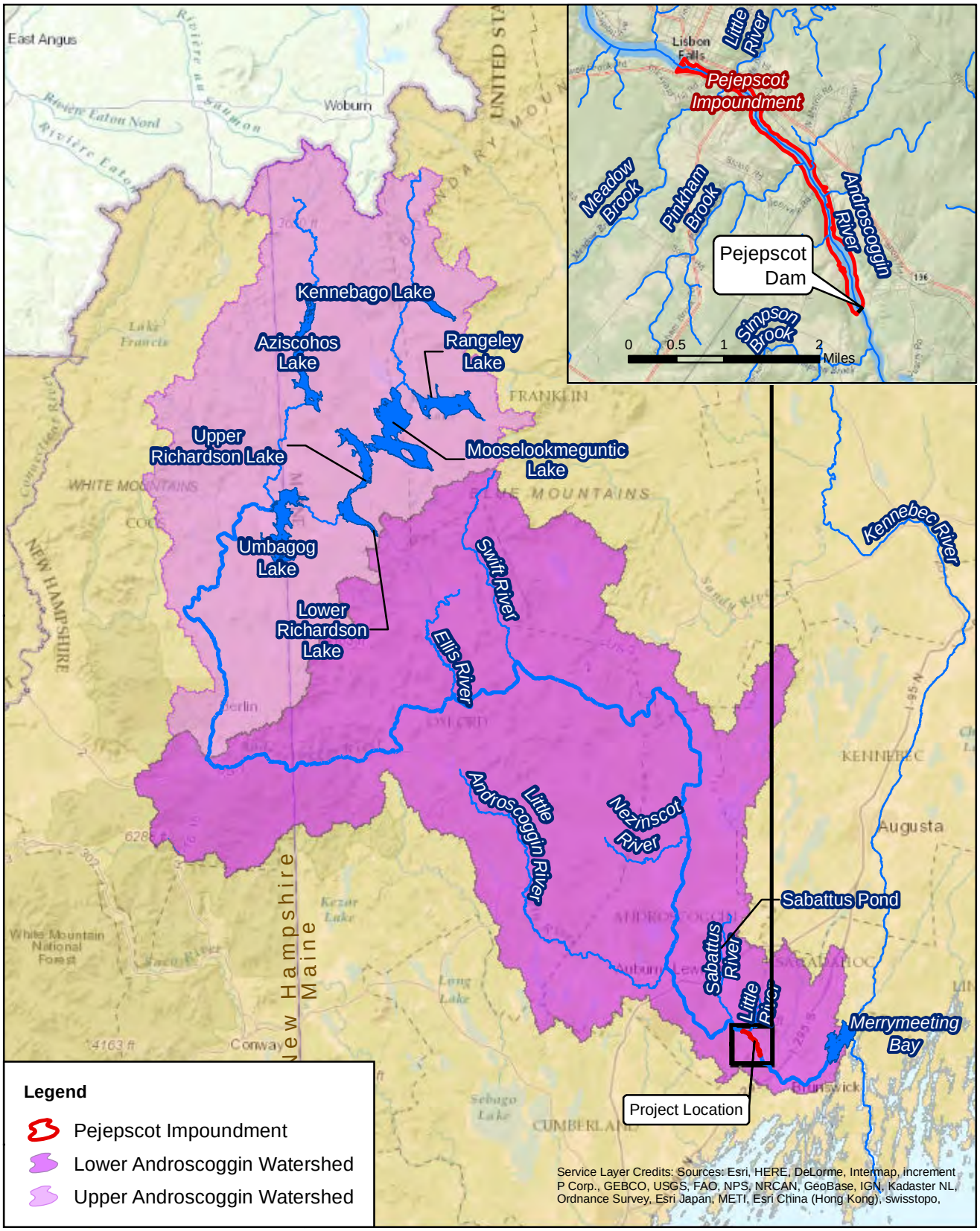
Federal Energy Regulatory Commission (FERC). 2017. Integrated Licensing Process. [Online] URL: https://www.ferc.gov/industries/hydropower/gen-info/licensing/ilp.asp [Accessed February 15, 2017].

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

3.1 Overview

The Androscoggin River Basin (Figure 3.1-1) has a total drainage area of 3,470 square miles (sqm) and is generally bounded on the west by the Connecticut, Saco, and Presumpscot River Basins and on the east by the Kennebec River Basin. The Androscoggin River originates at the outlet of Umbagog Lake in northern New Hampshire and flows south and east in New Hampshire and Maine about 169 miles to the tidal portion of the Kennebec River in Merrymeeting Bay along the coast of Maine (FERC, 1996). The Pejepscot Dam is about 155 river miles downstream of Umbagog Lake and has a drainage area of 3,420 sqm. The Project impoundment extends about 3 miles upstream from the dam to just downstream of the Worumbo Dam tailrace. The river can be tidally influenced to the Brunswick Project's tailwater, which is located approximately 4.7 miles downstream of the Pejepscot Project.

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 storage in the basin. Major tributaries to the Androscoggin River include the Swift, Little Androscoggin, Ellis, and Nezinscot rivers (USGS, 1985). There are approximately 16 tributaries within the Androscoggin watershed that have drainage areas ranging from 60 to 470 sqm each (ENSR, 2007). Figure 3.1-1 presents a map of the Androscoggin River watershed.



Brookfield

Pre-Application Document
Pejepscot Hydroelectric Project (FERC No. 4784)

N

0 7.5 15 30 Miles

Figure 3.1-1:
Androscoggin River Watershed

Path: P:\proposals\9059\maps\pejepscot_pad\figure_3_1-1_location.mxd

3.2 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 upstream of the Project is classified as either mixed forest (28%), deciduous forest (27%), or evergreen forest (21%). Woody wetlands, shrub/scrub, or open water, collectively account for 15% of the land in this area. The remaining 9% is a mix of various categories (e.g., developed/open space, pasture/hay, etc.), none of which account for greater than 2% of the land area (Homer, 2015). Table 3.2-1 provides a breakdown of the various land-use classifications found throughout the Androscoggin River watershed upstream of the Project, while Figure 3.2-1 shows the location of the various land-use classifications in relation to the Project.

Within 1,000 ft. of the Project boundary, the land-use is dominated by various forest classifications (i.e., mixed (23%), evergreen (10%), or deciduous (10%)), open water (19%) (i.e., the Pejepscot Impoundment), barren land composed of rock, sand, or clay (11%), and land with various degrees of development (13%). Significant commercial and industrial land uses in the Project vicinity include a metal recovery and recycling facility immediately adjacent to the Project powerhouses, and several active rock and gravel pits in proximity to the Project. The remaining land use classifications found within 1,000 ft. of the Project boundary are a combination of shrub/scrub, various types of wetlands, pasture/hay fields, cultivated crops, and grassland/herbaceous land (Homer, 2015).

Table 3.2-2 provides a breakdown of the various land-use classifications found within 1,000 ft. of the Project boundary, while Figure 3.2-2 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 3.2-1: Androscoggin River Watershed Land-Use Upstream of the Project

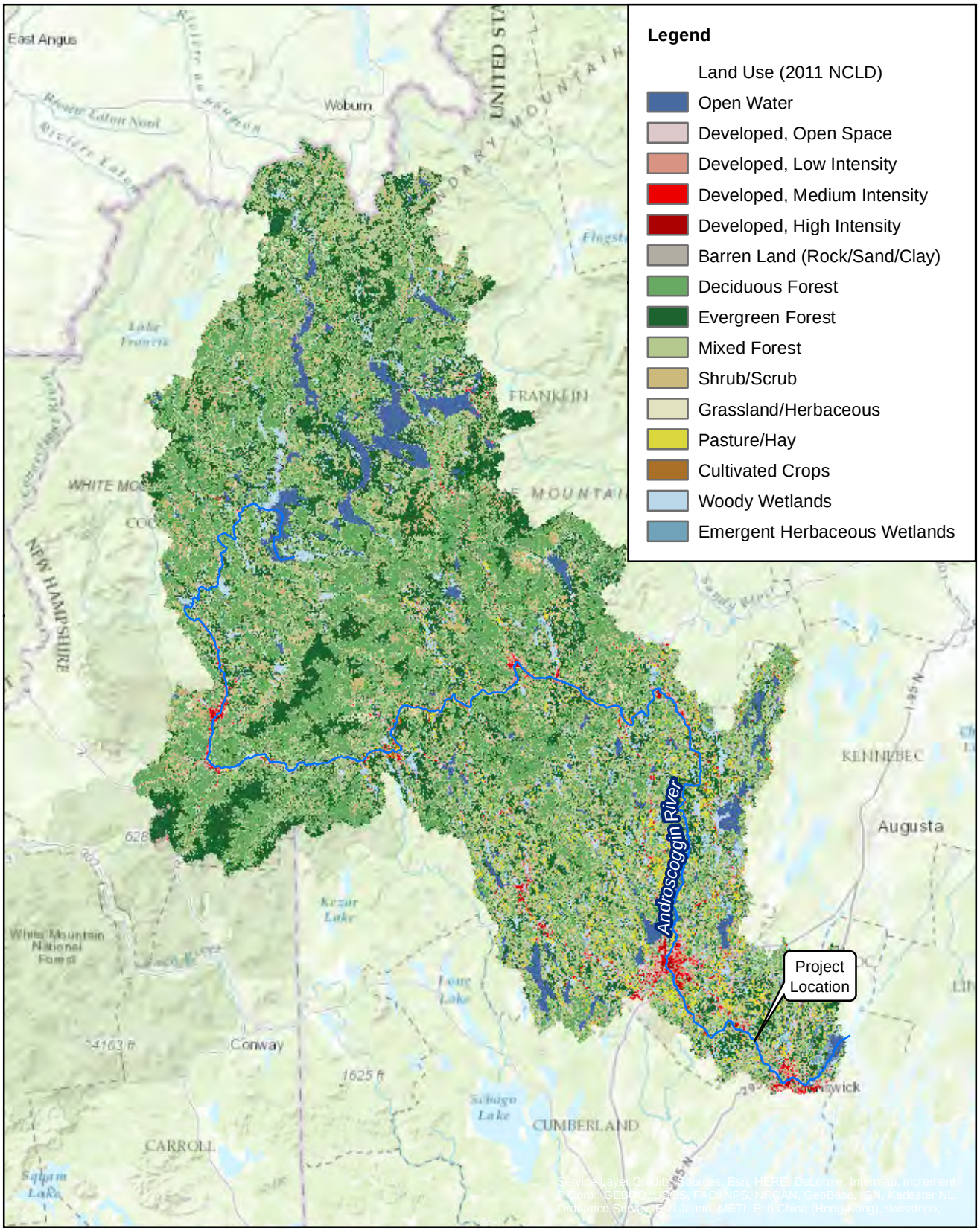
Land Use Classification	Area (acres)	Total (%)
Mixed Forest	629,751	28%
Deciduous Forest	604,922	27%
Evergreen Forest	465,114	21%
Woody Wetlands	129,409	6%
Shrub/Scrub	122,512	5%
Open Water	99,163	4%
Developed, Open Space	50,864	2%
Pasture/Hay	50,127	2%
Developed, Low Intensity	28,112	1%
Grassland/Herbaceous	24,261	1%
Emergent Herbaceous Wetlands	14,205	1%
Cultivated Crops	13,933	1%
Developed, Medium Intensity	11,374	1%
Barren Land (Rock/Sand/Clay)	9,264	0%
Developed High Intensity	3,991	0%
Sedge/Herbaceous	109	0%

(Homer, 2015)

Table 3.2-2: Land-Use within 1,000 ft. of the Project boundary

Land Use Classification	Area (acres)	Total (%)
Mixed Forest	297	23%
Open Water	247	19%
Barren Land (Rock/Sand/Clay)	140	11%
Deciduous Forest	131	10%
Evergreen Forest	120	10%
Developed, Open Space	75	6%
Pasture/Hay	46	4%
Developed, Low Intensity	44	3%
Shrub/Scrub	44	3%
Woody Wetlands	42	3%
Developed, Medium Intensity	37	3%
Cultivated Crops	23	2%
Grassland/Herbaceous	14	1%
Emergent Herbaceous Wetlands	10	1%
Developed High Intensity	8	1%

(Homer, 2015)



Brookfield

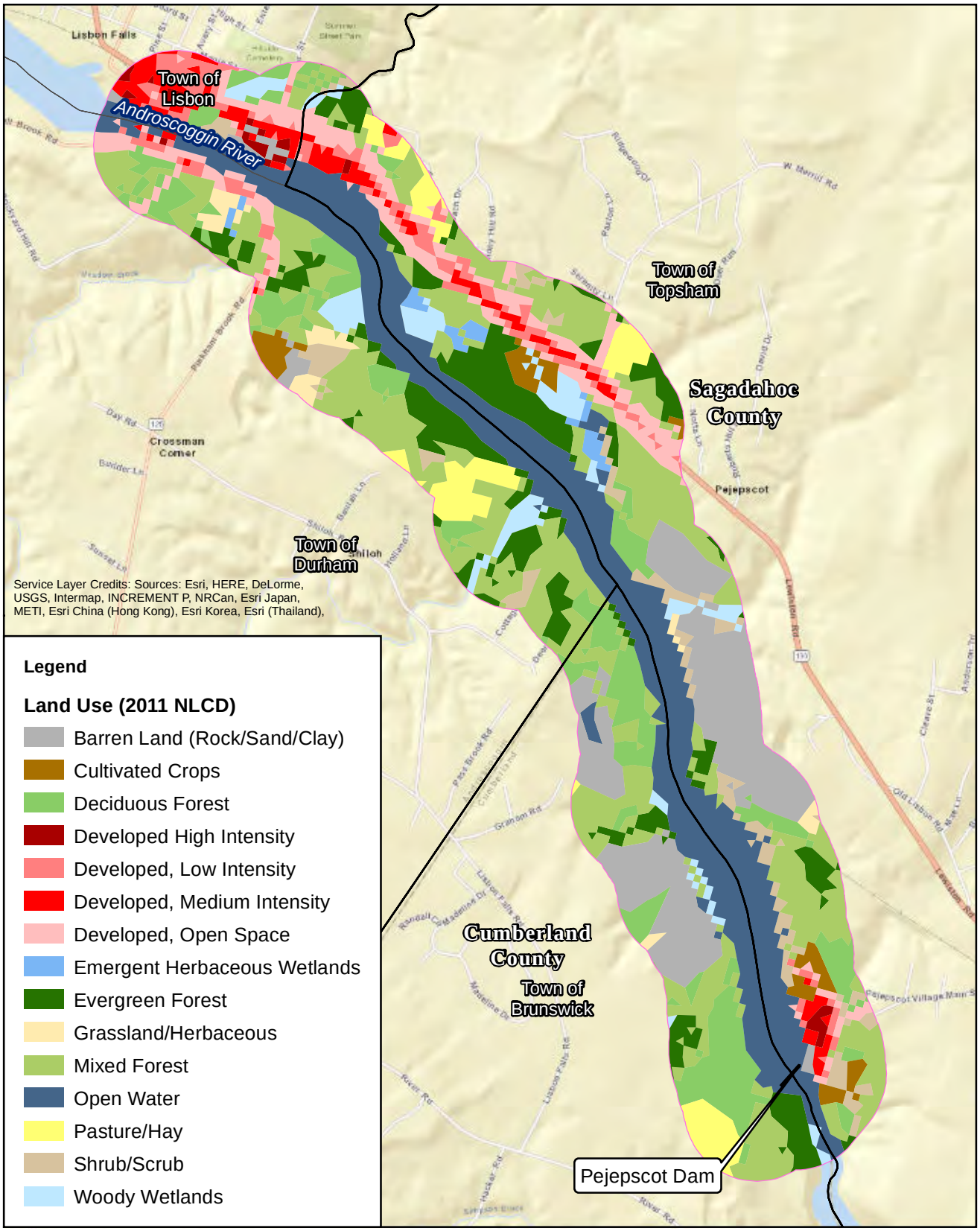
Pre-Application Document
Pejepscot Hydroelectric
Project (FERC No. 4784)

N

0 7.5 15 30 Miles

Figure 3.2-1:
Androscoggin River Watershed
Land-Use Classification
Upstream of the Project

Path: P:\proposals\9059\maps\pejepscot_pad\figure_3_2-1_lu_watershed.mxd



Brookfield

Pre-Application Document
Pejepscot Hydroelectric
Project (FERC No. 4784)

N

0 1,000 2,000 4,000 Feet

Figure 3.2-2:
Land-Use within 1,000 ft.
of the Project boundary

Path: P:\1925\maps\pad\figure_3_2-2_lu.mxd

3.3 Major Water Uses

Historically, the Androscoggin River served as Maine's primary industrial river with industries being developed along the river in towns such as Gorham, NH, Bethel, Rumford, Jay, Topsham and Mechanic Falls, ME (Turkel, 1977). In the early 1800's, mill dams had been constructed in Brunswick, Topsham and Lisbon Falls. By the 1930's Central Maine Power had completed several large hydroelectric dams on the river. Like other rivers in Maine, the Androscoggin River historically had been used for log conveyance of pulp and timber which was used at pulp and lumber mills for processing. The Androscoggin River had some of the largest paper mill companies in the world by the end of the 19th century (McFarlane, 2012), with other industries including lumber and textile mills. Today, there are very few paper mills still operating along the river. 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.

Along the Androscoggin River, there are numerous facilities that hold individual National Pollutant Discharge Elimination System (NPDES) permits allowing them to discharge treated wastewater. In the vicinity of the Project, the Town of Lisbon has a permit to discharge 2.025 million gallons per day (MGD) (3.8 cfs) of secondary treated municipal sanitary wastewater to the Little River, of which the confluence with the Androscoggin River is located in the upper reaches of the Project impoundment. There are no Drinking Water Treatment Plants along the river (EPA, 2016a & 2016b).

In 2015, approximately 62.35 million gallons of Combined Sewer Overflows (CSO) were discharged into the Androscoggin River from the watershed (MDEP, 2016). 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 estimated to be 7,000 cfs, pro-rated from the USGS Gage No. 01059000 Androscoggin River near Auburn, ME (USGS, 2017). The maximum peak flow recorded during the period of record (January 1987 to December 2016), as measured at the USGS Gage No. 01059000 upstream of the Project, was approximately 103,000 cfs, which occurred in April 1987. The lowest annual water year peak flow recorded during that time period was approximately 17,800 cfs, which occurred in March, 1995 (USGS, 2017).

3.4 Basin Dams

The Androscoggin River basin contains over 200 dams according to a combination of data from the NH GRANIT and Maine GIS dams layers. While many of these dams are on tributaries, there are 21 dams on the mainstem of the river below Errol, NH.

The Pejepscot Hydroelectric Project is the second dam upstream on the Androscoggin River, with the Brunswick Hydroelectric Project (FERC No. 2284) approximately 4.7 miles downstream. The Worumbo Hydroelectric Project (FERC No. 3428) is located

approximately 3.4 miles upstream of the Pejepscot Project. Both the Worumbo and Brunswick Projects are operated as run-of-river.

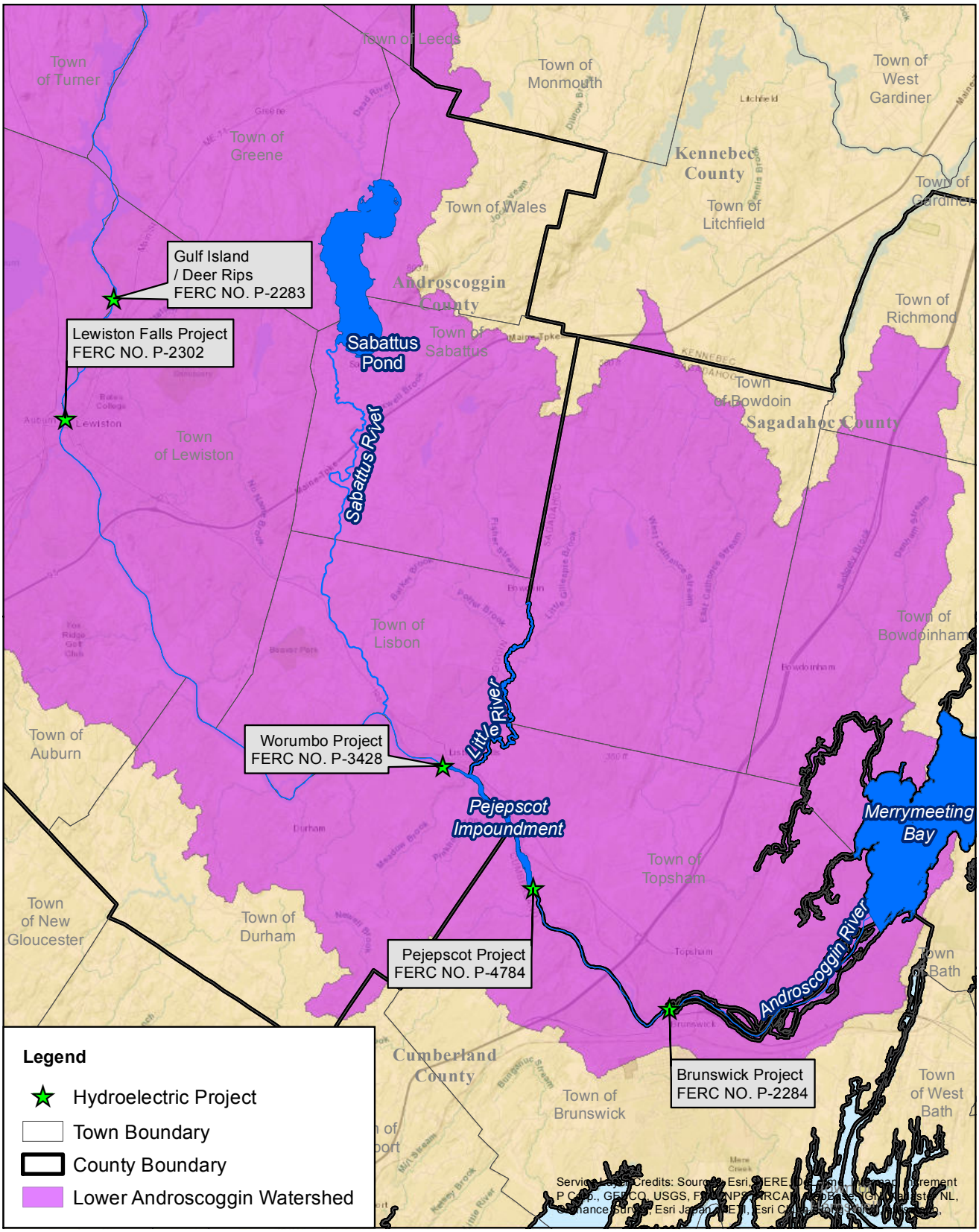
The FERC licensed hydroelectric projects on the mainstem of the Androscoggin River and the headwater storage dams are provided in Table 3.4-1. This table does not include the six developments on the Lewiston Canal System which are part of Lewiston Falls, nor numerous dams and FERC licensed hydropower projects on tributaries to the Androscoggin River. Figure 3.4-1 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 3.4-1: Dams on the Mainstem of the Androscoggin River and the headwaters above Umbagog Lake (Upstream to Downstream)

Project Name	State	FERC No.
Mahaney	ME	4413
Kennebago Falls	ME	4413
Rangeley	ME	N/A
Upper Dam	ME	11834
Middle Dam	ME	11834
Aziscohos	ME	4026
Errol	NH	3133
Pontook	NH	2861
Sawmill	NH	2422
Riverside	NH	2423
J. Brodie Smith	NH	2287
Cross Power	NH	2326
Cascade	NH	2327
Gorham	NH	2311
Gorham (Eversource)	NH	2288
Shelburne	NH	2300
Upper Rumford Falls	ME	2333
Lower Rumford Falls	ME	2333
Riley	ME	2375
Jay	ME	2375
Otis	ME	8277
Livermore Mills	ME	2375
Gulf Island	ME	2283
Deer Rips / Androscoggin No.3	ME	2283
Lewiston Falls	ME	2302
Worumbo	ME	3428
Pejepscot	ME	4784
Brunswick	ME	2284

Notes: 1) Headwater Storage Reservoirs include: Umbagog, Aziscohos, Middle Dam, and Upper Dam.
2) This list does not include the developments on the Lewiston Canal System which are currently part of the Lewiston Falls Project.

Source: (FERC, 2017)



Pre-Application Document
Pejepscot Hydroelectric Project (FERC No. 4784)

Brookfield

N

0 1.5 3 6 Miles

Figure 3.4-1:
Mainstem Hydroelectric Projects and Key Features in the Vicinity of the Project

Path: P:\proposals\9059\maps\pejepscot_pad\figure_3_4-1_features.mxd

3.5 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, 1985). There are 6 minor tributaries that feed directly into the Project impoundment, which have a total drainage area of about 38 sqm. In order of upstream to downstream, these include Meadow Brook, Little River, Pinkham Brook and 3 small (less than 2 miles long) 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 3.1-1.

3.6 Climate

The Androscoggin River basin has mild and humid summers and cold and snowy winters. At Durham, ME, near the Project, July temperatures range from a daily average maximum of 78°F to a daily average minimum of 57°F. January temperatures range from a daily average maximum of 28°F to a daily average minimum of 7°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 22°F to a daily average minimum of -1°F. The basin averages between 40 and 50 inches of precipitation per year, which is, on average, relatively evenly disturbed throughout the year. Much of the precipitation falls as snow in the colder months, with the total average annual snowfall at Durham, ME about 70 inches per season. Annual snowfall in the northern part of the watershed exceeds 120 inches (NOAA, 2017).

3.7 References

ENSR Corporation (ENSR). 2007. Historic Flooding in Major Drainage Basins, Maine. The Maine River Basin Report: Document No.:12092-003-B. October 2007

Environmental Protection Agency (EPA). 2016a. NPDES Permits in New England: Maine Final Individual Permits. Last Updated: 12/13/2016. https://www3.epa.gov/region1/npdes/permits_listing_me.html. Date Accessed: 12/16/16

Environmental Protection Agency (EPA). 2016b. NPDES Permits in New England: New Hampshire Final Individual Permits. Last Updated: 10/6/2016. https://www3.epa.gov/region1/npdes/permits_listing_nh.html. Date Accessed: 12/16/16

Federal Energy Regulatory Commission (FERC). 1996. Final Environmental Impact Statement: Lower Androscoggin River Basin Hydroelectric Projects Maine (FERC 2283-005, 11482-000). July 1996.

Federal Energy Regulatory Commission (FERC). 2017. Complete List of Active Hydropower Licenses. https://www.ferc.gov/industries/hydropower.asp. Date Accessed 4/4/2016

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K. 2015. Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. Photogrammetric Engineering and Remote Sensing, v. 81, no. 5, p. 345-354.

Maine Geographic Information Systems (MEGIS). 1987. Last updated 2004. The information provided in this coverage is a subset of spatial databases developed by NHDES.

Maine Department of Environmental Protection (MDEP). 2015. Volunteer River Monitoring Reports. 2015: Androscoggin River – Friends of Merrymeeting Bay. Online: http://www.maine.gov/dep/water/monitoring/rivers_and_streams/vrmp/reports.html. Date Accessed: 12/20/16

Maine Department of Environmental Protection (MDEP). 2016. Maine Combined Sewer Overflow 2015 Status Report. Document No. DEPLQ0972H-2016. May 2016. Available online: http://www.maine.gov/dep/water/cso/2015_status_report.pdf. Date Accessed: 12/20/2016

McFarlane, Wallace S. 2012. Environmental History, Defining a Nuisance: Pollution, Science and Environmental Politics on Maine's Androscoggin River, 8 March 2012; largest paper-producing companies in the world: Bethel Historical Society, A River's Journey: The Story of the Androscoggin. Online: www.bethelhistorical.org/A_River's_Journey.html, 11 September 2014. Date Accessed: 12/15/16

National Oceanic and Atmospheric Administration (NOAA). 2017. Climate Data Online. Data Tools: 1981-2010 Normals. Retrieved from: https://www.ncdc.noaa.gov/cdo-web/datatools/normals. Date Accessed: 4/4/17

NH GRANIT. 2014 GIS layer. Layers by data category: Utilities and Communication: National Pollutant Discharge Elimination System (NPDES). Retrieved from: http://www.granit.unh.edu/data/downloadfreedata/category/databycategory.html#. Date Accessed: 12/14/16

Turkel, Tux. 1977. "Something Else Important On Nov. 5 Ballot." Lewiston Evening Journal. Vol 117. November 8, 1977. Online: https://news.google.com/newspapers?nid=1913&dat=19771108&id=16VGAAAAIBAJ&sjid=fvMMAAAAIBAJ&pg=5242,1202559. Date Accessed: 12/14/16

U.S. Army Corp of Engineers (USACE). 1987. 1987 Dam Survey. Additional points were added by Maine Department of Environmental Protection (MDEP), Bureau of Land (BL) & Water Quality (WQ) staff for use with BL&WQ projects. Accessed online: http://www.maine.gov/megis/catalog/. Date accessed: 12/12/16

United States Census Bureau (USCB). 2016. Quick Facts: United States. Online: http://www.census.gov/quickfacts/. Date Accessed: 1/12/17

United States Geological Survey (USGS). 1999. Water-Quality Assessment of the New England Coastal Basins in Maine, Massachusetts, New Hampshire, and Rhode Island: Environmental Settings and Implications for water Quality and Aquatic Biota. Available online: https://pubs.usgs.gov/wri/wri984249/. Date Accessed: 12/15/16

United States Geological Survey (USGS). 1986. National Water Summary 1985 – Hydrologic Events and Surface-Water Resources. Water-Supply Paper 2300. United States Government Printing Office. p. 260. Available on Google Reads Online. Date Accessed: 12/19/16

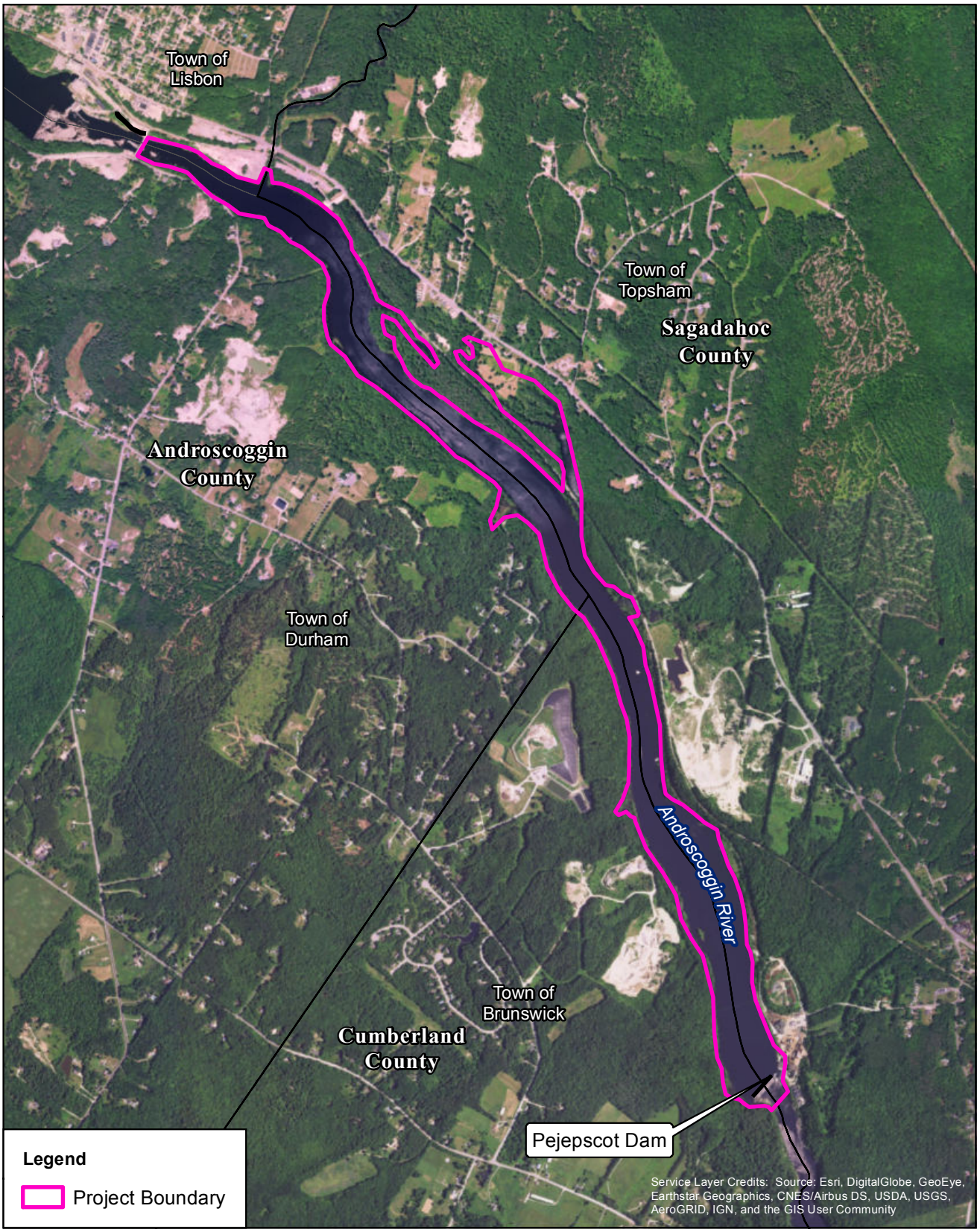
United States Geological Survey (USGS). 2017. National Water Information System: Web Interface. Peak Streamflow for Maine; USGS Gage No. 01059000 Androscoggin River near Auburn, Maine. https://nwis.waterdata.usgs.gov/me/nwis/peak?site_no=01059000&agency_cd=USGS&format=html. Date Accessed: 8/18/2017

4 PROJECT LOCATION, FACILITIES, AND OPERATIONS

4.1 Project Location

The Pejepscot Project is located on the Androscoggin River in the village of Pejepscot and the Town of Topsham, ME about 4 miles upstream of the city of Brunswick, ME. The Project straddles the border between Cumberland and Sagadahoc Counties, and a portion of Androscoggin County. From the Pejepscot Project, the Androscoggin River flows approximately 14 miles to its mouth at Merrymeeting Bay (the head-of-tide is located at the Brunswick Dam downstream of the Project at about RM 9.3). At normal pool elevation (El. 67.5), the impoundment has a surface area of 225 acres, gross storage capacity of 3,278 acre-ft, and approximately 6.6 miles of shoreline. The drainage area at the Project is 3,420 sqm while the average annual inflow to the Project is approximately 7,000 cfs.

The Project boundary follows the contour level of 75.0 ft. above mean sea level, except in the vicinity of the dam and powerhouse and at the upstream limit of the reservoir. The Project boundary extends approximately 3 miles upstream from the Pejepscot Dam to the Route 125 bridge, which is located approximately 0.25 miles downstream of the Worumbo Dam and 0.3 miles upstream of the Little River confluence. The Project boundary terminates approximately 260 feet downstream of the Pejepscot Dam. The Project boundary encompasses a total of approximately 229 acres. Figure 4.1-1 depicts the Project boundary, while Appendix B depicts the original Exhibit G drawings.



Brookfield

Pre-Application Document
Pejepscot Hydroelectric
Project (FERC No. 4784)

N

0 1,000 2,000 4,000 Feet

Figure 4.1-1:
Project Boundary

Path: P:\1925\maps\pad\figure_4_1-1_project_boundary.mxd

4.2 Project Facilities

The Project generally consists of the dam, spillway, fish passage facilities, two powerhouses, a sheet-pile floodwall, and ancillary equipment. The combined FERC authorized rating of the four generating units is 13.88 MW. More detailed descriptions for each of these facilities is provided below and shown in Figure 4.2-1. A summary of pertinent Project information is provided in Table 4.2-1.

Impoundment

The Project impoundment extends approximately 3 miles upstream from the Pejepscot Dam to the confluence with the Little River. At normal full pool elevation (El. 67.5 ft), the impoundment has a surface area of 225 acres, gross storage capacity of 3,278 acre-ft, and approximately 6.6 miles of shoreline. The drainage area at the Project is 3,420 sqm. Because the Project is run-of-river, there is minimal usable available storage behind the dam.

Dam & Spillway

The Pejepscot Dam is a 560-foot-long, 47.5-foot-high, rock- and gravel-filled, timber-crib, overflow structure with a sheet-pile cutoff to bedrock along the upstream side. The cribs are topped with a 5-foot-thick reinforced concrete slab to protect the dam from erosion during periods of high river flow. At the right (west) end of the dam where the abutment rock level is high, there is no cribwork, and the dam consists of a low, mass-concrete section. The dam is abutted on the right by a high bedrock outcrop and on the left (east) by a mass-concrete and stone-masonry pier.

Spillway capacity is provided by operating the gates on the crest of the dam. The crest is equipped with five, 96-foot-long by 3-foot-high, hydraulically operated, bascule gates separated by concrete piers. The gates can be operated automatically or manually. The hydraulic pump units that operate the gates are contained in the mass-concrete pier forming the left abutment of the dam. The crest gate seals are heated to permit operation of the gates during cold weather, including movement when subjected to heavy ice pressure. The Project has a spillway discharge capacity of 95,000 cfs. Overtopping of the dam does not occur until the headwater reaches El. 81, at which point the spillway discharge is approximately 110,000 cfs.

Powerhouses & Intake

The powerhouses at the Project include an original powerhouse that was constructed in 1898, and a newer powerhouse that was constructed from 1985 to 1987. The combined FERC authorized capacity of the four generating units is 13.88 MW. The Project has two separate intake structures, the old powerhouse intake and the new powerhouse intake, both of which are integral with the powerhouses. The original (northerly) powerhouse contains three rehabilitated horizontal Francis units (identified as Nos. 21, 22, and 23) with a combined output capacity of about 1.588 MW. Each of the units has an intake gate for dewatering, which is operated with a rack-and-pinion gear-type hoist. The

tailrace water passage for the three units can be isolated from the downstream tailwater by means of a bulkhead-type gate, which is operated from the new powerhouse intake deck using a mobile crane. The newer powerhouse contains a vertical-shaft, low speed, adjustable-blade, propeller type (Kaplan) turbine-generator unit (identified as Unit No. 1) rated at 12.3 MW, with four blades and 18 feet in diameter; it rotates at 82 revolutions per minute (rpm). The maximum flow through the turbine is 7,500 cfs. The Kaplan unit intake has 1.5-inch bar spacing at the top of the trashrack and 2.5-inch bar spacing at the bottom. The three Francis units have 1.5-inch bar spacing on the trashrack. The Project discharges into a short tailrace that meets the Androscoggin River approximately 25 feet downstream of the powerhouse.

Fish Passage Facilities

Migratory fish restoration efforts on the Androscoggin River have historically focused on alewife (*Alosa pseudoharengus*) and American shad (*A. sapidissima*). The Project has both upstream and downstream fish passage facilities.

Upstream Fish Passage Facilities

The upstream fish passage facility is a vertical lift (elevator) that lifts migratory fish in a hopper about 30 feet vertically from near the powerhouse tailrace to the impoundment level behind the dam. The lift hopper is about 20 feet long and 7 feet wide with a sloping bottom that assists in removal of the fish from the hopper. The inlet to the hopper is a V-trap about 8 inches wide by 8 feet high opening. In front of the entry gate there are four attraction pumps under a grating that create an additional flow up to 160 cfs through the entry channel to attract the fish to the lift. These pumps can be sequenced to change the volume of water passing through the entry channel, depending on the flow out of the powerhouse tailrace. The lift basket discharges the fish into a metal channel about six feet wide and eight feet high. The channel is approximately 110 feet long from the lift hopper to the gate at the dam. Along the channel is a viewing window to observe the fish along with a crowding panel that moves the fish closer to the window for viewing. There is a continuous flow of about 30 cfs from the impoundment to the lift basket to attract the fish to the impoundment.

The upstream fish passage is operated annually from April 15th to November 15th. The lift is operated automatically to lift the fish hopper every two hours beginning at 8 a.m. for a total of five lifts per day. The four attraction pumps are operated by station technicians; the number of pumps operating is determined based on the flow coming through the turbine and out the tailrace. A preset weir in the channel provides an attraction flow through the channel and hopper. The channel from the hopper to the impoundment is opened when the seasonal operation is started for passage of anadromous fish. The gates in the channel that allow fish to be counted through the observation window are left open unless they are being used for counting. Fish at the plant are not actively counted and, historically, the counting facilities have only been used for efficiency tests.

Downstream Fish Passage Facilities

The downstream fish passage facilities consist of two entry weirs, one on either side of the Unit 1 turbine intake. From each weir, an outlet pipe transports the fish in water down to the tailwater. The weir gates are four feet wide and are part of an inlet box with the outlet pipe located on the side opposite the weir. The right-side weir has a 30-inch diameter transport pipe and the left-side weir has a 24-inch diameter transport pipe. Both pipes have a free discharge to the water below the dam.

To ensure downstream passage safety for Atlantic salmon smolts and post-spawned adults (i.e., kelts) migrating in the Androscoggin River system, the downstream fishway is currently operated from April 1 to December 31, as river conditions allow.

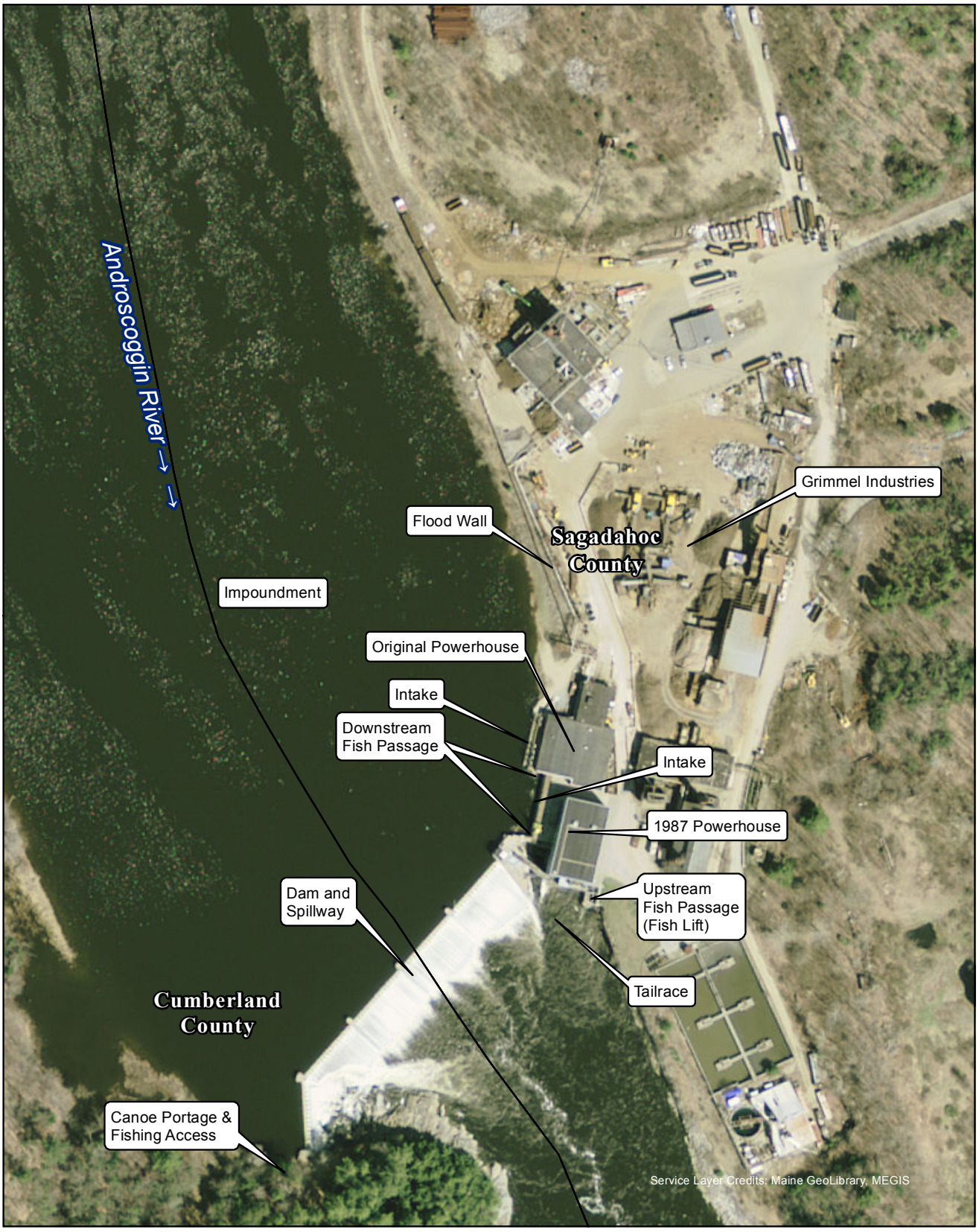
Switchyard/Transmission Lines

Main and secondary substations are located to the north and south of the powerhouse, respectively. In addition, the Project works include 900-foot-long, 15-kV cable connections to the substations. Volume 2 contains the one-line diagram for the Project.

Volume 2 contains the project drawings for the Pejepscot Project. The figures included in Volume 2 depict the dam, powerhouse, and the mechanical and electrical equipment contained within it. Volume 2 is considered CEII and is not available to the public except in accordance with the Commission's regulations at 18 CFR § 388.113.

Table 4.2-1: Project Description

General Information Summary	
Owner	Topsham Hydro Partners, L.P.
FERC Project No.	4784
Current License Term	September 1, 1982 - August 31, 2022
Counties	Project: Sagadahoc, ME Impoundment: Sagadahoc, Cumberland, Androscoggin Counties, ME
General	
Nearby towns	Topsham, Brunswick, Durham, Lisbon
River	Androscoggin River
Drainage area	3,420 sqm at the Project
Normal full pond elevation	67.5 ft.
Impoundment length	~3 miles
Gross storage	3,278 acre-ft
Surface area at normal full pond	225 acres
Average annual inflow at Project	7,000 cfs
Structures	
Dam	Pejepscot
Construction	Timber Crib and Concrete gravity
Total length	560 ft.
Spillway length	480 ft.
Powerhouses	Original (1898) New (1987)
Turbine/generator units	4 Units
Turbine type	Unit 1: vertical Kaplan Units 21/22/23: horizontal Francis
Generator capacities	Unit 1: 13,000 KVA at 0.95 power factor (12,300 kW) Unit 21: 490 kW Unit 22: 545 kW Unit 23: 545 kW
Total authorized installed capacity	13.88 MW



Brookfield

Pre-Application Document
Pejepscot Hydroelectric
Project (FERC No. 4784)

N

0 100 200 400 Feet

Figure 4.2-1:
Project Facilities

Path: P:\1925\maps\pad\figure_4_2-1_facilities.mxd

4.3 Project Operations

The Pejepscot Project is operated as a run-of-river facility. The main turbine generator unit (Unit 1) is operated on pond level control. Unit 1 controls the turbine wicket gates to maintain a preset pond level which is normally at about El. 67.2 or 0.3 feet below the top of the spill gates. When Unit 1 nears its maximum flow capacity of 7,550 cfs, one or more of the three small units (Units 21, 22 and 23) is manually started and set at its best efficiency point. The small units are mainly operated during high spring runoff and after large storm events that increase river flow.

4.3.1 Normal Operation

The Project has a maximum hydraulic capacity of 7,550 cfs through the units. The minimum flow of 1,710 cfs is conveyed to the Project tailrace as flow through the powerhouse or as spill over the dam or as a combination. Inflows in excess of the hydraulic capacity of the units are passed at the dam spillway. A summary of pro-rated daily average flows at the Project by month from January 1987 to December 2016 is presented in Table 5.2.1.2-1 (Section 5.2.1). Inflows to the Project exceed the maximum capacity of the units approximately 28 percent of the time, on average.

4.3.2 High Flow Operations

When the pond level reaches El. 69.0 (1.5 feet above the spill gates), the gates begin to lower starting with Gate 1, closest to the powerhouse. The gates operate on pond level control and as flow increases they maintain the pond level of El. 69.0 until all five gates are open. When the flow starts decreasing and the pond level drops to El. 68.0 the gates start to close to maintain a level above El. 68.0. When all five gates are closed, the pond is again on turbine pond level control until the pond level exceeds El. 69.0.

4.3.3 Minimum Flow Requirement

The Project is required to discharge a continuous minimum flow of 1,710 cfs, as measured immediately downstream from the Project powerhouse, or inflow to the impoundment, whichever is less, minus process water (approximately 5 MGD or 9.3 cfs) and 100 cfs for pond level control. Flows may be modified temporarily if required by operating emergencies beyond the Licensee's control, or for short periods upon mutual agreement between Topsham Hydro, Maine Department of Marine Resources (MDMR), and Maine Department of Inland Fisheries and Wildlife (MDIFW).

4.4 Other Project Information

4.4.1 Current License Requirements

On September 16, 1982, the Commission issued a license for the Project, effective September 1, 1982, for a period of 40-years. The current license is set to expire on August 31, 2022. 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 C. 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. In addition, several License Amendments and Orders have been issued since the original Order Issuing License (Major) in 1982. These amendments are summarized in Table 4.4.1-1.

Table 4.4.1-1: License Amendments and Applications

Date Issued	FERC Order
August 7, 1984	Order Amending License for operating the Pejepscot Project. (FERC, 1984)
June 21, 1985	Order Amending License and setting minimum flows. (FERC, 1985)
October 26, 1987	Order Approving Topsham Hydro Partners Ltd Partnership transfer of license from Androscoggin Water Power Co. (FERC, 1987)
November 18, 1993	Order Amending License: To amend the description of the Project to match as-built conditions previously submitted for an Exhibit A revision (FERC, 1993).
May 10, 1995	Order Approving Revised Exhibit F Drawings: To approve Exhibit F drawings filed on December 21, 1994 and eliminating superseded drawings (FERC, 1995).
August 19, 1997	Order Approving Modifications to the Downstream Fish Passage Facility and Operating Plan: Approval of the modifications to the downstream fish passage facility and operating plan filed on April 28, 1997 (FERC, 1997).
May 20, 2004	Order Approving Partial Transfers of License: Substituting Chrysler Financial Company L.L.C., for Chrysler Financial Corporation, and DaimlerChrysler Services North America LLC for Chrysler Financial Company L.L.C. (FERC, 2004).
February 24, 2005	Order Approving Partial Transfer of License: Substituting UtilCo SaleCo, LLC to Teton Power Funding, LLC (FERC, 2005).
April 11, 2006	Order Approving Partial Transfer of License: Substituting DaimlerChrysler Financial Services Americas LLC for DaimlerChrysler Services North America LLC (FERC, 2006).
June 12, 2007	Order Approving Partial Transfer of License: The transfer of DaimlerChrysler Financial Americas LLC, Teton Power Funding, LLC, and Topsham Hydro Partners Limited Partnership to Topsham Hydroelectric Generating Facility Trust No. 1 (FERC, 2007).
April 29, 2011	Order Approving Partial Transfer of License: Substituting Brown Bear Power, LLC for Teton Power Funding, LLC (FERC, 2011a).
September 7, 2011	Order Approving Partial Transfer of License: Substituting Topsham Hydro Partners Limited Partnership for Brown Bear Power, LLC and Topsham Hydroelectric Generating Facility Trust No. 1 (FERC, 2011b).

4.4.2 Compliance History

Topsham Hydro has operated the Project in accordance with the terms and conditions of the license. Over the term of the license, the Project has been subject to FERC's standard operational and environmental inspections. Following these inspections, Topsham Hydro has implemented and completed all necessary actions to address FERC's comments and recommendations, if any comments were received.

4.4.3 Public Safety

The Pejepscot Project is classified as a significant hazard dam. A Potential Failure Mode Analysis was most recently updated on September 1, 2016. The Dam Safety Surveillance and Monitoring Program (DSSMP) defines the appropriate monitoring for the water retaining project works; the DSSMP for the Project was most recently filed with the FERC in December 2016. Further, the Project's Fifth Part 12 Independent Consultant Dam Safety Inspection Report was submitted to the Commission on November 30, 2015 as required by Section 12.39 of the Commission's regulations.

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. Topsham Hydro 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 October 17, 2016. Topsham Hydro maintains fences, handrails, and warning signs to protect the public from the hazards of project structures and operations and seasonally installs a boat barrier before May 15 and removes the barrier by October 15 annually as flow conditions allow.

4.4.4 Summary of Project Generation and Flow Records

Table 4.4.4-1 provides the annual gross and average monthly gross generated megawatt hours (MWh) at the Project for the past ten years (2006-2016). As observed in the table, annual gross generation ranged from 61,347 to 90,715 MWh in 2016 and 2008, respectively with a mean annual generation of 77,558 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 of the Project is 7.976 (summer) and 7.941 (winter).

Table 4.4.4-1: Annual and Monthly Gross Generation (MWh) for the Project (2006 - 2016)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2006	8,544	7,616	7,442	8,469	8,098	8,432	6,824	5,594	4,162	6,415	8,268	8,368	88,232
2007	7,453	5,288	7,628	7,587	8,790	6,491	4,296	3,246	2,618	5,148	7,817	6,771	73,133
2008	7,379	7,213	9,041	7,272	7,739	8,211	7,276	7,841	6,047	6,692	7,496	8,508	90,715
2009	7,048	5,736	8,351	8,123	8,606	6,809	7,089	6,874	3,610	6,182	6,966	8,246	83,641
2010	7,833	6,376	8,513	8,412	7,559	5,269	3,792	3,298	2,858	7,624	7,900	7,668	77,101
2011	7,160	5,556	8,232	7,443	8,675	6,693	3,882	3,469	6,316	8,439	7,411	7,846	81,123
2012	6,664	5,282	7,909	5,985	8,704	7,819	4,821	4,775	4,402	6,414	6,636	7,191	76,603
2013	6,786	6,375	8,196	9,141	7,915	8,488	8,164	5,962	5,756	4,164	4,764	5,865	81,574
2014	7,492	5,522	6,084	7,486	9,447	7,400	7,292	6,610	3,023	4,993	5,261	6,660	77,270
2015	4,958	5,402	5,556	7,752	6,565	8,170	5,455	0	5,776	5,295	4,948	7,457	67,333
2016	6,811	7,388	8,385	8,658	7,101	3,397	3,158	1,972	1,773	2,401	4,848	5,456	61,347
Mean	7,046	6,104	7,685	7,803	8,068	6,814	5,383	4,590	3,921	5,534	6,439	7,209	77,558

4.4.5 Current Net Investment

The current net investment for the Project will be provided in the Final License Application.

4.4.6 Proposed New Facilities and/or Changes in Project Operation

At this time, Topsham Hydro is not proposing to construct new facilities or to alter Project operations as part of this relicensing.

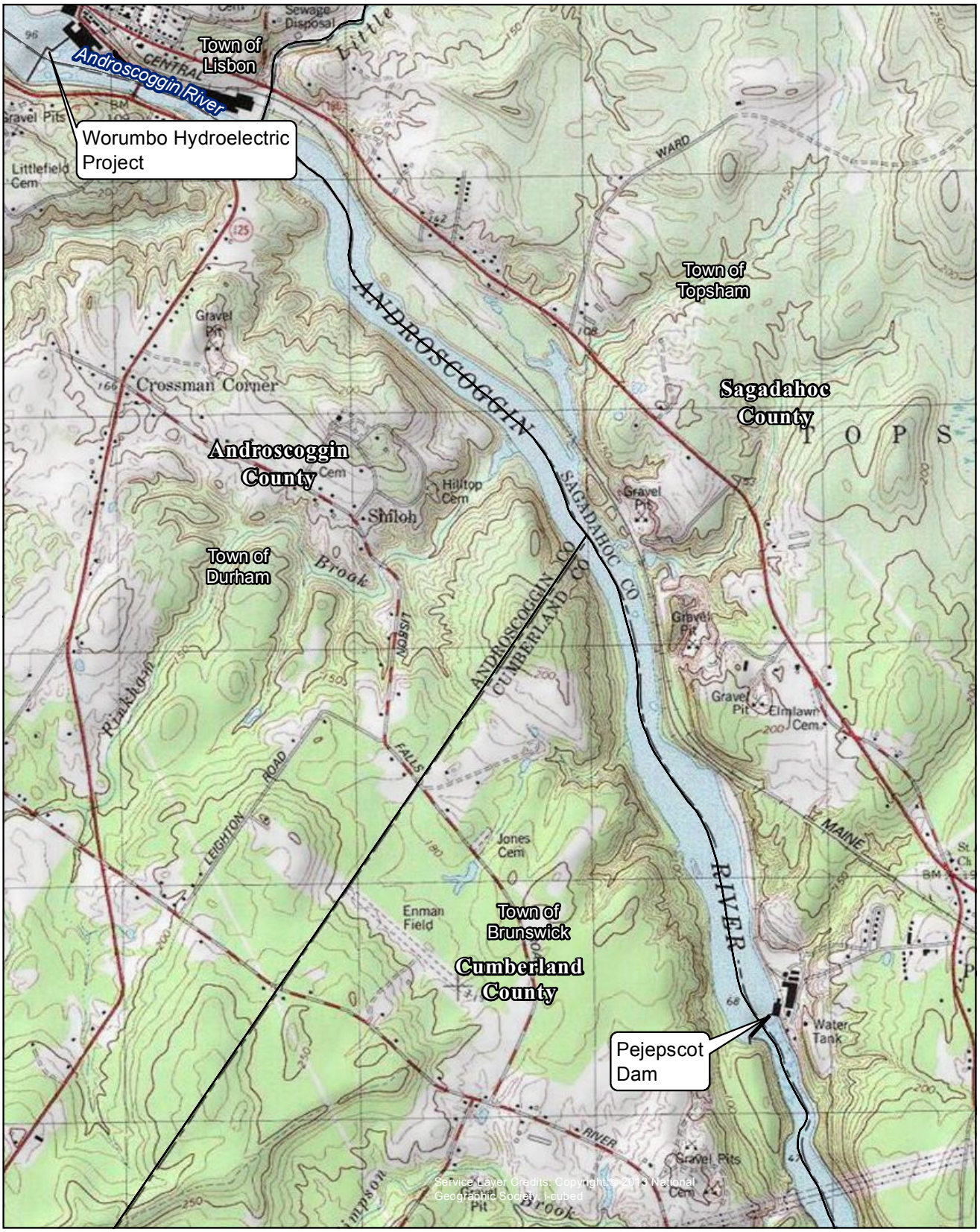
5 DESCRIPTION OF EXISTING ENVIRONMENT AND POTENTIAL EFFECTS ON RESOURCES (18 CFR §5.6 (D)(3))

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

Although the Androscoggin River in the vicinity of the Project is located in the Seaboard Lowlands, the topography of the river basin varies greatly from its headwaters at Lake Umbagog (El. 1250) to the Project (El. 67.5) before continuing to the river mouth at Merrymeeting Bay at sea level. Consistent with the characteristics of the Seaboard Lowlands, elevations surrounding the Pejepscot Impoundment typically remain below El. 200 and decrease gradually to the impoundment shoreline (normal pool elevation 67.5 ft). The general topography of the Androscoggin River watershed in the vicinity of the Project is shown in Figure 5.1.1-1.



Brookfield

Pre-Application Document
Pejepscot Hydroelectric Project (FERC No. 4784)

N

0 1,000 2,000 4,000 Feet

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

Path: P:\1925\maps\pad\figure_5_1_1-1_topology.mxd

5.1.2 Geology

5.1.2.1 Bedrock Geology

The bedrock geology found at the Project and surrounding area consists of the Silurian-Ordovician Vassalboro Formation. The geologic age of the formation ranges from Silurian (443 million years old) to Ordovician (488 million years old). The Vassalboro formation is usually made up of sandstone, is massive in size, and bluish-gray in color. It is locally quartzite with shaly layers that have been transformed to pyritiferous mica schists and contains numerous calcareous beds. The lithologic constituents include sandstone (major), limestone (minor), and quartzite and schist (incidental) (USGS, 2016).

5.1.2.2 Surficial Geology

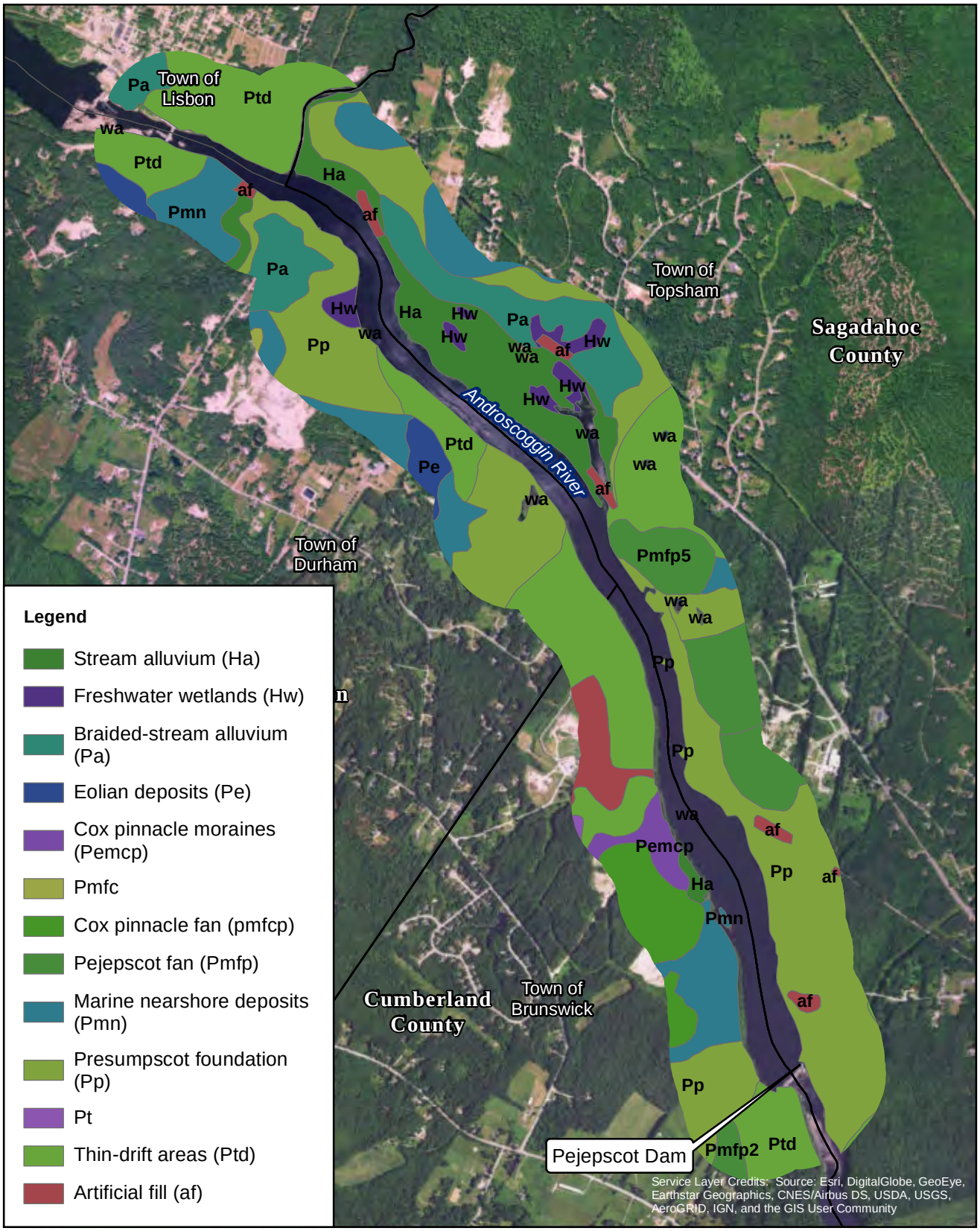
The surficial characteristics observed near the Project Area are dominated by the Presumpscot foundation, thin-drift areas, and Marine nearshore deposits, which collectively account for 54% of the total area analyzed. The remaining 46% is composed of a variety of surficial classifications. Summary statistics 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.

- Presumpscot foundation (Pp): 32%
- Thin-drift areas (Ptd): 23%
- Marine nearshore deposits (Pmn): 10%
- Stream alluvium (Ha): 8%
- Braided-stream alluvium (Pa): 8%
- Pejepscot fan (Pmfp): 7%
- Cox pinnacle fan (pmfcp): 4%
- Artificial fill (af): 3%
- Freshwater wetlands (Hw): 2%
- Eolian deposits (Pe): 2%
- Cox pinnacle moraines (Pemcp): 1%

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.

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

Marine nearshore deposits: Marine nearshore deposits are composed of Pleistocene gravel, mud and sand deposits resulting from wave activity in nearshore or shallow-marine environments. It is unrelated to beach morphology (MGS, 1997).



Brookfield

Pre-Application Document
Pejepscot Hydroelectric Project (FERC No. 4784)

N

0 1,000 2,000 4,000 Feet

Figure 5.1.2.2-1:
Surficial Geology in the Vicinity of the Project

Path: P:\1925\maps\pad\figure_5_1_2_2-1_surficial.mxd

5.1.3 Soils

Adams loamy sand, 0 to 30 percent slopes, is the dominant soil type found in the Project Area. Other prominent soil types found in this area include: Hartland very fine sandy loam; Hinckley gravelly sandy loam; Suffield silt loam; and Windsor loamy sand. Collectively, these five soil types account for 78.5% of the area analyzed. The remaining 21.5% is comprised of a combination of 21 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.

- Adams loamy sand, 0 to 30 percent slopes (AaB-AaD): 47%
- Hartland very fine sandy loam, 2 to 25 percent slopes; eroded (HfB, HfC2, HfD2): 11%
- Hinckley gravelly sandy loam, 0 to 25 percent slopes (HkB, C, D): 8%
- Suffield silt loam, 8 to 15 percent and 25 to 45 percent slopes, eroded (SuC2, SuE2): 6%
- Windsor loamy sand, 0 to 8 percent and 15 to 35 percent slopes (WmB & D): 6.5%

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).

Hartland: The Hartland series slopes between 2 and 25 percent within the vicinity of the Project but may slope up to 50 percent elsewhere. It consists of coarse to silty mix of well drained soils that can be found very deep in glacial lake plains and terraces. The upper layer ranges in thickness from 14 to 40 inches and has a depth to bedrock greater than 60 inches (NRCS, 2016).

Hinckley: The Hinckley series slopes between 0 and 25 percent within the vicinity of the Project but may slope up to 60 percent elsewhere. It consists of mixed sandy to skeletal sand excessively drained soils that were formed very deep in glaciofluvial materials. They can be found on outwash deltas, outwash planes, outwash terraces, kames, kame terraces and eskers. The upper layer ranges in thickness from 12 to 34 inches (NRCS, 2016). The depth to bedrock is over 10 inches (USDA et. al, 1974).

Suffield: The Suffield series are gently sloping to very steep soils on tops and sides of ridges in dissected marine and lacustrine plains. Slope gradients are commonly 8 to 20 percent, but they may range from 3 to 45 percent or more on ridge sides and escarpment margins. The soils are formed in marine or lacustrine sediments consisting of a silt loam mantle over silty clay loam or silty clay materials (NRCS, 2016).

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, 2016). Depth to bedrock is 5 feet or more (USDA et. al, 1974).

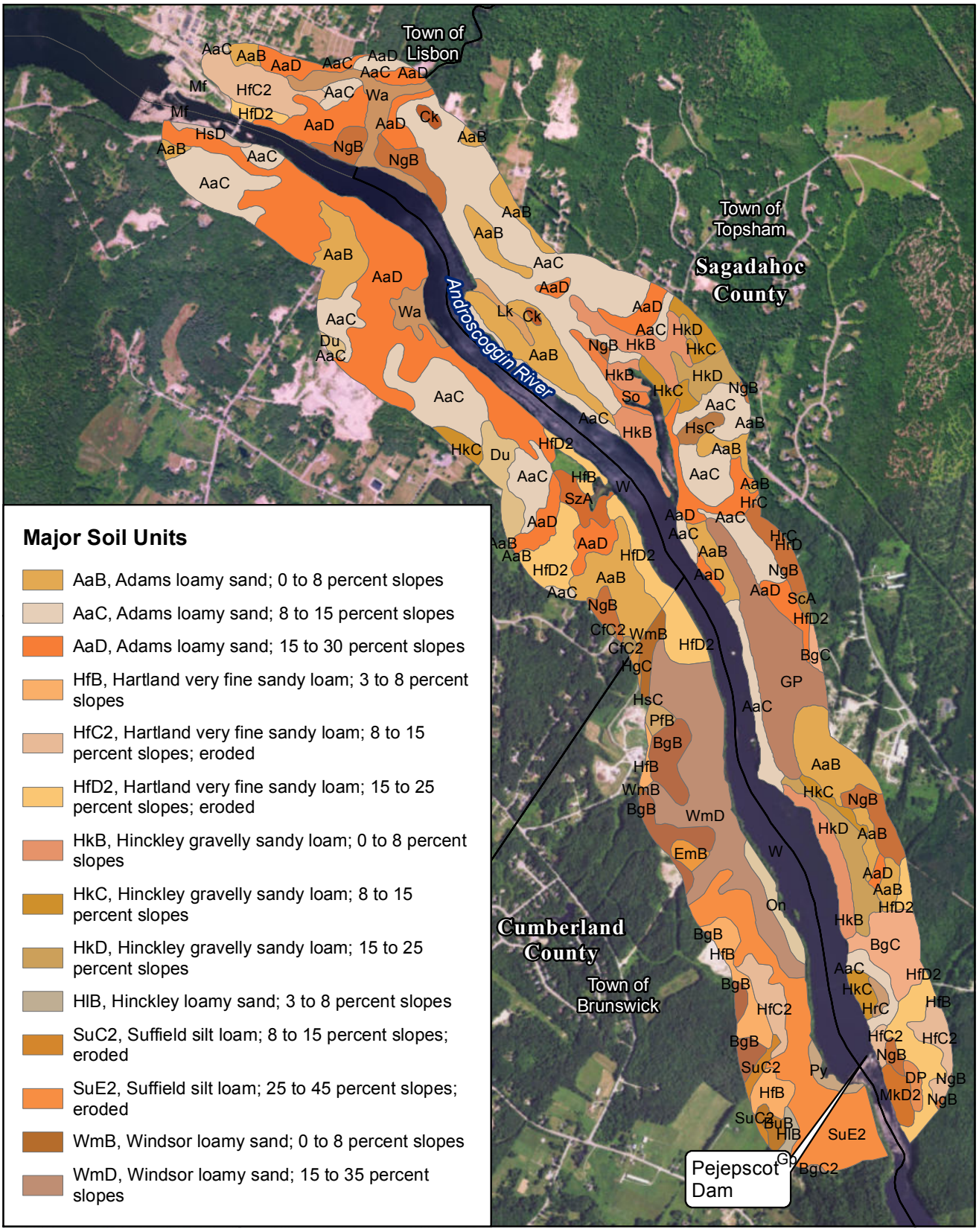
Soil Erodibility

Erosion factors for the soils identified above were gathered from the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS, 2017). 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 0.69, with the higher the K factor value typically indicating a higher susceptibility to erosion (NRCS, 2017). **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 Adams series, the most common soil type found in the Project Area, was found to have the lowest erodibility, while the Hartland and Suffield 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
Adams	0.10
Hartland	0.32-0.37
Hinckley	0.17
Suffield	0.28-0.32
Windsor	0.15

Source: NRCS, 2017



Major Soil Units

- AaB, Adams loamy sand; 0 to 8 percent slopes
- AaC, Adams loamy sand; 8 to 15 percent slopes
- AaD, Adams loamy sand; 15 to 30 percent slopes
- HfB, Hartland very fine sandy loam; 3 to 8 percent slopes
- HfC2, Hartland very fine sandy loam; 8 to 15 percent slopes; eroded
- HfD2, Hartland very fine sandy loam; 15 to 25 percent slopes; eroded
- HkB, Hinckley gravelly sandy loam; 0 to 8 percent slopes
- HkC, Hinckley gravelly sandy loam; 8 to 15 percent slopes
- HkD, Hinckley gravelly sandy loam; 15 to 25 percent slopes
- HlB, Hinckley loamy sand; 3 to 8 percent slopes
- SuC2, Suffield silt loam; 8 to 15 percent slopes; eroded
- SuE2, Suffield silt loam; 25 to 45 percent slopes; eroded
- WmB, Windsor loamy sand; 0 to 8 percent slopes
- WmD, Windsor loamy sand; 15 to 35 percent slopes

Brookfield

Pre-Application Document
Pejepscot Hydroelectric
Project (FERC No. 4784)

N

0 1,000 2,000 4,000 Feet

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

Path: P:\1925\maps\pad\figure_5_1_3-1_soils.mxd

5.1.4 Impoundment Shoreline and Streambanks

The Project impoundment extends approximately 3 miles upstream of the Pejepscot Dam and includes approximately 6.6 miles of shoreline. In general, the shoreline is mostly forested with a mixture of evergreen and deciduous trees; however, shoreline characteristics, including sediment composition, topography, and vegetative cover, tend to vary. Shoreline soils found in the upper portion of the impoundment are dominated by the Adams series, which has a low erodibility factor. Shoreline soils found throughout the middle and lower portions of the impoundment are a combination of the Adams, Hartland, Hinckley, Windsor, and Suffield series, which have low to moderate erodibility factors (Table 5.1.3-1). In general, erosion is not a concern along the impoundment.

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

5.1.5 References

Flanagan, S. M., Nielsen, M.G., Robinson, K.W., and Coles, J.F. 1999. Water-Quality Assessment of the New England Coastal Basin in Maine, Massachusetts, New Hampshire, and Rhode Island: Environmental Settings and Implications for Water Quality and Aquatic Biota. U.S. Geological Survey. 1999.

Maine Geological Survey (MGS). 1997. Surficial geology of the Lisbon Falls South Quadrangle, Maine. Open File Map 97-49: Lisbon-Falls-South. Online: https://www1.maine.gov/dacf/mgs/pubs/online/surficial/97-64-lisbon-falls-south-surficial.pdf. Date accessed: 12/12/16

Maine Geological Survey (MGS). 2000. A General Introduction to the Presumpscot Formation Maine's "Blue Clay." Geological Site of the Month. October 2000. Obtained online: https://www1.maine.gov/dacf/mgs/explore/surficial/facts/oct00.pdf. Date Accessed: 12/20/16

Natural Resources Conservation Service (NRCS). 2016. NRCS Official Soil Series Description: Search. Online: https://soilseries.sc.egov.usda.gov/osdname.aspx. Date Accessed: 12/21/16.

Natural Resources Conservation Service (NRCS). 2017. Web Soil Survey. [Online] URL: https://websoilsurvey.nrcs.usda.gov/app/ [Accessed February 15, 2017].

United States Department of Agriculture (USDA) in cooperation with Maine Agricultural Experiment Station. 1974. Soil Survey: Cumberland County, Maine. Issued August 1974. Online: https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/maine/cumberlandME1974/cumberland.pdf. Date Accessed: 12/21/16.

United States Geological Society (USGS). 2016. Mineral Resources On-Line Spatial Data: Silurian-Ordovician Vassalboro Formation. Online: https://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=MESOv%3B0. Date Accessed: 12/21/16

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

5.2.1 Water Quantity

The Androscoggin River flows about 169 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 and hydraulics of the Pejepscot Project including its drainage area, flow statistics, and operations.

5.2.1.1 Drainage Area

The Pejepscot Project has a reservoir of approximately 225 acres at the full pond elevation of 67.5 feet. The drainage area of the Project is approximately 3,420 sqm. The normal tailwater elevation is about 43.7 feet. While the Project has a gross storage capacity of 3,278 acres at the full pond elevation, the Project has negligible usable storage capacity as a run-of-river Project.

5.2.1.2 Streamflow, Gage Data, and Flow Statistics

The vast majority of the inflow to the Pejepscot impoundment is provided by the Worumbo Project approximately 3.4 miles upstream, which has a drainage area of about 3,382 sqm. Between the Worumbo and Pejepscot Dams, inflow is also provided by the Little River, Meadow and Pinkham Brooks as well as several smaller streams.

The U.S. Geological Survey (USGS) operates a streamflow gaging station (No. 01059000 Androscoggin River near Auburn, ME) approximately 17 miles upstream of the Pejepscot 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[1]. The period of January 1987 – December 2016 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 7,000 cfs. The peak streamflow at the impoundment during this period was approximately 108,000 cfs on April 02, 1987. The peak streamflow for the period of record at the USGS gage is about 141,500 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.

[1] The proration factor is 1.05 as a result of the drainage area of Pejepscot Dam (3,420 sqm) divided by the drainage area of the gage (3,263 sqm).

Table 5.2.1.2-1: Daily Average Streamflow (cfs) at Pejepscot Dam January 1987 – December 2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min	1,667	1,782	1,897	2,861	1,782	1,708	1,342	1,331	1,321	1,289	1,646	1,604
Max	36,160	24,107	41,401	104,392	64,878	61,210	30,919	40,667	47,899	40,457	42,449	51,043
Median	4,732	4,612	6,582	12,787	8,626	5,366	3,417	2,977	2,819	3,868	5,932	5,534
Average	5,526	5,000	8,062	16,251	10,458	7,106	4,759	3,948	3,434	5,697	7,282	6,910

5.2.1.3 Reservoir Bathymetry and Downstream Hydraulic Gradient

There is no readily available information to describe the bathymetry of the impoundment with any specificity. Topsham Hydro plans to take cross sections of the river sufficient to characterize the impoundment.

The river immediately downstream of the dam is approximately 400 feet wide, but quickly narrows downstream to 250-300 feet wide, and is constrained by steep banks. Most of the right bank in the vicinity of the dam is bounded by steep bedrock ledges, and the first ~360 feet of the left bank downstream of the powerhouse consists of bedrock topped with nearly vertical constructed rock walls or concrete walls. Approximately 4.7 miles downstream of the Project is the Brunswick Project, which is owned by Brookfield White Pine Hydro. Depending on the river flow and the headpond elevation of the Brunswick Project, backwater from the Brunswick Project can affect the area downstream of the Pejepscot Project. However, under low flow conditions, there is a shallow riffle area downstream of the Project.

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. As discussed in Section 4.3, the Kaplan unit is operated on pond level control and controls the turbine wicket gates to maintain a normal pond elevation. The Francis units are operated when the river flow is near or above the capacity of the Kaplan, typically during large flow events or during maintenance of the Kaplan (NMFS, 2012). The required minimum flow is 1,710 cfs, or inflow, whichever is less (FERC, 2016). There are no currently documented withdrawals of water within the impoundment.

5.2.1.5 Existing Water Rights

Topsham Hydro holds all of 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 headpond operations or by generation releases.

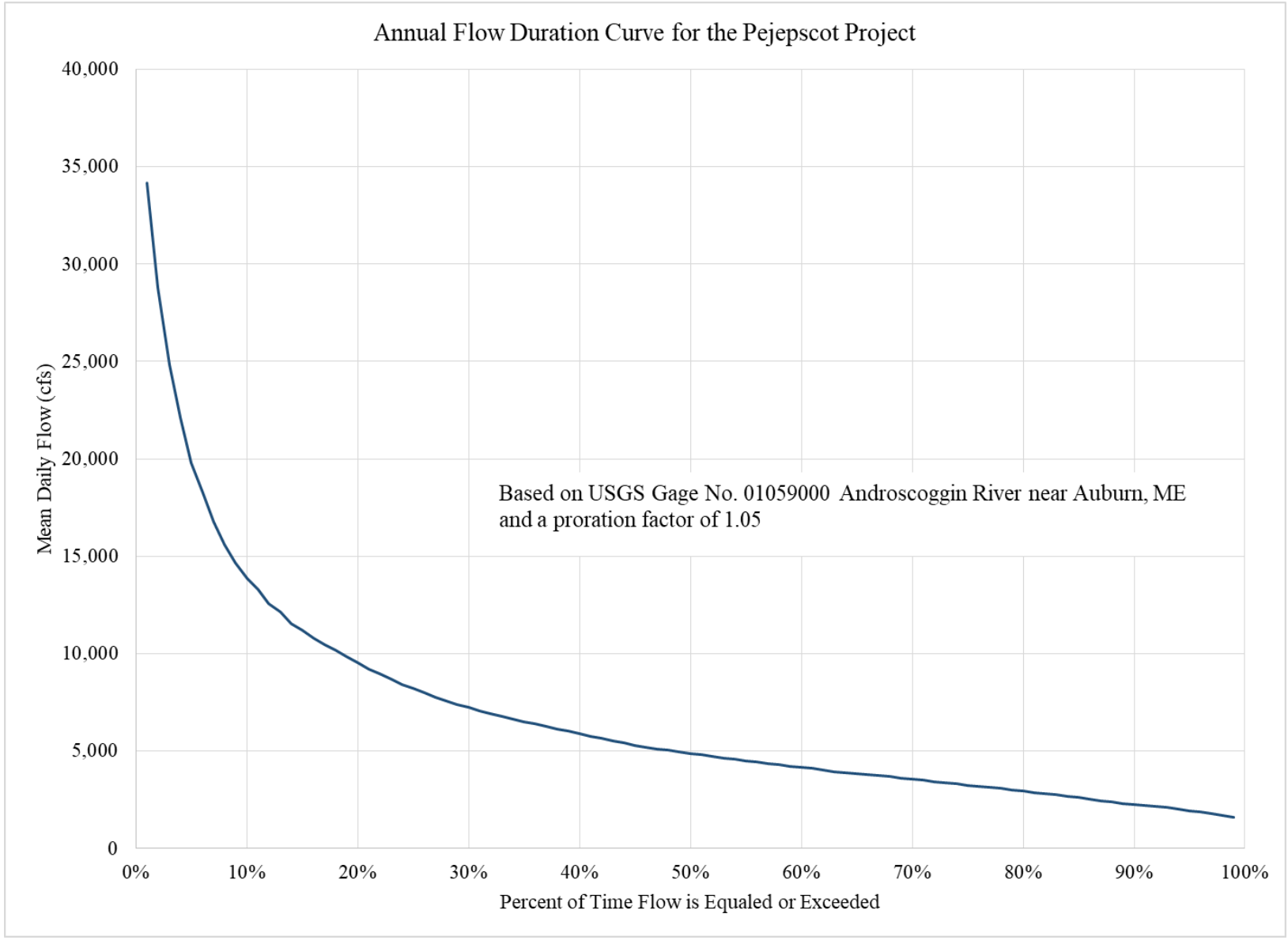


Figure 5.2.1.2-1: Annual Flow Duration Curve (1987-2016)

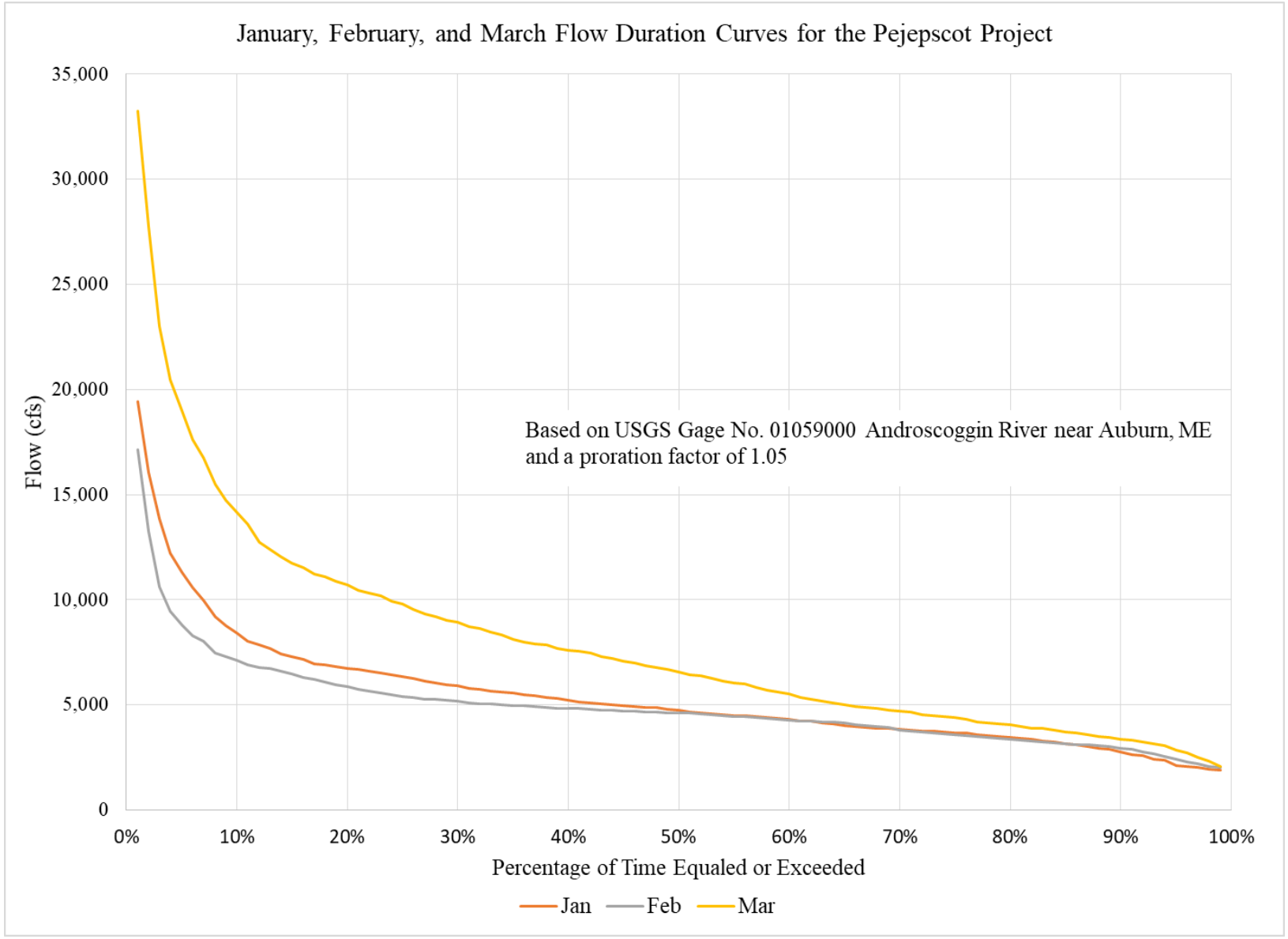


Figure 5.2.1.2-2: January, February, and March Flow Duration Curves (1987-2016)

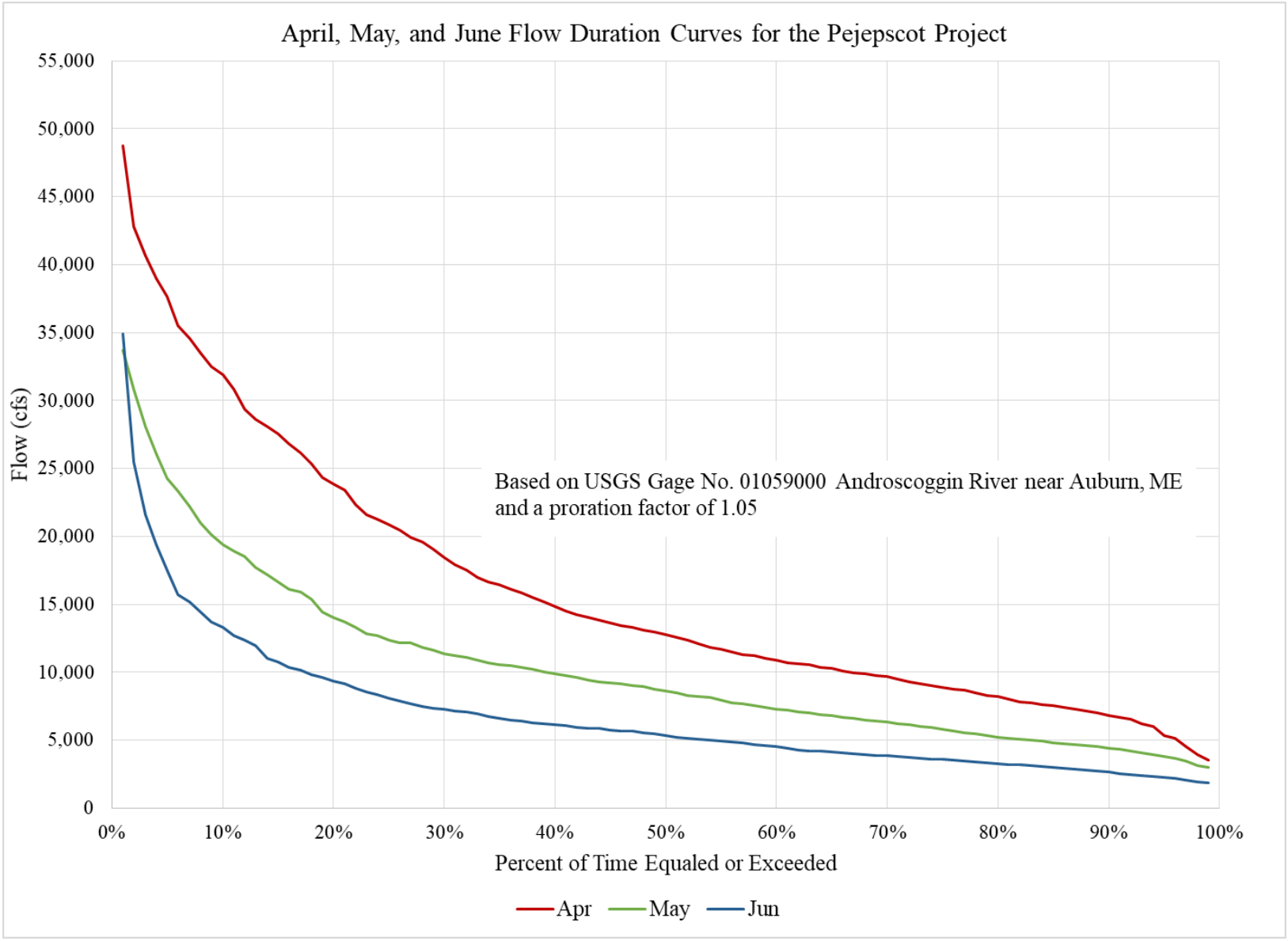


Figure 5.2.1.2-3: April, May, and June Flow Duration Curves (1987-2016)

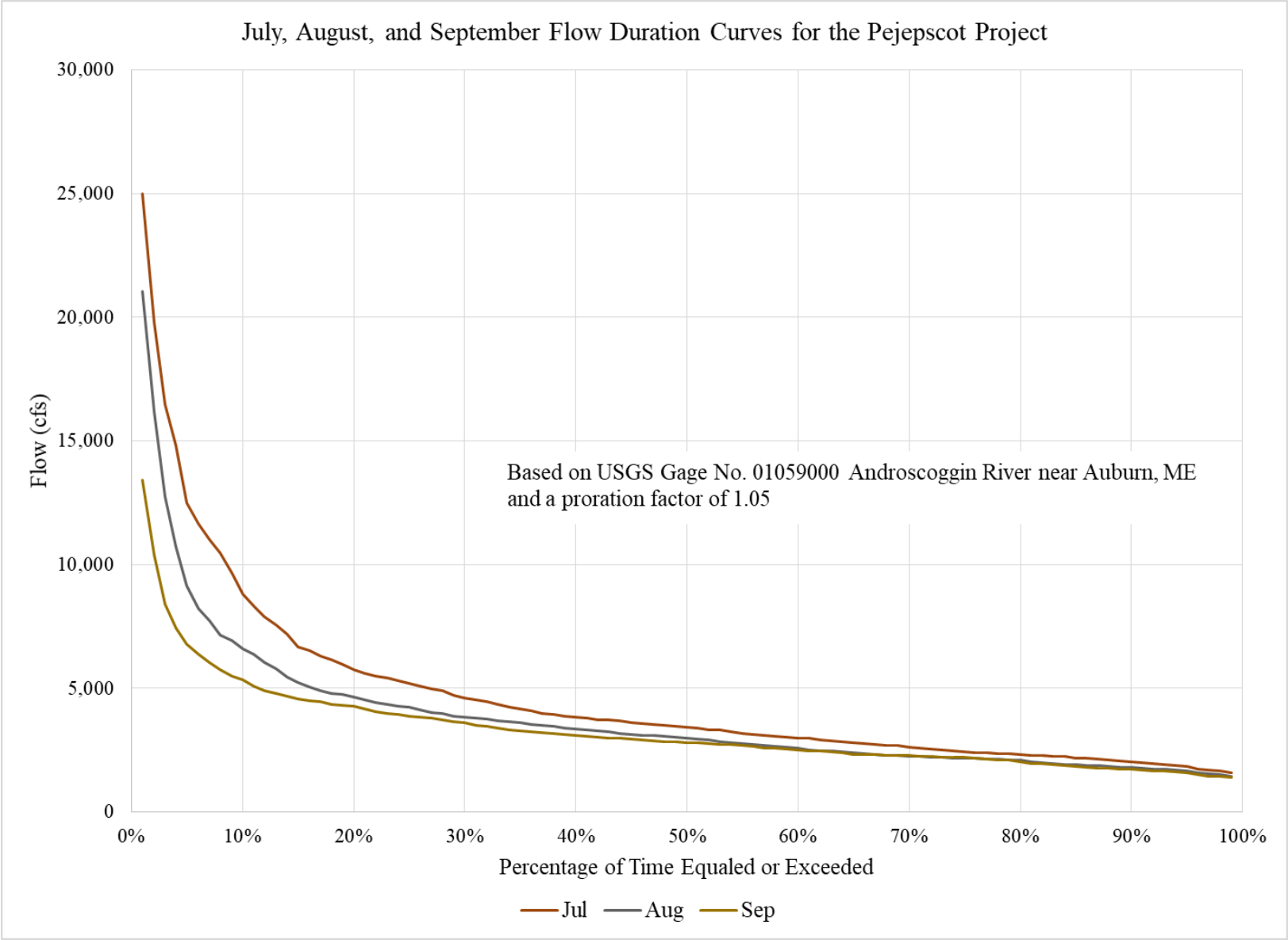


Figure 5.2.1.2-4: July, August, and September Flow Duration Curves (1987-2016)

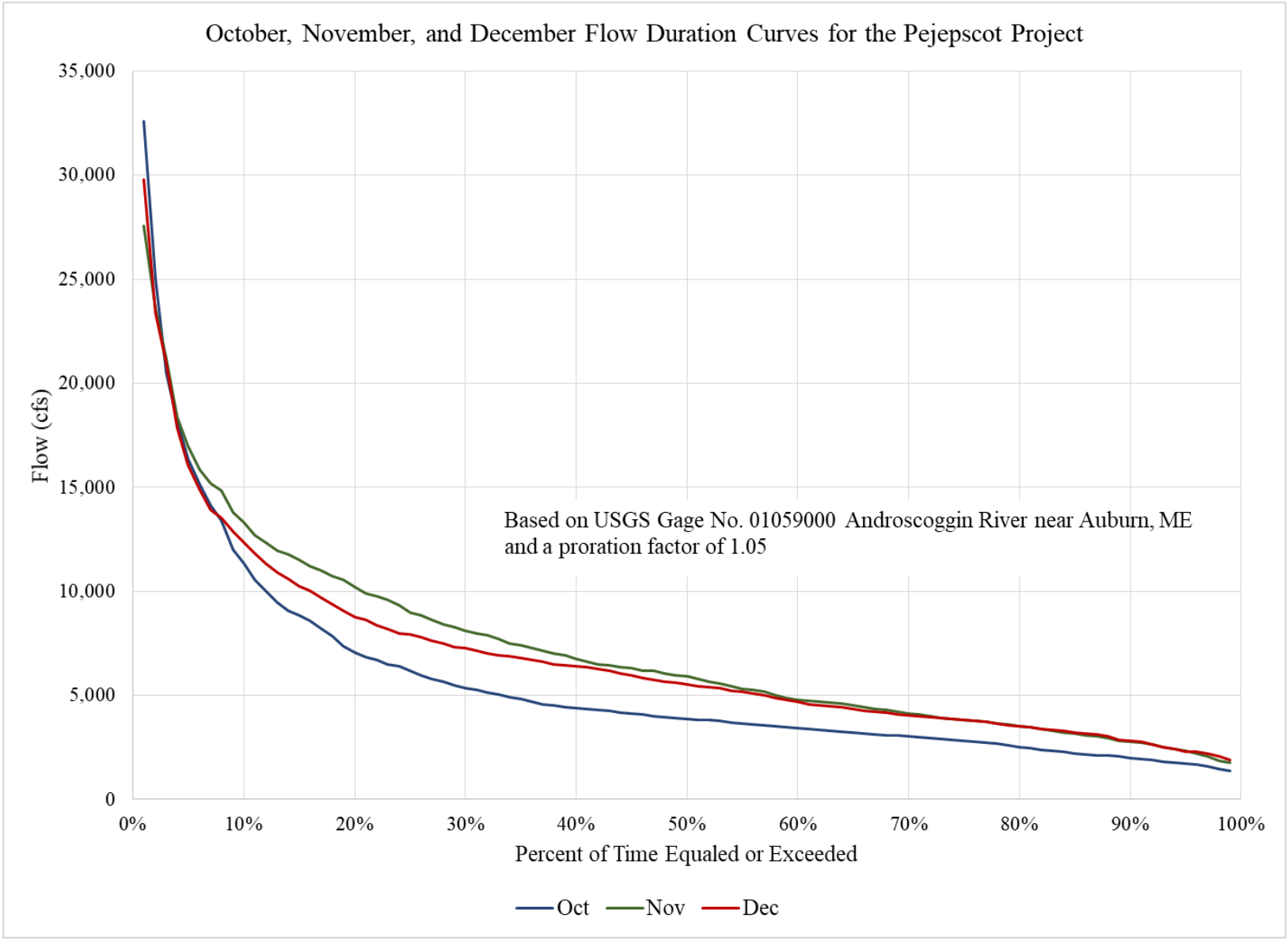


Figure 5.2.1.2-5: October, November, and December Flow Duration Curves (1987-2016)

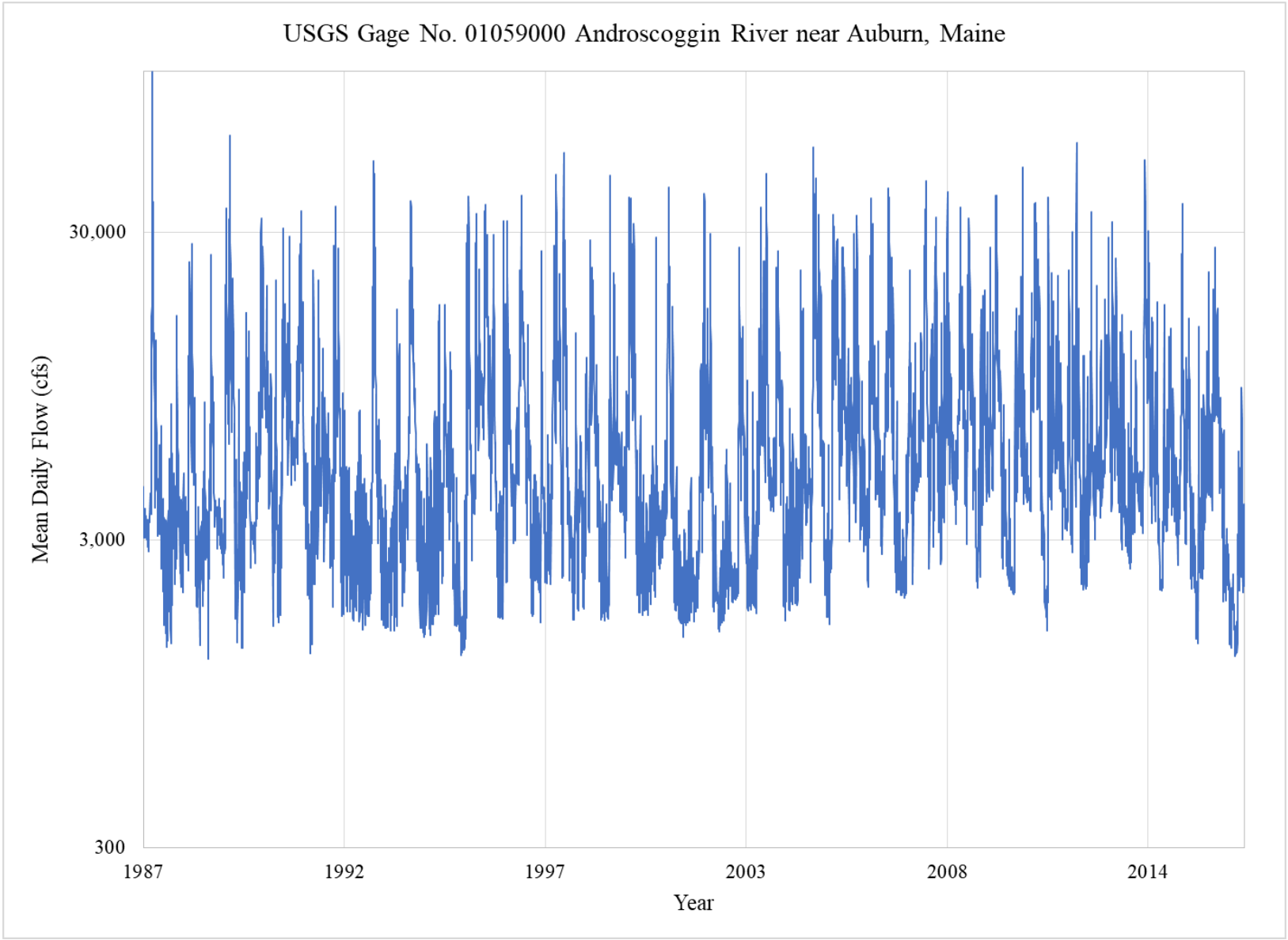


Figure 5.2.1.2-6: Mean Daily Flow at USGS 01059000 Androscoggin River Near Auburn, Maine

5.2.2 Water Quality

5.2.2.1 Federal Clean Water Act

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

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 is a Class C waterbody from its confluence with the Atlantic Ocean at Merrymeeting Bay, through Project waters, upstream until its confluence with the Ellis River about 100 miles upstream of the Project at Rumford Point in Maine. The Androscoggin becomes Class B from its confluence above the Ellis River until the ME/NH border (Maine, 2016a). The upper drainage of the Androscoggin River in Maine, above Umbagog Lake are classified as Class A or AA. Most minor tributaries to the Androscoggin River are Class B waters with some exceptions. A water quality certificate under Section 401 of the Clean Water Act was issued by MDEP for the Pejepscot Project in 1982.

The waters on the mainstem of the Androscoggin River in the vicinity of the Project are classified as Class C. Class C waters must meet standards ensuring suitability for the following: drinking after treatment, agriculture, fishing, recreation in and on water, industrial process and cooling water supply, navigation, as habitat for fish and other aquatic life, and hydroelectric power generation, except as prohibited under Title 12, section 403. DO must meet a minimum of 5 ppm (mg/L) or 60% saturation, whichever is greater. Table 5.2.2.2-1 details standards of Class C waterbodies.

Waterbodies that fail to meet water quality standards are placed on the 303(d) impaired waterbodies list as required under the CWA. The 303(d) list assesses the attainment criteria of water bodies and determines whether designated uses are threatened or the waterbody is impaired by bacteria, mercury or a legacy pollutant such as polychlorinated biphenyls (PCBs), dioxins, DDT and others (MDEP, 2014). 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. There are no waterbodies within the Project boundary, or that feed directly into the Project impoundment, currently on the 303(d) list of impaired waters under the CWA that require a TMDL (MDEP, 2014). However, several waterbodies in the vicinity of the Project are listed as impaired under Section 305(b) of the CWA. Section 305(b) of the CWA requires states to assess the condition of their waters toward meeting designated uses, as well as TMDLs, and to prepare a report biannually to Congress.

Table 5.2.2.2-2 defines the various categories used to describe the status of waterbodies as stated in the biannual "Integrated Water Quality Monitoring and Assessment" reports.

Based on the most recent water quality assessment, several sections of the Androscoggin River watershed in the vicinity of the Project are listed under Category 4 (some impaired use) and Category 5 (uses are attained but one or more uses may be impaired) (Table 5.2.2.2-2). The mainstem Androscoggin River from the Little Androscoggin confluence (located about 18 miles upstream of the Pejepscot Dam) to the Pejepscot Dam is listed under Category 5-D for being impaired due to legacy Polychlorinated Biphenyls (PCBs) found in fish tissue and Category 4-B for dioxin contamination (MDEP, 2014). Downstream of the Project, the mainstem Androscoggin River from the Pejepscot Dam to the Brunswick Dam is listed as Category 4-B river due to dioxins, Category 5-D for legacy PCBs, and Category 4-C for aquatic life impairment due to inadequate fish passage for American shad at Brunswick Dam (MDEP, 2014).

Table 5.2.2.2-1: MDEP Water Quality Standards for Class C Waterbodies

Parameter	Standard
Dissolved oxygen	Minimum of 5 ppm (mg/l) or 60% saturation, whichever is greater, except in identified salmonid spawning areas
E. coli (human and domestic origin)	May not exceed a geometric mean of 126 per 100 milliliters or an instantaneous level of 236 per 100 milliliters between May 15th and September 30th. There must be provisional periodic review of designated salmonid spawning areas.
Discharges	Discharges to Class C waters may cause some changes to aquatic life, except that the receiving waters must be "of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community."

Source: Maine, 2016b

Table 5.2.2.2-2: Integrated Water Quality Report category definitions

Category	Definition
Category 1	Rivers and streams fully attaining all designated uses
Category 2	Rivers and streams attaining some designated uses - insufficient information for other uses
Category 3	Rivers and streams with insufficient data or information to determine if designated uses are attained (one or more uses may be impaired)
Category 4-A	Rivers and streams with impaired use other than mercury, TMDL completed
Category 4-B	Rivers and streams impaired by pollutants - pollution control requirements reasonably expected to result in attainment
Category 4-C	Rivers and streams with impairment not caused by a pollutant
Category 5-A	Rivers and streams impaired by pollutants other than those listed in 5-B through 5-D, TMDL required
Category 5-B	Rivers and streams impaired for bacteria only, TMDL required
Category 5-C	Waters impaired by atmospheric deposition of mercury
Category 5-D	Rivers and streams impaired by legacy pollutants

Source: MDEP, 2014

5.2.2.3 Existing Water Quality Data

Recently, many segments of the Lower Androscoggin River near the Project have been monitored by several organizations (including water quality data collection) as part of the following programs:

- MDEP 2010 Lower Androscoggin River Basin Water Quality Study Modeling Report;
- Volunteer River Monitoring Program (VRMP); and
- Dioxin Monitoring Program (DMP) fish toxic information and Surface Water Ambient Toxics (SWAT).

The existing water quality monitoring data indicates that the Project Area meets the Class C water quality classification. Figure 5.2.2.3-1 provides a map of the water quality monitoring locations. The water quality data from these monitoring programs is summarized below.

MDEP 2010 Lower Androscoggin River Basin WQ Study Modeling Report

In 2010, MDEP implemented a water quality sampling program for the Lower Androscoggin River to determine if the section of river from Worumbo Dam to Merrymeeting Bay could be expected to meet criteria for reclassification from Class C to Class B. Waters were sampled during low flow, high temperature conditions in 2010 on July 13 to 16 and August 2 to 5 (MDEP, 2011).

This data was used to help develop a Water Quality Analysis Simulation Program[2] (WASP) water quality model for the freshwater section of the river from a location just downstream of the Little Androscoggin River in Auburn, through the Project Area, to below the Brunswick Project. Sampling locations were chosen to also incorporate point source discharges from Publicly Owned Treatment Works (POTWs); Lewiston-Auburn Water Pollution Control Authority and the Lisbon Wastewater Treatment Facility. 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 the POTWs to predict water quality conditions during a 7Q10 low flow (occurring 7 consecutive days, once every 10 years) (MDEP, 2011).

Sampling locations near the Project included:

- S-858, 3.15 miles upstream of the Pejepscot Dam in the Little River 0.2 miles from Androscoggin mainstem;
- S-956, 0.45 miles upstream from the Pejepscot Dam in the impoundment;
- S-A47, just upstream of the Pejepscot Dam in the impoundment; and
- S-954, about 0.15 miles downstream of the Pejepscot Dam.

[2] 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.

Macroinvertebrates were analyzed at S-956 and S-954 in July and August of 2010 (MDEP, 2011 & MDEP, 2016b). Field collected water quality data from the macroinvertebrate analysis deployment indicated water temperatures between 22.3 and 25.2^{o}C, dissolved oxygen (DO) levels between 7.2 and 7.9 mg/l, and specific conductivity between 79 and 103 us/cm.

Based on field sampling and modeling, MDEP stated that the Pejepscot Dam river segment exhibits DO concentrations that met the Class C criterion. Due to the increased depth and volume, MDEP stated that the impoundment creates a slower moving body of water, decreasing reaeration rates and potentially allowing organic sediment to accumulate. MDEP stated that a narrow diurnal range is the result of greater depths and lower oxygen (MDEP, 2011).

The Aquatic Life Classification Attainment study, also performed by MDEP for the 2011 model report, indicated that the upstream Worumbo Impoundment, and the Pejepscot Impoundment itself, had aquatic communities that met Class C criterion, as indicated by communities of macroinvertebrates collected at these locations. Alternatively, at the sampling location downstream of the Project, aquatic communities attained Class B aquatic life criteria due to the majority of organism's present being sensitive to organic pollution (MDEP, 2011). Section 5.3.7 discusses this study in greater detail.

Volunteer River Monitoring Program 2010 - 2015

DO, temperature, pH, specific conductance, and *E. coli* are currently monitored along the Androscoggin River by the Volunteer River Monitoring Program (VRMP). The Friends of Merrymeeting Bay (FOMB) joined the VRMP in 2009. Monitoring is generally performed once a month from May to September or October at 8 different locations (MDEP, 2016c).

Sample locations which the FOMB monitor regularly within the Project Area include the Pejepscot boat launch and Fish Park Upstream, data is also occasionally monitored at Fish Park Downstream:

- Pejepscot Boat Launch: is in the impoundment about 850 feet downstream of the Little River confluence and half a mile below the Worumbo Project;
- Fish Park Upstream is in the impoundment, just upstream of the Pejepscot Dam;
- Fish Park Downstream is about 330 feet downstream from the Pejepscot Dam.

Water quality data for each of these locations, from 2010 to 2015 were obtained from Mary-Ellen Dennis (VRMP Program Coordinator). Figure 5.2.2.3-1 shows each of the 3 the locations in relation to the Project.

Based on the monitoring by the VRMP for Pejepscot Boat Launch, Fish Park Upstream and Fish Park Downstream in all 2010 to 2015 VRMP recorded observations, the lowest DO measurements were 6.3 mg/l and 72.2%. Both *E. coli* criteria (instantaneous geometric mean concentration of 236 Most Probable Number (MPN)/100 ml, or 126 MPN/100ml maximum average between May 15 and September 30) were met for 2010

through 2015 data at Fish Park Upstream and Fish Park Downstream. The Pejepscot Boat Launch exceeded the 236 MPN/100ml instantaneous maximum on May 18, 2014 with a sample concentration of 435 MPN/100ml. However, the duplicate concentration for this sample was 48 MPN/100ml (Dennis, 2017). The water quality samples were usually collected 3 feet below the surface of the water but were also collected at 1.5 feet or mid-depth from the bank (if non-wadeable) or via wading (Dennis, 2017).

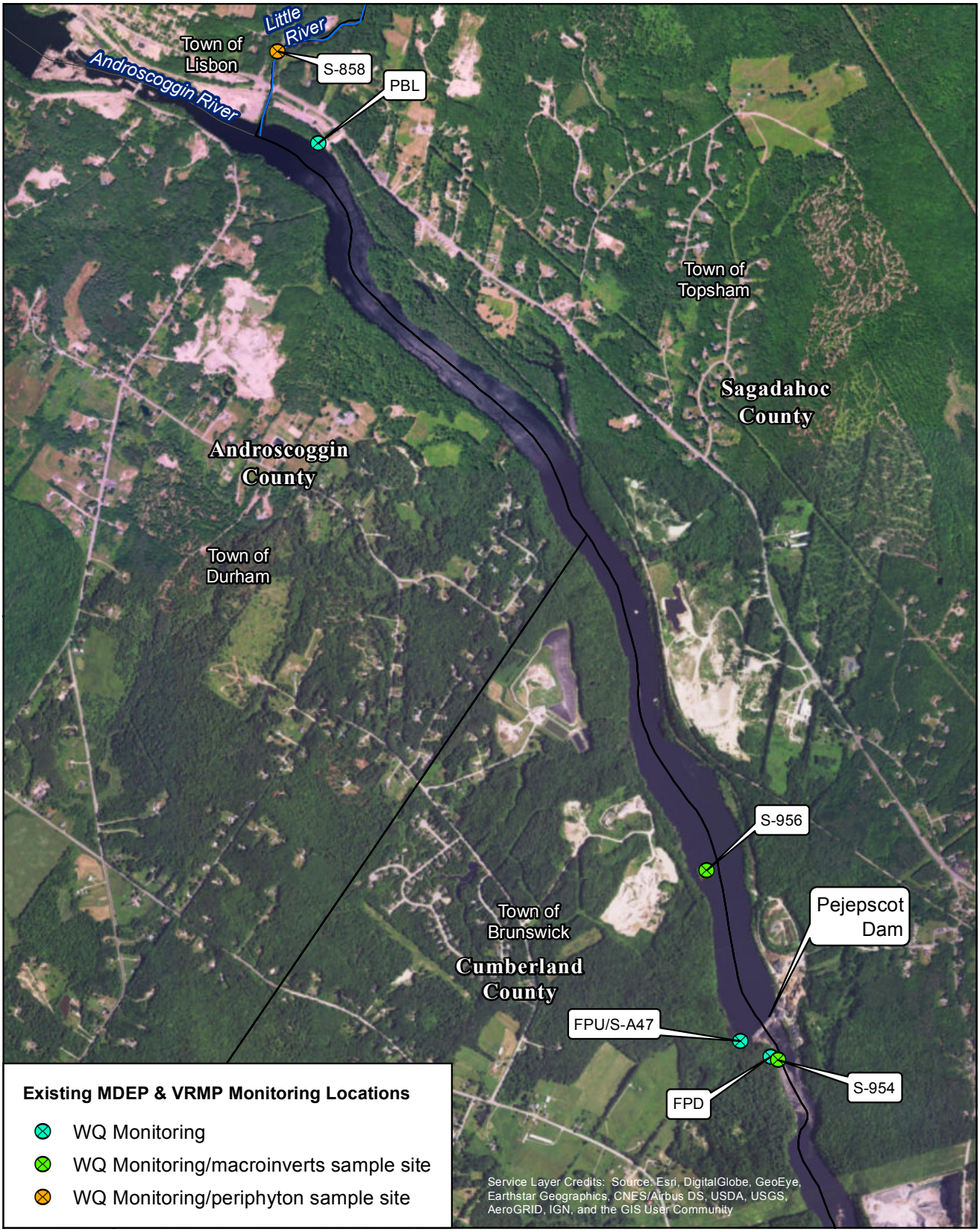
At the Fish Park Upstream location, vertical profiles were recorded twice a day, once in the morning and once in the afternoon during each of the July and August 2010 field sampling events. The depth of the Fish Park Upstream profile location ranged from 13 to 18 feet with measurements taken roughly every 3 feet, starting near the water's surface. Recorded parameters include specific conductivity, pH, DO concentration, and DO saturation. A secchi depth was also recorded during each profile. Results of the Fish Park Upstream vertical profiles indicate that the water column is well-mixed with little, if any variation in temperature, pH, DO or specific conductivity for July and August. Specific conductivity remained the most consistent for each profile with no change in concentration over depth. DO concentration remained above 7 mg/l and DO saturation remained above 87.9% in each profile. Temperature ranged from 24.3 to 27ºC and pH ranged from 7.0 to 7.5. Secchi depths ranged from approximately 9.8 ft. to 12.5 ft. (MDEP, 2016c).

Dioxin Monitoring Program fish toxic information and Surface Water Ambient Toxics

The Dioxin Monitoring Program (DMP) has been in place since 1987 (as per 38MRSA §420-A). It was merged with the Surface Water Ambient Toxics (SWAT) monitoring program in 2007 for dioxin monitoring. Dioxins and furon congeners have been monitored in fish tissue where rivers have been suspected to receive dioxin-related discharge pollution. Fish sampling locations along the Androscoggin River that have been monitored under this program include locations between Gilead, ME near the border of NH downstream to Lisbon, ME bordering the northern end of the Pejepscot Impoundment (MDEH, 2008).

Sources of dioxin contamination within the Androscoggin River watershed include industrial discharges from paper mills, other municipal and industrial effluents, and nonpoint sources such as landfill leaches, runoff and spills (MDEP, 1990). Re-suspending sediments may affect dioxin levels as dioxins tend to associate with solids and may accumulate in soil.

The Maine Center for Disease Control and Prevention Division of Environmental Health (MDEH) advises eating just 6 to 12 fish meals a year if the fish have been caught in the Androscoggin River from Gilead (ME/NH border) to Merrymeeting Bay due to chemical contamination that may include high levels of PCBs, Dioxins or dichloro-diphenyl-trichloroethane (DDT) (MDEH, 2013). They also recommend limiting or eliminating the consumption of fish, especially older fish or fish higher in the food chain, due to mercury contamination in all of Maine's freshwater bodies.



Brookfield

Pre-Application Document
Pejepscot Hydroelectric Project (FERC No. 4784)

N

0 1,000 2,000 4,000 Feet

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

Path: P:\1925\maps\pad\figure_5_2_2_3-1_wq.mxd

5.2.3 References

Dennis, Mary-Ellen (VRMP Program Coordinator of MDEP). Correspondence on 1/4/17. VRMP water quality data from 2010 to 2015 received via email.

Federal Energy Regulatory Commission (FERC). 1996. Final Environmental Impact Statement: Lower Androscoggin River Basin Hydroelectric Projects Maine (FERC 2283-005, 11482-000). July 1996.

Federal Energy Regulatory Commission (FERC). 2015. FERC Form 80: Licensed Hydropower Development Recreation Report (OMB No. 1902-0106). March 2015.

Federal Energy Regulatory Commission (FERC). 2016. Letter informing Topsham Hydro Partners L.P. that the minimum flow deviations that occurred on June 5-6 et al will not be considered violations of Article 32 re the Pejepscot Project under P-4784. September 22, 2016

Maine Department of Environmental Health (MDEH). 2008. Evaluation of the Health Implications of Levels of Polychlorinated Dibenzo-p-Dioxins (dioxins) and Polychlorinated Dibenzofurans (furans) in Fish from Maine Rivers: 2008 Update. January 2008. Online: https://www1.maine.gov/dhhs/mecdc/environmental-health/eohp/fish/documents/finaldraft-eval-of-pcdd.pdf. Date Accessed: 12/29/16

Maine Department of Environmental Health (MDEH). 2013. Freshwater Fish Safe Eating Guidelines. Online: http://www.maine.gov/dhhs/mecdc/environmental-health/eohp/fish/2kfca.htm. Date Accessed: 12/29/16

Maine Department of Environmental Protection (MDEP). 1990. State of Maine 1990 water quality assessment, a report to Congress pursuant to section 305(b) of the Federal Water Pollution Control Act as amended. Augusta, Maine. 103pp + appendices

Maine Department of Environmental Protection (MDEP). 2011. Lower Androscoggin River Basin Water Quality Study Modeling Report. Prepared by Peter Newkirk. March 2011. Online: http://www.maine.gov/dep/water/monitoring/rivers_and_streams/modelinganddatareports/androscoggin/2011/lowerandromodelreport_final_march_2011.pdf. Date Accessed: 12/28/16

Maine Department of Environmental Protection (MDEP). 2014. Draft State of Maine Department of Environmental Protection 2014 Integrated Water Quality Monitoring and Assessment Report. Online: http://www.maine.gov/dep/water/monitoring/305b/2014/draft-report.pdf

Maine Department of Environmental Protection (MDEP). 2016. GIS Maps and Other Data Files. Wastewater Facilities and Outfalls (MEPDES) (Data Under

Development). 2016 Online: http://www.maine.gov/dep/gis/datamaps/. Date Accessed: 12/28/16

Maine Department of Environmental Protection (MDEP). 2016b. GIS Maps and Other Data Files. Biomonitoring Stream and Wetland Sampling Data GIS layer (3/3/2016). Online: http://www.maine.gov/dep/gis/datamaps/. Date Accessed: 12/28/16

Maine Department of Environmental Protection (DEP). 2016c. Volunteer River Monitoring Report: 2015 Data Report. Online: http://www.maine.gov/dep/water/monitoring/rivers_and_streams/vrmp/reports.html. Date Accessed: 1/3/17

New Hampshire Department of Environmental Services (NHDES). 2008. New Hampshire Water Resources Primer. Online: http://www.des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer_chapter2.pdf. Date Accessed: 1/13/16

National Marine Fisheries Service (NMFS). 2012. NMFS Endangered Species Act Biological Opinion for Emergency Spillway Repair and Proposed Amendment of the License for the Worumbo Project (FERC No. 2428).

The State of Maine (Maine). 2016a. Maine Revised Statutes. Title 38 Waters and Navigation, §467: Classification of major river basins. Online: http://legislature.maine.gov/statutes/38/title38sec467.html. Date Accessed: 11/1/16

The State of Maine (Maine). 2016b. Maine Revised Statutes. Title 38 Waters and Navigation, §465: Standards for classification of fresh surface waters. Online: http://legislature.maine.gov/statutes/38/title38sec465.html. Date Accessed: 12/28/16

United States Geological Survey (USGS). 2016. National Water Information System: Web Interface. USGS Surface-Water Daily Data for Maine; USGS Gage No. 01059000 Androscoggin River near Auburn, Maine. https://waterdata.usgs.gov/me/nwis/dv? Date Accessed: 12/27/2016.

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 (approximately 75 miles upstream of the Project), the river is referred to as the Upper Androscoggin. This section 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 (*Salvelinus fontinalis*) and rainbow trout (*Oncorhynchus myskiss*) contribute to the fishery, it is dependent upon annual stocking of brook trout, rainbow trout, brown trout (*Salmo trutta*), and landlocked salmon (*Salmo salar sebago*) (Brautigam and Pellerin, 2014).

Downstream of Rumford Falls, including the Project Area, the fish assemblage consists primarily of a warmer-water community, with a greater prevalence of lentic species. Additionally, American eel (*Anguilla rostrata*) were documented at most locations downstream of Gulf Island Dam, including areas in the vicinity of the Project (Yoder et al., 2006). Anadromous migrants such as Atlantic salmon (*Salmo salar*), American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), striped bass (*Morone saxatilis*), and sea lamprey (*Petromyzon marinus*) are seasonally present in the lower reaches, as a result of fish passage facilities, stocking, and trap and transport programs (Brown et al., 2006). The historic extent of upstream passage for shad and herring has been reported to be Lewiston Falls (approximately 17.5 miles upstream of the Project), with some American eel, Atlantic salmon, and possibly sea lamprey having passed as far upstream as Rumford Falls. However, according to Taylor, 1951, the Androscoggin River may never have been a shad river because of impassable falls at Brunswick, which is located 4.7 miles downstream of the Project.

Electrofishing surveys were performed along 1.0 km of shoreline at each of three sites in the vicinity of the Pejepscot Project by Yoder et al., (2006) in late July of 2003. Because of the timing of the surveys, data would primarily be representative of the resident fish assemblage. Overall, 16 species were captured from the areas downstream of Worumbo Dam to the areas downstream of Pejepscot Dam, and relative abundance varied between the sites sampled (Table 5.3.1-1). Overall, the catch was dominated by cyprinids and/or centrarchids. The highest abundance was observed in the impoundment, primarily due to large numbers of spottail shiner (*Notropis hudsonius*) captured there. All alosines captured in the surveys were young-of-the-year. Because many individuals collected during the surveys were small or juvenile fish, biomass by species shows a different pattern, with smallmouth bass (*Microperus dolomieu*) and white sucker (*Catostomus commersonii*) dominating the overall fish biomass in the riverine areas upstream of the Project Impoundment and below the Project. smallmouth bass and yellow perch (*Perca flavescens*), followed by redbreast sunfish (*Lepomis auritus*) dominated the fish biomass in the Project Impoundment (Table 5.3.1-2).

Though northern pike (*Esox lucius*) were not represented in high abundance during the 2003 survey, they have become established in the main-stem Androscoggin River downstream of Turner, and also within many lakes in the watershed over the last 20 years (Brown et al., 2006; B. Lewis, MDIFW, pers. comm., 12/13/2016). As a top predator, they have the potential to alter the fish community in the Androscoggin River and also provide recreational fishing opportunities. Fishing reports from message boards and guide services would indicate that populations have expanded such that they provide recreational open water and ice fishing opportunities in the lower main-stem Androscoggin River. According to MDIFW, northern pike are well-established, with the river producing some trophy-sized fish (B. Lewis, MDIFW, pers. comm. 12/13/2016). black crappie (*Pomoxis nigromaculatus*) are another non-native species that has expanded populations within the Lower Androscoggin (B. Lewis, MDIFW, pers. comm. 12/13/2016); though this species is not a top predator, it may also provide additional recreational fishing opportunities. Additionally, white catfish (*Ameiurus catus*) have been documented in the fishway at Brunswick Dam, and if populations expand in the Lower Androscoggin, changes to the fish community may occur.

The presence of most diadromous species at the Project can be inferred from passage at the Brunswick Project downstream (Table 5.3.1-3), though not all individuals that pass at Brunswick may reach the Project. Diadromous fish that have been captured and counted at the Brunswick Fishway are typically passed upstream into the Brunswick headpond or are transported to a number of areas within the watershed upstream of the Pejepscot Project, depending on the species. Approximately 20,000 river herring are trapped and trucked to upstream locations at the Brunswick Project. The remaining balance of river herring and all other species are passed upstream to the headpond, where they can ascend to the Pejepscot Project Area. Abundance of diadromous fish at the Brunswick Fishway varies from year-to-year.

Currently, fisheries within the Project Area are limited to recreational fishing. River herring are harvested in some areas of Maine for use by the commercial lobster fishery as bait in lobster traps but no directed municipal commercial harvest areas for alosines are present on the Androscoggin River (ASMFC, 2016a). American eel commercial harvest, in the form of glass eel and elver fisheries, are operating in the State of Maine, but would typically be focused on tidal water areas and would not occur at the Project.

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

Species	Number of Fish (n/km)			Relative Abundance		
	Upstream of Project (~3.3 miles upstream)	Project Impoundment (~2.3 miles upstream)	Downstream of Project (~0.4 miles downstream)	Upstream of Project (~3.3 miles upstream)	Project Impoundment (~2.3 miles upstream)	Downstream of Project (~0.4 miles downstream)
Alewife (*Alosa pseudoharengus*)	288	21	91	44.9%	1.8%	13.9%
American eel (*Anguilla rostrata*)	2	-	3	0.3%	-	0.5%
American shad (*Alosa sapidissima*)	-	-	33	-	-	5.0%
Chain pickerel (*Esox niger*)	2	9	-	0.3%	0.8%	-
Common shiner (*Luxilus cornutus*)	1	10	-	0.2%	0.8%	-
Fallfish (*Semotilus corporalis*)	5	25	303	0.8%	2.1%	46.2%
Golden shiner (*Notemigonus crysoleucas*)	-	15	-	-	1.3%	-
Largemouth bass (*Microperus salmoides*)	1	5	-	0.2%	0.4%	-
Northern pike (*Esox lucius*)	-	1	-	-	0.1%	-
Pumpkinseed sunfish (*Lepomis gibbosus*)	5	4	-	0.8%	0.3%	-
Redbreast sunfish (*Lepomis auritis*)	110	112	111	17.1%	9.5%	16.9%
Smallmouth bass (*Micropterus dolomieu*)	189	47	95	29.4%	4.0%	14.5%
Spottail shiner (*Notropis hudsonius*)	2	773	4	0.3%	65.5%	0.6%
White perch (*Morone americana*)	1	-	-	0.2%	-	-
White sucker (*Catostomus commersonii*)	25	4	16	3.9%	0.3%	2.4%
Yellow perch (*Perca flavescens*)	11	154	-	1.7%	13.1%	-
All Species	**642**	**1180**	**656**	**100.0%**	**100.0%**	**100.0%**

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

Species	Biomass of Fish (kg/km)				Relative Biomass		
	Upstream of Project (~3.3 miles upstream)	Project Impoundment (~2.3 miles upstream)	Downstream of Project (~0.4 miles downstream)		Upstream of Project (~3.3 miles upstream)	Project Impoundment (~2.3 miles upstream)	Downstream of Project (~0.4 miles downstream)
Alewife (*Alosa pseudoharengus*)	0.5	0.04	0.15		2.0%	0.2%	0.4%
American eel (*Anguilla rostrata*)	1.24	-	1.4		5.1%	-	4.0%
American shad (*Alosa sapidissima*)	-	-	0.01		-	-	0.0%
Chain pickerel (*Esox niger*)	0.01	2.43	-		0.0%	9.6%	-
Common shiner (*Luxilus cornutus*)	0	0.02	-		0.0%	0.1%	-
Fallfish (*Semotilus corporalis*)	0.01	0.62	2.98		0.0%	2.4%	8.6%
Golden shiner (*Notemigonus crysoleucas*)	-	0.25	-		-	1.0%	-
Largemouth bass (*Microperus salmoides*)	0	0.01	-		0.0%	0.0%	-
Northern pike (*Esox lucius*)	-	0.08	-		-	0.3%	-
Pumpkinseed sunfish (*Lepomis gibbosus*)	0.12	0.23	-		0.5%	0.9%	-
Redbreast sunfish (*Lepomis auritis*)	2.22	4.27	4.85		9.1%	16.8%	13.9%
Smallmouth bass (*Micropterus dolomieu*)	13.08	6.93	10.56		53.3%	27.3%	30.3%
Spottail shiner (*Notropis hudsonius*)	0	1.21	0.03		0.0%	4.8%	0.1%
White perch (*Morone americana*)	0	-	-		0.0%	-	-
White sucker (*Catostomus commersonii*)	7.08	2.77	14.83		28.9%	10.9%	42.6%
Yellow perch (*Perca flavescens*)	0.27	6.56	-		1.1%	25.8%	-
All Species	**24.53**	**25.42**	**34.81**		**100.0%**	**100.0%**	**100.0%**

Table 5.3.1-3: Adult Diadromous Fish Captured at the Brunswick Fishway, 2000-2016.

Year	Atlantic salmon	American shad	River herring	Striped bass	Sea lamprey	American eel
2000	4	88	9,551	95	0	3
2001	5	26	18,196	0	0	5
2002	2	11	104,520	8	3	2
2003	3	7	53,732	4	6	0
2004	12	12	113,686	1	8	2
2005	10	0	25,896	18	0	0
2006	6	3	34,239	75	0	9
2007	21	6	60,662	2	10	4
2008	18	1	92,359	3	19	2
2009	24	0	44,725	0	15	0
2010	9	22	39,689	0	28	0
2011	44	0	54,886	1	19	2
2012	0	11	170,191	3	125	108
2013	2	16	69,104	103	26	100
2014	4	0	55,678	1	45	201
2015	2	53	71,887	1	129	1
2016	7	1,123	121,010	46	132	-

5.3.2 Fish Habitats

5.3.2.1 Impoundment

The Project boundary upstream of the Pejepscot Dam includes approximately three miles of the Androscoggin River. Upstream of the Project Area, the river flows through the Worumbo Project prior to entering the impoundment. The impoundment has a surface area of 225 acres, and gross storage of 3,278 acre-feet at full pool elevation (El. 67.5 ft.). Adult Atlantic salmon were observed at the mouth of a small tributary on the Durham side of the river, upstream of the dam, during summer 2011 (Topsham Hydro, 2012a).

5.3.2.2 Tailwater

The Project does not have a bypass reach. Depending on the river flow and the headpond elevation of the Brunswick Project (which may occasionally backwater to the Pejepscot Dam), the habitat downstream of the dam likely reflects that of a free-flowing section of river until it reaches the Brunswick Impoundment. The river immediately downstream of the dam is approximately 400 feet wide, but quickly narrows downstream to 250-300 feet wide, and is constrained by steep banks. Most of the right bank in the vicinity of the dam is bounded by steep bedrock ledges, and the first ~360 feet of the left bank downstream of the powerhouse consists of bedrock topped with nearly vertical constructed rock walls and concrete walls. Depending on the flow and backwatering effect from the Brunswick Project, most of the downstream areas appear to consist of pool and run habitat, though some shallower riffle areas may be present during certain flow and water level conditions.

5.3.2.3 Tributaries

The Little River enters the Androscoggin in the furthest upstream areas of the Project Impoundment and is the only major tributary in the vicinity of the Project. The remaining streams (Meadow Brook, Pinkham Brook, two unnamed streams, and an unnamed intermittent stream) entering the Androscoggin River within the Project Area are relatively small and have not been evaluated for habitat suitability.

5.3.2.4 Fish Habitat Surveys

Habitat in the main-stem 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 based on "good" and "modified" characteristics of lotic habitat. QHEI results from Yoder et al., (2006) for the three sites in the vicinity of the Project are shown in Tables 5.3.2.4-1 and 5.3.2.4-2.

Yoder et al., (2006) performed QHEI evaluations at two locations between the Pejepscot and Worumbo Projects and one location in the riverine area downstream of the Pejepscot Project. Of these sites, the furthest upstream location was approximately 3.3 miles upstream of the Pejepscot Project, and was characterized as having all good QHEI

attributes, and no modified attributes; as such, this was considered a free-flowing location with good riverine qualities based on the QHEI evaluation. Approximately 2.3 miles upstream of the Pejepscot Project, Yoder et al., (2006) evaluated a location that was classified as within the Pejepscot Impoundment; this location was classified as impounded, having slow flow, and no riffle/run habitats, but also possessed good habitat attributes such as extensive to moderate cover, low/normal embeddedness of substrate, and max depths greater than one meter (Tables 5.3.2.4-1 and 5.3.2.4-2). Approximately 0.4 miles downstream of the Project, Yoder et al., (2006) characterized the habitat as riverine, with most of the good habitat attributes and no modified attributes.

Topsham Hydro and Miller Hydro Group completed a habitat survey in the Little River as part of the interim Species Protection Plan. Most of the lower reach (~6.5 miles) of the Little River was deemed accessible to Atlantic salmon, though suitable spawning habitat appears to be limited there (HDR, 2011). The area was considered suitable for survival and habitation by Atlantic salmon, and may provide resting areas in pools for salmon migrating upstream along with rearing habitats, particularly in tributaries. Barriers on the Little River may prevent Atlantic salmon from migrating to potential spawning areas further upstream (HDR, 2011).

Table 5.3.2.4-1: QHEI Results for Good Habitat Attributes at Sites Evaluated on the Androscoggin River in the Vicinity of the Pejepscot Project (Yoder et al., 2006)

Good Habitat Attributes	Upstream of Project (~3.3 miles upstream)	Project Impoundment (~2.3 miles upstream)	Downstream of Project (~0.4 miles downstream)
No Channelization/Recovered	X	-	X
Boulder, Cobble, Gravel Substrates	X	-	-
Silt Free Substrates	X	-	-
Good/Excellent Development	X	-	X
Five or More Substrate Types	X	-	X
Extensive-Moderate Cover	X	X	X
Fast Current/Eddies	X	-	X
Low-Normal Overall Embeddedness	X	X	X
Max Depth > 1m	X	X	X
Low-Normal Riffle/Run Embeddedness	X	-	X

Table 5.3.2.4-2: QHEI Results for Modified Habitat Attributes at Sites Evaluated on the Androscoggin River in the Vicinity of the Pejepscot Project (Yoder et al., 2006)

Modified Habitat Attributes	Upstream of Project (~3.3 miles upstream)	Project Impoundment (~2.3 miles upstream)	Downstream of Project (~0.4 miles downstream)
Impounded	-	X	-
Channelized or No Recovery	-	X	-
Silt/Muck Substrates	-	-	-
Sparse or No Cover	-	-	-
Max Depth < 70 cm	-	-	-
Recovering Channel	-	-	-
High/Moderate Silt Cover	-	-	-
Fair-Poor Development	-	X	-
Only 1-2 Cover Types	-	-	-
Slow or No Flow	-	X	-
High-Mod Overall Embeddedness	-	-	-
High-Mod Riffle-Run Embeddedness	-	-	-
No Riffle/Run	-	X	-

5.3.2.5 Special Fish Habitats

Critical habitat is designated by the NMFS for the survival and recovery of species listed as threatened or endangered under the Endangered Species Act (ESA), including Atlantic salmon. 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. Atlantic salmon in the Androscoggin are part of the Merrymeeting Bay Salmon Habitat Recovery Unit (SHRU) and portions of the Androscoggin River, downstream of the Lewiston Falls Dam is classified as critical habitat (i.e., critical to the recovery of the species), including the waters of the Pejepscot Project (NMFS, 2009).

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). 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).

Atlantic salmon EFH for eggs and larvae, juvenile and adults is designated for the Androscoggin River, including Project waters (NMFS, 2012a).

5.3.3 Fish Species Temporal/Life History Information

5.3.3.1 Resident Fish Species Temporal/Life History Information

Though a variety of resident fish species are present at the Project, the primary gamefish inhabiting the Project Area include Smallmouth Bass and Northern Pike. These species are described in further detail below.

Smallmouth bass – Smallmouth bass are native to the Great Lakes – St. Lawrence system and the Ohio, Tennessee, and upper Mississippi River systems. They are not native to Maine, where they were introduced in the late 1800's and are now prevalent in many areas. Optimum habitat of the 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). Lacustrine habitat for smallmouth bass includes large, clear lakes with an average depth of approximately 30 feet or greater and rocky shoals with limited vegetation. 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 a 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 50°F, they will become inactive and seek shelter (Edwards *et al.*, 1983).

Northern pike – Northern pike have become established in the Lower Androscoggin River, and are a popular gamefish species, but also have the potential to alter the fish

community as a top predator. They are a coolwater, piscivorous species that occurs worldwide in fresh waters north of latitude 40°N and is the only species in the esocid family native to both North America and Eurasia (Inskip, 1982). They are predominantly a freshwater species, but may survive and spawn in weak brackish water (MDIFW, 2008). Despite their broad, intercontinental range, they are not native to Maine. They were first illegally introduced into the Belgrade Lakes in the 1970's, and have expanded their populations throughout central and southern Maine (MDIFW, 2008). Northern pike broadcast spawn in the spring around ice-out, typically over dense mats of vegetation in areas of calm, shallow water (Inskip, 1982; MDIFW, 2008). Migration up tributaries to wetlands, flooded marshes, or shallow pools has been documented in both lake and river populations. Despite their strong reported swimming speeds, northern pike are not suited for life in strong currents; in rivers, they tend to inhabit backwaters and pools instead of main-channel areas (Inskip, 1982). All life stages prefer shallow areas with vegetation, and juvenile pike are especially dependent on this type of habitat (Inskip, 1982).

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 considered to be semelparous; when individuals may survive and return to spawn again, the species is considered to be iteroparous.

Recent fish passage records for the Brunswick Dam indicate that Atlantic salmon, American shad, river herring (alewife and blueback herring), striped bass, sea lamprey, and American eel utilize the lower Androscoggin River (BWPH, 2016). Though no formal fish passage exists for American eel at the Brunswick Dam, they have been documented at the Brunswick Fishway and throughout much of the Lower Androscoggin during fisheries surveys (Yoder et al., 2006). Atlantic sturgeon (*Acipenser oxyrhynchus*) and shortnose sturgeon (*Acipenser brevirostrum*) are present below the Brunswick Dam, but are not to be passed upstream if captured at the Brunswick Fishway and are therefore not expected to be found at the Pejepscot Project.

Atlantic salmon – 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, 2012a). 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, 2012a). They spawn in the late fall, and will build nests in suitable substrate. The most suitable substrate is highly permeable gravel and cobble (NMFS, 2012a). 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, 2012a). 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.

Atlantic salmon are a federally endangered species. The Project Area is within the Gulf of Maine Distinct Population Segment (GOM DPS) as part of the Merrymeeting Bay SHRU. The critical habitat designation for the Androscoggin River extends from its confluence with the Kennebec River upstream to Lewiston, with the Lower Androscoggin and Little Rivers designated as sub-basins. Historically, Atlantic salmon may have passed upstream as far as Rumford Falls. Most of the highest quality habitat for Atlantic salmon in the Androscoggin River watershed is currently inaccessible, and low quality habitat scores have been assigned to the Lower Androscoggin River areas where the Pejepscot Project is located, though the area is considered an important migration corridor (NMFS, 2012a; NASCO, 2009). No spawning or rearing habitat is expected to occur in the Project impoundment or tailwater areas (NMFS, 2012a; NASCO, 2009).

The numbers of Atlantic salmon returning to the Androscoggin River have been very low in recent years, and Atlantic salmon are considered extirpated in waters to the south of the Androscoggin River watershed (NMFS, 2012a). However, returns are currently so low, and the prevalence of hatchery origin fish so high, that the wild population of Atlantic salmon in the Androscoggin River are essentially no longer present as well.

Atlantic salmon stocking in the Androscoggin River watershed 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), the majority of which were stocked into the Little River annually by school groups. Other than this limited stocking, there are no stocking programs or active restoration programs for Atlantic salmon on the Androscoggin River. The fish entering the fishway at Brunswick are often assumed to be strays from other coastal rivers such as the Penobscot (ASRP, 2015). Since the year 2000, salmon returns at the Brunswick Fishway have ranged from 0 to 44 fish per season, with only 14 salmon captured there from 2012 through 2016 (Table 5.3.1-3). The majority of fish returning have typically been 2-sea-winter fish of hatchery origin (Figure 5.3.3.2-1). No 3-sea-winter fish or repeat spawners have been documented since 1999.

Atlantic salmon passage numbers at the Worumbo Fishway, as reported from years 2003 through 2015, indicate that Atlantic salmon are passing through the Pejepscot Project

(Table 5.3.3.2-1). The counts at the Worumbo Fishway do not, however, include fish that may have remained in the Project Impoundment, Worumbo tailwater, or migrated into spawning tributaries such as the Little River. Passage was evaluated at the Project by Maine Department of Marine Resources (MDMR) in 2011; this study found that 43% of the adult Atlantic salmon passed at the Brunswick Project successfully migrated beyond the Pejepscot Project (MDMR, 2012, as cited in NMFS, 2012b). Nine out of 12 fish that approached the Pejepscot Project passed upstream, for an estimated 75% passage efficiency during that study.

American shad – 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 will 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.

The numbers of American shad passed at the Brunswick Fishway have ranged from zero to 1,123 fish from 2000-2016 (Table 5.3.1-3). It should be noted that the falls at Brunswick may have been an impassible barrier for American shad, and the Androscoggin River may not have been historically considered a shad river (Taylor, 1951).

River herring – River herring is a collective term for anadromous alewife and blueback herring (Fay et al., 1983a), 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). They 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 Brunswick 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 Brunswick has exceeded the MDMR stocking rate targets of 27,358 river herring into 4,562 acres of habitat. Passage facilities are also present at the Pejepscot and Worumbo Projects, allowing fish passed at Brunswick 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 historic habitat for river herring is currently accessible due to dams without fish passage facilities (ASMFC, 2016a; 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, 2012). 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, 2016b). Little stock-specific information on blueback herring was found, likely due to higher prevalence of alewife in Maine waters.

Striped bass – 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., 1983b). 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., 1983b), 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., 1983b). 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 of the mid-Atlantic coast.

Striped bass are captured at the Brunswick 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 with regard to stock status in the Androscoggin

River specifically, though oceanic stocks as a whole have rebounded from extreme lows in the 1980's. Female spawning stock biomass peaked around 2003 followed by a slow, steady decline, though it remained within the ASMFC targets and the population was classified as "not overfished and overfishing is not occurring" (ASMFC, 2016b). Striped bass are not currently passed upstream at the Brunswick Project due to concerns about a lack of safe downstream passage for these fish, therefore they would not be currently reaching the tailwaters of the Pejepscot Project.

Sea lamprey – 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). They have also become landlocked in many inland waters around the Great Lakes, where they are considered invasive. 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 are passed at the Brunswick Fishway in relatively low but varying abundance, with zero to 132 individuals passed per season since the year 2000 (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 – 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, though migration from lakes that are far inland may occur sooner, such as June – August from Lake Champlain (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 back 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 Brunswick Dam. Though eels have been captured in the fishway at Brunswick Dam (Table 5.3.1-3), no specific eel passage facilities are operated there, and the existing fishway is not likely to be successful in capturing large numbers of juvenile eel due to their very small size. Eels may also pass the Brunswick Dam by climbing over the spillway, as they often do at many low-head dams. Most eels captured further upstream by Yoder et al., (2006) on the Androscoggin River were large specimens. Upstream eel passage measures were installed at the Worumbo Fishway in 2012, after which 17 eels were captured in 2012 and 131 eels in 2013, according to annual fish passage reports filed with FERC (Miller Hydro, 2013; Miller Hydro, 2014); more recent reports were not found.

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 as a whole (USFWS, 2015a). The stock status of American eel is considered to be depleted, and quotas restrict the glass eel fishery in Maine (ASMFC, 2016b). 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).

Table 5.3.3.2-1: Atlantic salmon reported at the Worumbo Fishway, 2003-2015 (Brown Bear, 2016)

Year	Atlantic salmon Passed
2003	1*
2004	1
2005	0
2006	2
2007	7
2008	2
2009	1
2010	5
2011	3
2012	1
2013	1*
2014	2*
2015	0

*Reported as landlocked salmon

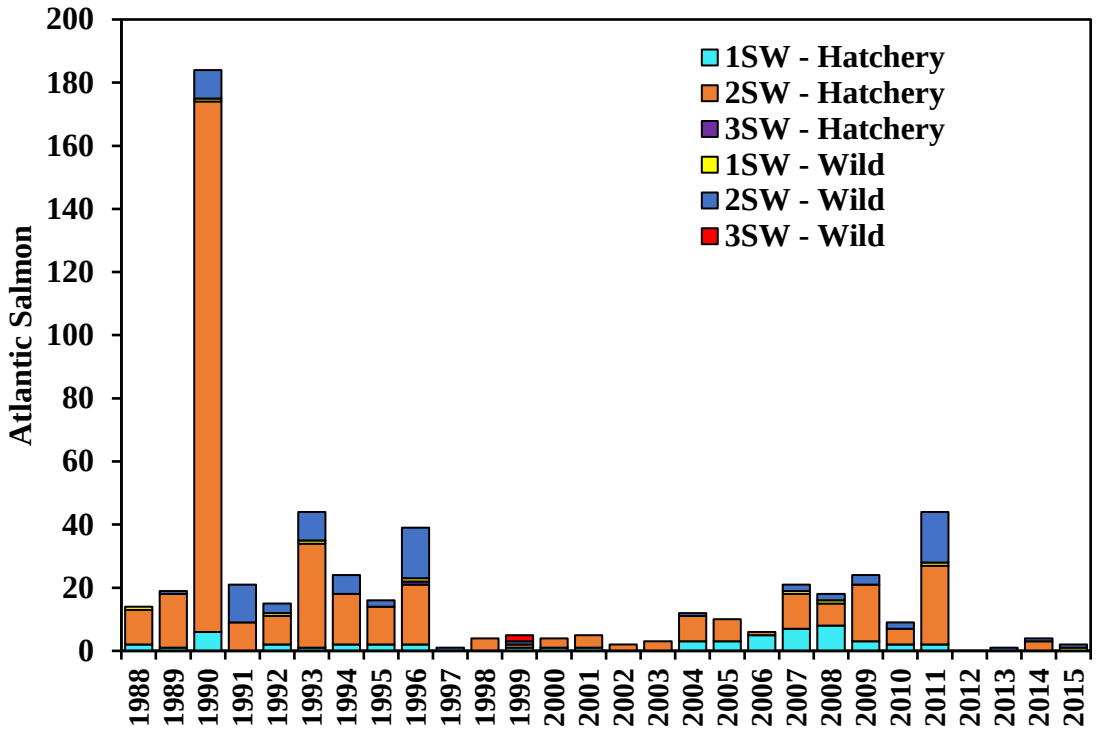


Figure 5.3.3.2-1: Atlantic salmon Captured at the Brunswick Fishway, 1988-2015.

5.3.4 Fisheries Studies Conducted by the Licensee

Included in the five-year interim Species Protection Plan developed by Topsham Hydro and accepted by FERC in 2012, were proposed monitoring studies of upstream (pre-spawn adults) and downstream (smolts and adults) migrating Atlantic salmon for three years (2013-2015). Due to the low numbers of adult salmon passed at Brunswick Dam, most efforts expended have evaluated smolt survival through the Project. Adult salmon monitoring has been limited to maintenance of receivers for tracking fish tagged by MDMR at Brunswick Dam, and full studies have been deferred until enough test fish are available.

It should be noted that Topsham Hydro and resource agencies have been consulting on study results and discussing how, at the present time, no active salmon restoration effort is ongoing in the Androscoggin River, and none is proposed in the near future. FERC has granted an extension of time (EOT) until May 1, 2020 to conduct adult Atlantic salmon upstream passage effectiveness studies at the Brunswick Project due to a lack of study fish. Therefore, for as long as there are not enough adult Atlantic salmon to perform upstream passage assessment at Brunswick, there will not be enough adults for upstream studies, or kelts for downstream studies, at the Pejepscot Project. Topsham Hydro is currently seeking an EOT for pre-spawn adult (upstream) and post-spawn kelt (downstream) studies similar to the EOT for Brunswick.

5.3.4.1 Atlantic Salmon Smolt Downstream Passage Evaluation

Radio telemetry tracking studies of Atlantic salmon smolts were completed in 2013, 2014, and 2015 with the primary goal of evaluating whole-station survival. Key findings are presented here, though additional details can be found in the study reports (Topsham Hydro (2014); Topsham Hydro (2015); BWPH and BBHP (2016)). The studies incorporated test fish, released upstream of the Project, and control fish, which were released downstream of the Project. Whole-station survival estimates in 2013, 2014, and 2015 were 100%, 91.3%, and 86.3%, respectively; with a 3-year estimate of 92.5%, which is within ISPP take limits (7.5% vs. 8.4% permitted). Passage occurred via different routes, including spill, the downstream fishway, the upstream fishway, and through the powerhouse. The 2014 and 2015 studies differed in the relative number passed through each route, with the majority passing via spill in 2014, and most passing via the powerhouse in 2015 (Tables 5.3.4.1-1 and 5.3.4.1-2). Estimated survival was lower through the downstream bypass, but higher through the powerhouse in 2015 relative to 2014. In addition to passage routes and survival, other aspects of migration through the Project were evaluated in 2015, including findings for:

- Temporal Distribution and Diel Timing – Smolts typically passed the Project within 1-2 days after release, primarily during the evening, night, and early morning hours.
- Project Approach Times – Median approach time of 5.3 hours, ranging between 1.9 to 83.8 hours from initial release (2.6 miles upstream of the Project) to detection ~656 feet upstream of the dam.

- Project Residence Times – Median residence time of 0.3 hours (ranging from 0.1 to 35.4 hours) from peak signal detection ~656 feet upstream of the dam to the last detection through passage routes available. There was no significant difference between residence times for fish passing the Project via Unit 1 versus the downstream bypass fishway.
- Downstream Transit Times – Transit times downstream of the Project for fish passed via different routes did not differ significantly from control fish that were released directly into the tailrace.
- Rates of Movement – Passage did not significantly affect the rate of movement of downstream travel after passage when compared to control fish.

Table 5.3.4.1-1: Summary of Atlantic salmon smolt passage survival via different downstream passage routes at the Pejepscot Project, 2014, for all three release groups (Adapted from Table 4, Topsham Hydro (2015))

Passage Route	N	Proportion Passed (%)	Minimum Survival (%)	Portion of River Flow (%)*
Upstream Fishway	1	1.1	100	0.2
Spillway	61	64.9	95.1	32.5
Downstream Fish Bypass	12	12.8	100	0.6
Powerhouse	20	21.3	85	66.7

*Based on average flows recorded at the Project during the study period (May 14 – June 5, 2015)

Table 5.3.4.1-2: Summary of Atlantic salmon smolt passage survival via different downstream passage routes at the Pejepscot Project, 2015 (Adapted from BWPH and BBHP, (2016))

Passage Route	Detected (n)	Passed Downstream (n)	Test Survival	Paired-Release Survival (%)*
Upstream Fishway	1	0	0.00	0
Spillway	2	2	1.00	100
Downstream Fish Bypass	15	11	0.73	80
Powerhouse (Unit 1) **	60	51	0.85	92.7

*Calculated as the test survival divided by the tailrace release group survival (0.917) multiplied by 100.
**Reported survival estimate was through Unit 1 only. In total, 76 smolts were reported to have passed through the powerhouse.

5.3.4.2 Atlantic Salmon Upstream Passage Evaluation

Despite low returns to the Androscoggin River, small numbers of adult Atlantic salmon that have been captured at Brunswick Dam in recent years were implanted with radio tags by MDMR for subsequent tracking within the river. Tagging was performed in 2013 and 2014.

2013 – Only two adult Atlantic salmon were captured at the Brunswick Dam. These fish were tagged by MDMR, and were released downstream of Brunswick Dam to evaluate their approach to that fishway. Both fish left the Androscoggin River, migrated to the Kennebec River, and were not available for evaluating passage at the Project (Topsham Hydro, 2014).

2014 – Four adult Atlantic salmon were radio-tagged by MDMR staff and released upstream of the Brunswick Dam in 2014 (Topsham Hydro, 2015). MDMR performed mobile tracking of these fish, and Topsham Hydro maintained telemetry stations in the forebay and tailrace of the Pejepscot Project to monitor adult upstream passage through the Project. Of the four fish tagged, three were detected in the Project tailrace and one passed upstream of the Pejepscot Project. After release above Brunswick Dam on June 26, 2014, this male salmon spent a considerable amount of time below the Project, milling between the Brunswick and Pejepscot projects prior to passage at the Project on October 3, 2014. It then milled in the upper Project Impoundment and downstream of the Worumbo Project before being tracked into the Little River, where it was observed spawning with an un-tagged female salmon that had passed the Brunswick and Pejepscot fishways undetected. It was confirmed to be in the Project Impoundment by MDMR on December 1, 2014, when this fish was last detected. Two tagged female salmon that were released above Brunswick Dam milled in between Brunswick Dam and the Project, including many movements into and out of the Project tailrace, but did not pass. One of these fish abandoned migration in the Androscoggin River and swam to the Kennebec River, where it was captured at Lockwood Dam.

5.3.4.3 Upstream Passage Evaluation of Alewife

Studies to determine the effectiveness of the Pejepscot fish passage facility for alewife were conducted in 1991 and 1992 during non-spill or very limited spill conditions (Charles Ritzi Associates, 1992). Passage rates were determined for five release cohorts based on the success of marked (floy-tagged) alewife that were tagged at the Brunswick Project, which were then tallied as they passed the Pejepscot fishway viewing window. Four of the cohorts released were considered suitable for analysis, at an average passage efficiency of 87%. This number was determined to be an underestimate, and the agencies concluded that the efficiency of the upstream passage facility at the Pejepscot Project was close to the agency goal of 90% for alewife. Rapid passage at the Project was noted, with 90% or greater of the fish passing the Project within 2-6 days of being passed at the Brunswick Project. One of the cohorts exhibited 66% passage from Brunswick through the Project on the first fishway lift after release at Brunswick, which was over a span of 20 hours after release.

5.3.5 Fisheries Management Plans

5.3.5.1 Atlantic Salmon Management Plans

The Atlantic salmon is not listed or protected by the State of Maine, but it is a Species of Greatest Conservation Need and is federally endangered for the GOM DPS. The U.S. Fish and Wildlife Service (USFWS) and NOAA-Fisheries recently drafted a recovery plan which would wholly supersede a previous recovery plan developed in 2005 (USFWS and NOAA-Fisheries, 2016). 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, recommend the development of various implementation plans, such as 5-year SHRU-level "workplans". These workplans would follow an adaptive management process and could change over time.

Workplans for the three SHRUs were drafted in 2015 (ASRP, 2015). As of the date of this filing, the workplans have not been finalized. Once finalized, the workplans will provide strategies for salmon recovery within the Merrymeeting Bay SHRU, including:

- Increase abundance, diversity and resilience by providing access to areas that support the highest quantities and highest quality habitats;
- Increase diversity and resilience by ensuring that salmon have access to diverse and rare habitats;
- Increase diversity and resilience by ensuring that salmon are geographically widespread;
- Prevent extinction and increase survival by the removal or abatement of threats to salmon and their habitats; and
- Restoration of the co-evolved suite of diadromous fish that are part of the ecosystem that Atlantic salmon depend upon.

The Little River is described in the workplan as being one of the best opportunities on the Androscoggin River for achieving the workplan objectives with regard to spawning and rearing given the river's current configuration of dams (ASRP, 2015). The workplan also identifies additional important features of the Androscoggin River relative to Atlantic salmon recovery, including:

- The Androscoggin River and tributaries contain 97,000 units of historical nursery habitat for Atlantic salmon, but only 16,000 units are currently accessible. Nearly all habitat is above two or more hydropower dams, through which survival has not been demonstrated to be sufficient to allow for recovery.
- Rumford Falls is believed to be the upstream extent of anadromy, with the possible exceptions of American Eel and Sea Lamprey.
- The Androscoggin River upstream of Lewiston Falls is inaccessible to diadromous fish due to obstructions by dams.

- Other than a small friends fish program, there is no stock management program for Atlantic salmon on the Androscoggin River.
- The lakes in the Sabattus River provide the best opportunities for river herring spawning and rearing in the Androscoggin drainage, and are currently managed by MDMR for river herring.

Topsham Hydro developed an interim Species Protection Plan in 2012 (Topsham Hydro, 2012b) to identify additional measures for avoiding and minimizing potential effects of Project operations on Atlantic salmon. The plan covered a 5-year period from 2012 through 2016, during which the Licensee was scheduled to implement a variety of protection measures and monitoring studies, including:

- Upstream adult salmon passage studies
- Downstream smolt passage studies
- Downstream kelt passage studies
- Expansion of the season during which fish passage facilities at the Project operate
- Incorporation of debris management of the downstream bypass fishway into operations and maintenance features.

Brookfield filed the next proposed Species Protection Plan and related Draft Biological Assessment (BA) with FERC on December 22, 2016 for incorporation into the existing License. Topsham Hydro requested that FERC initiate formal ESA consultation with NMFS and the USFWS pursuant to Section 7 of the ESA with respect to the Species Protection Plan by adopting the Draft BA as its own and transmitting the Draft BA with its attached Species Protection Plan to those agencies.

Within the filed Species Protection Plan and supporting BA was a summary of measures to protect Atlantic salmon for the period from 2017 to when a new license is issued (current license expires August 31, 2022). These measures include:

- Upstream Passage Monitoring
    - Continue operation of the Project fish lift
    - Install monitoring equipment in the fish lift for Atlantic salmon
    - Conduct upstream adult Atlantic salmon passage effectiveness studies, when at least 40 adult Atlantic salmon of Androscoggin River origin are counted at the Brunswick fish trap for two consecutive years
- Downstream Passage Monitoring
    - Installation of monitoring equipment for downstream passage of kelts
    - Conduct one-year downstream passage effectiveness study of smolts in 2018 to evaluate whole station survival under additional spill conditions
- Little River Atlantic salmon Habitat Mapping
- Sabattus River Fish Passage Improvements (dam removal).

5.3.5.2 Androscoggin River Anadromous Fish Restoration Program (MDMR)

The goal of the Androscoggin River Anadromous Fish Restoration Program is to increase ecosystem health in the Androscoggin River watershed by restoring native diadromous fish species and their habitats (Brown et al., 2006). The plan focuses on restoration of alosine species to the watershed. Objectives of the plan, as outlined in Brown et al., (2006) include:

- Increase the abundance, survival, and natural reproduction of pre-spawn adult river herring and American shad in historic spawning and nursery habitats;
- Protect and enhance the health of the native fish community structure in support of river herring and American shad restoration efforts;
- Characterize the annual migration of adult river herring and American shad;
- Assess the reproductive success of adults and productivity of juvenile alosine species;
- Increase the accessibility to historic habitat for native diadromous and resident fish species to increase the abundance, survival, and natural reproduction in historic habitat; and
- Increase public awareness of the program in order to encourage participation and support in river restoration initiatives.

To satisfy the objectives, MDMR employs or aims to employ a variety of strategies, including:

- Trap and Transport from the Brunswick Fishway
- Transport of pre-spawn adults from other river systems
- Fry stocking
- Fish counts at the Brunswick Fishway, along with biological data collection
- Participating in the FERC relicensing process at hydropower dams.

The goal of MDMR's shad stocking program was the annual release of 19.9 million hatchery-reared fry into the Androscoggin River until a self-sustaining population was established (Brown et al., 2006); however, fry stocking efforts have been abandoned due to funding issues. The adult release target for river herring on the Androscoggin River is 27,358 fish into approximately 4,562 acres of habitat, with an arbitrary target stocking density of six fish per acre (Brown et al., 2006; ASMFC, 2016).

5.3.5.3 American Shad Habitat Plan (MDMR)

The coastal states are responsible for American shad and river herring management, which is coordinated through the ASMFC (ASMFC, 2010). MDMR has 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.

5.3.5.4 American Eel Management Plans

No specific management plan has been developed for American eel in the State of Maine, but all Atlantic states must comply with the management goals and objectives set forth by the ASMFC when regulating fishing activity. 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:

I. 2006 – Mandatory reporting of catch and effort data.

II. 2008 – Increased emphasis on improving upstream and downstream passage for American eel.

III. 2013 – New management measures for commercial and recreational fisheries. Implementation of fishery-independent and fishery-dependent monitoring requirements.

IV. 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.

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 regional scale. Examination of available species distribution maps have determined that there are approximately seventeen amphibian species and approximately thirteen reptile species that may be present in the Project Area (Table 5.3.6-1). Based on their life history requirements, the salamander, frog/toad, and 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, 2013).

Table 5.3.6-1: Amphibian and 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
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	*Rana clamitans melanota*	All Stages	Adult (wintering)	Not Listed
	Mink frog	*Lithobates*	All Stages	Juvenile/Adult -	Special

Type	Common Name	Scientific Name	Aquatic Habitat Use	Riparian Habitat Use	Status in Maine
		septentrionalis		occasionally	Concern
	Northern leopard frog	*Lithobates pipiens*	All Stages	Juvenile/Adult	Special Concern
	Pickerel frog	*Lithobates palustris*	Breeding/Larvae Wintering Adult	Juvenile/Adult (summer)	Not Listed
	Spring peeper	*Pseudacris crucifer*	Breeding/Larvae	Juvenile/Adult	Not Listed
	Wood frog	*Lithobates sylvaticus*	Breeding/Larvae	Juvenile/Adult	Not Listed
Snake	Eastern milk snake	*Lampropeltis triangulum trangulum*	NA	All Stages	Not Listed
	Northern brown snake	*Storeria d. 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	Eastern painted turtle	*Chrysemys picta*	Juvenile/Adult	Breeding/Nesting Juvenile/Adult (sunning)	Not Listed

Type	Common Name	Scientific Name	Aquatic Habitat Use	Riparian Habitat Use	Status in Maine
	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

Source: Maine Herpetological Society, 2016 and MDIFW, 2013, 2015

5.3.6.1 Salamanders

Eight species of salamander could potentially use aquatic or terrestrial habitats in the Project Area. Of these, the blue-spotted salamander and the northern spring salamander are listed as Species of Special Concern in Maine (MDIFW, 2013). 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.

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

The eastern red-backed salamander, the four-toed salamander, the yellow spotted salamander, and the blue-spotted salamander share similar habitat, reproduction and diet requirements. These species can inhabit lakes, ponds, swamps, and quiet stream pools, forested wetland, scrub-shrub wetland, riparian zones, and multiple forest types containing damp microhabitats under leaf litter, surface objects, or inside logs. Breeding migration timing varies depending on local conditions and may occur in both spring and fall, with egg laying typically occurring in late winter to mid-summer (NatureServe Explorer, 2016).

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

5.3.6.2 Frogs and Toads

There are nine species of frog and toad that may utilize habitats within the Project Area. The American toad, spring peeper, wood frog, pickerel frog, gray tree-frog, green frog, and American bullfrog are common species throughout Maine. Two species, the mink frog and the northern leopard frog, are listed as Species of Concern in the State of Maine (MDIFW, 2013).

The mink frog, 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 both the mink frog and 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 Turtles

There are five species of turtle that may utilize habitats within the Project Area. 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.

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).

5.3.6.4 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. 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.

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, 2013, NatureServe Explorer, 2016).

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 macroinvertebrate community composition used 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) (MDIFW, 2016).

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. Other benthic macroinvertebrate

data was collected by the Maine Department of Environmental Protection's Biological Monitoring Program, which assess the health of rivers, streams, and wetlands as part of the Water Classification Program. In the vicinity of the Project, the most recent sampling effort was performed in 2010 at two locations.

Table 5.3.7-1: Common Types of Benthic Macroinvertebrates in Maine

Common Name	Order
Flatworms	Tubellaria
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	Plectopera
True Bugs	Hemiptera
Dobsonfly & Alderfly Larvae	Megaloptera
Water Beetles	Coleoptera
Caddisfly Larvae	Trichoptera
True Fly Larvae	Diptera

Source: MDIFW, 2016

5.3.7.1 Aquatic Insects

Within the Project Area, recent MDEP sampling efforts focused on a location in the Project Impoundment and a riverine location downstream of the Project (S-956 and S-954, respectively). The impoundment and downstream sampling locations had diversity indices that were similar, though the overall macroinvertebrate abundance at the downstream location was considerably higher (Table 5.3.7.1-1). Additionally, the downstream location also exhibited higher EPT tolerance, and dominant taxa included *Chimarra, Macrostemum, Maccaffertium, Hydropsyche,* and *Acerpenna*. In the impoundment, the dominant taxa included *Stenacron, Oecetis, Amnicola, Tribelos, and Maccaffertium*. Generic richness, which was defined as "the number of different genera found in all replicates from one sampling site", was similar between the impoundment and downstream locations.

Though the samples were collected as part of water quality biomonitoring, the differences in the macroinvertebrate community between the impoundment and downstream locations is also a function of habitat. The sampling location in the impoundment was deeper, with slow or imperceptible flow and primarily sand substrate. Alternatively, the downstream sampling location was characterized by swift flow and primarily rubble/cobble substrate.

Table 5.3.7.1-1: Macroinvertebrate Reported Variables

Variable	Impoundment (S-956)	Downstream (S-954)
Total Mean Abundance	75.33	956.0
Generic Richness	36.0	37.0
Ephemeroptera Mean Abundance	18.0	278.0
Shannon-Wiener Generic Diversity	4.16	3.91
EPT Generic Richness	10.0	21.0
Top Five Dominant Taxa	*Stenacron* *Oecetis* *Amnicola* *Tribelos* *Maccaffertium*	*Chimarra* *Macrostemum* *Maccaffertium* *Hydropsyche* *Acerpenna*
Dominate Substrate	Sand	Rubble/Cobble

Source: Maine DEP 2010

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 2010 biomonitoring macroinvertebrate surveys discussed above, four genera (Argia, Enallagma, Gomphus, Boyeria) of dragonflies or damselflies were identified in the vicinity of the Project. A Maine Damselfly and Dragonfly Survey (MDDS) was formally conducted between 1999 and 2005, with additional volunteer records added between 2006 and 2016. This dataset provides a county level overview of Damselflies and Dragonflies that may be present in the Project Area. The Maine Damselfly and Dragonfly Survey identified a total of 158 species in 58 genera present in the state. Of the 158 species, 94 species are found in Androscoggin County, 106 species are found in Cumberland County, and 68 species are found in Sagadahoc County. Sixty-three species are found in all three counties. Of the 63 species, there are a total of ten species listed on the Maine Species of Special Concern List, and only one is present in all three counties (MDDS, 2016). Table 5.3.7.2-1 displays the ten Species of Special Concern odonates that may be present in the Project Area.

Table 5.3.7.2-1: Odonate Species of Special Concern Present in Counties Adjacent to the Project

Common Name	*Scientific Name*	Odonate Type	County
New England bluet	*Enallagma laterale*	Damselfly	Androscoggin/Cumberland
Scarlet bluet	*Enallagma pictum*	Damselfly	Androscoggin/Cumberland
Swamp darner	*Epiaeschna heros*	Dragonfly	Cumberland
Lilypad clubtail	*Arigomphus furcifer*	Dragonfly	Cumberland
Cobra clubtail	*Gomphus vastus*	Dragonfly	Cumberland
Southern pygmy clubtail	*Lanthus vernalis*	Dragonfly	Cumberland
Extra-striped snaketail	*Ophiogomphus anomalus*	Dragonfly	Androscoggin/Cumberland/ Sagadahoc
Pygmy snaketail	*Ophiogomphus howei*	Dragonfly	Androscoggin/Cumberland
Common sanddragon	*Progomphus obscurus*	Dragonfly	Cumberland
Arrowhead spiketail	*Cordulegaster obliqua*	Dragonfly	Cumberland

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 the Creeper is considered a Species of Special Concern. 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: Project Area Freshwater Mussels

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
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
Alewife floater	*Anodonta implicata*	Alewife, American shad, blueback herring	Androscoggin / Sagadahoc	Silt/sand/gravel	Streams, rivers, lakes	Not Listed

Common Name	Scientific Name	Host	County	Substrate	Aquatic Environment	Status
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 al., 2000; Pers. Comm. Ethan Nedeau, 8/18/2017

5.3.7.4 Aquatic Invasive Species

There are no confirmed infestations of aquatic invasive zebra mussel, however, the non-native northern pike is documented in the Androscoggin River. Invasive aquatic botanical species are discussed in Section 5.3.3.1.

5.3.8 References

Atlantic States Marine Fisheries Commission (ASMFC). 2016a. Maine ASMFC River Herring Sustainable Fishing Plan. September 2016. http://www.asmfc.org/files/Shad%20SFMPs/ME_RiverHerring_SFMP_Sept2016.pdf

Atlantic States Marine Fisheries Commission (ASMFC). 2016b. ASMFC Stock Status Overview. January 2016.

Atlantic States Marine Fisheries Commission (ASMFC). 2012. Stock Assessment Report No. 12-02: River Herring Benchmark Stock Assessment Volume I. Accepted for management use May 2012.

Atlantic States Marine Fisheries Commission (ASMFC). 2010. Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring (American Shad Management). Prepared by ASMFC Shad and River Herring Plan Development Team.

Atlantic Salmon Recovery Project (ASRP). 2015. Draft SHRU Specific Recovery Implementation Strategy. http://kyoto.zentraal.com/atlantic-salmon-recovery-project/resources/documents/atlantic-salmon-recovery-plan-2015/recovery-plan-pages/shru-based-recovery/shru-specific-implementation-strategy-2015/index_html

Brautigam, F. and J. Pellerin. 2014. Upper Androscoggin Fishery Management Plan. Maine Department of Inland Fisheries and Wildlife. January 2014.

Brookfield White Pine Hydro (BWPH). 2016. 2015 Brunswick Project Fishway Report (FERC No. 2284) Article 30. Submitted to FERC on May 12, 2016.

Brookfield White Pine Hydro (BWPH) and Black Bear Hydro Partners (BBHP). 2016. Evaluation of Atlantic Salmon Passage, Spring 2015 – Weston, Shawmut, and Lockwood Projects, Kennebec River, and Pejepscot and Brunswick Projects, Androscoggin River. Prepared for Brookfield White Pine Hydro, LLC and Black Bear Hydro Partners, LLC by Normandeau Associates, Inc. March 2016.

Brown Bear II Hydro, Inc. (Brown Bear). 2016. Draft Biological Assessment for Gulf of Maine Distinct Population Segment of Atlantic Salmon. Prepared July 2016.

Brown, M.E., Maclaine, J., and L. Flagg. 2006. Annual Report: Anadromous Alosid Restoration in the Androscoggin River Watershed. State of Maine Department of Marine Resources, Augusta, ME. September 15, 2006.

Bruijs, M.C.M. and C.M.F. Durif. 2009. Silver eel migration and behaviour. Thillart, G., Dufour, S., and J. Rankin (eds.). Spawning Migration of the European Eel – Reproduction Index, a Useful Tool for Conservation Management. Springer, Netherlands. 477pp.

Charles Ritzi Associates. 1992. Pejepscot Hydroelectric Project, FERC Project No. 4784-ME – Evaluation of Upstream Fish Passage Facility. Report No. 2. Prepared for Topsham Hydro Partners.

Danie, D.S., Trial, J.G, and J.G. Stanley. 1984. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (North Atlantic) – Atlantic Salmon. U.S. Fish and Wildlife Service FWS/OBS-82/11.22. U.S. Army Corps of Engineers, TR EL-82-4. 19pp.

Downeast Salmon Federation (DSF). 2015. Atlantic Salmon Overview. https://mainesalmonrivers.org/atlantic-salmon-overview/ Accessed 12/16/2016.

Facey, D.E. and M.J. Van Den Avyle. 1987. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (North Atlantic) – American Eel. U.S. Fish and Wildlife Service Biological Report 82(11.74). U.S. Army Corps of Engineers, TR EL-82-4. 28pp.

Fay, C.W., Neves, R.J., and G.B. Pardue. 1983a. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Mid-Atlantic)– Alewife and Blueback Herring. U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-82/11.9. U.S. Army Corps of Engineers, TR EL-82-4. 25pp.

Fay, C.W., Neves, R.J., and G.B. Pardue. 1983b. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Mid-Atlantic) – Striped Bass. U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-82/11.8. U.S. Army Corps of Engineers, TR EL-82-4. 36pp.

Fuller, P., Foster, A., and L.A. Somma. 2016. *Chelydra serpentina*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. https://nas.er.usgs.gov/queries/factsheet.aspx?speciesID=1225 Revision Date: 1/30/2015

Inskip, P.D. (1982). Habitat suitability index models: Northern pike. U.S. Dept. Int., Fish Wild. Serv. FWS/OBS-82/10.17. 40pp.

HDR Engineering (HDR). 2011. Little River Habitat Assessment Report. Prepared for Topsham Hydro. December 2011.

Kircheis, F.W. 2004. Sea Lamprey – *Petromyzon marinus*. Prepared by F.W. Kircheis L.L.C., Marmel, Maine.

Limburg, K.E., Hattala, K.A., and A. Kahnle. 2003. American Shad in its Native Range. Pages 125-140 in K.E. Limburg and J.R. Waldman, editors. Biodiversity, status, and conservation of the world's shads. American Fisheries Society, Symposium 35, Bethesda, MD.

Maine Damselfly and Dragonfly Survey. 2016. Maine Damselfly and Dragonfly Survey Data. http://mdds.umf.maine.edu/ Accessed 12/6/16.

Maine Department of Environmental Protection (MDEP). 2016a. Benthic Macroinvertebrates. Maine Department of Environmental Protection. http://www.maine.gov/dep/water/monitoring/biomonitoring/sampling/bugs/ Accessed 12/9/16

Maine Department of Environmental Protection (MDEP). 2016b. Biomonitoring Data and Maps. Google Earth Download. Biological Monitoring Program. http://www.maine.gov/dep/water/monitoring/biomonitoring/data.htm Accessed 12/9/16.

Maine Department of Inland Fisheries & Wildlife (MDIFW). 2015. Maine's State Wildlife Action Plan (SWAP)-2015. Maine Department of Inland Fisheries & Wildlife. http://www.maine.gov/ifw/wildlife/reports/MWAP2015.html Accessed 12/6/16.

Maine Department of Inland Fisheries & Wildlife (MDIFW). 2013a. Species of Special Concern. Maine Department of Inland Fisheries & Wildlife 2011. http://www.maine.gov/ifw/wildlife/endangered/specialconcern.htm Accessed 12/5/16.

Maine Department of Inland Fisheries & Wildlife (MDIFW). 2013b. Snakes. Maine Department of Inland Fisheries & Wildlife. http://www.maine.gov/ifw/wildlife/human/lww_information/snakes.html Accessed 12/7/16.

Maine Department of Inland Fisheries and Wildlife (MDIFW). 2008. Northern Pike Assessment. Maine Department of Inland Fisheries and Wildlife. Prepared by F. Brautigam, November 2001, Updated by J. Lucas, January 2008.

Maine Department of Inland Fisheries and Wildlife (MDIFW). 1991. Spotted Turtle Assessment. Maine Department of Inland Fisheries and Wildlife, Wildlife Division, Wildlife Resource Assessment Section, Endangered and Threatened Species Group. https://www1.maine.gov/ifw/pdfs/species_planning/reptiles/spottedturtle/speciesassessment.pdf Accessed 12/8/16.

Maine Department of Marine Resources (MDMR). 2013. American Shad Habitat Plan. Submitted to the ASMFC. September 2013.

Maine Department of Marine Resources (MDMR). 2012. Androscoggin River Atlantic Salmon Tagging and Tracking Project 2011. Prepared by M. Pasterczyk, G. Wippelhauser, and M. Brown.

Maine Revised Statutes. 2009. Maine's Endangered and Threatened Species. http://www.maine.gov/ifw/wildlife/pdfs/Maine_ET_%20List_20090912.pdf. Accessed 12/9/16.

Miller Hydro Group (Miller Hydro). 2014. Worumbo Project (FERC No. 3428-ME) Annual Fish Passage Report. Submitted to FERC July 1, 2014.

Miller Hydro Group (Miller Hydro). 2013. Worumbo Project (FERC No. 3428-ME) Annual Fish Passage Report. Submitted to FERC July 29, 2013.

Milne, L. and M. Milne. 1980. *National Audubon Society Field Guide to Insects & Spiders*. Alfred A Knopf: New York, 1980. 31st printing October 2015. Pp. 363.

National Marine Fisheries Service (NMFS). 2009. Endangered and Threatened Species. Designation of critical habitat for Atlantic salmon (Salmo salar) Gulf of Maine Distinct Population Segment. Final rule. Federal Register, Vol. 74, No. 117. June 19, 2009.

National Marine Fisheries Service (NMFS). 2012a. NMFS Endangered Species Act Biological Opinion for the Proposed Amendment of License for the Pejepscot Project (FERC No. 4784).

National Marine Fisheries Service (NMFS). 2012b. NMFS Endangered Species Act Biological Opinion for Emergency Spillway Repair and Proposed Amendment of the License for the Worumbo Project (FERC No. 2428).

NatureServe Explorer. 2016. Comprehensive Report Species. NatureServe Explorer: An Online Encyclopedia of Life. Ver. 7.1. http://explorer.netureserve.org Accessed 12/6/16-12/9/16.

New England Fishery Management Council. 1998. Final Amendment for Essential Fish Habitat, Incorporating the Environmental Assessment. Saugus, MA: New England Fishery Management Council in Consultation with National Marine Fisheries Service.

North Atlantic Salmon Conservation Organization (NASCO). 2009. IP(09)07: Protection, Restoration, and Enhancement of Salmon Habitat Focus Area Report – USA. http://www.nasco.int/pdf/far_habitat/HabitatFAR_USA.pdf

Nedeau, E.J., McCollough, M.A., and B.I. Swartz. 2000. *The Freshwater Mussels of Maine*. Maine Department of Inland Fisheries and Wildlife: Augusta Maine, 2000.

Shepard, S.L. 2015. American Eel Biological Species Report. U.S. Fish and Wildlife Service, Hadley, Massachusetts. xii +120 pages.

Taylor, C.C. 1951. A Survey of Former Shad Streams in Maine. U.S. Department of the Interior. Special Scientific Report: Fisheries No. 66, August, 1951.

Topsham Hydro. 2012a. Investigation of Potential Additional Protection and Enhancement Measures for Listed Species. Attachment B in the Draft Biological Assessment for Gulf of Maine DPS of Atlantic Salmon. April, 2012.

Topsham Hydro. 2012b. Species Protection Plan – Topsham Project. Attachment A in the Draft Biological Assessment for Gulf of Maine DPS of Atlantic Salmon. April, 2012.

Topsham Hydro. 2014. Atlantic Salmon Passage Study Report – Topsham Hydroelectric Project. Prepared for Topsham Hydro Partners Limited Partnership by HDR Engineering, March 2014.

Topsham Hydro. 2015. 2014 Atlantic Salmon Passage Study Report – Pejepscot Project. Prepared for Topsham Hydro Partners Limited Partnership by HDR Engineering, March 2015.

U.S. Atlantic Salmon Assessment Committee (USASAC). 2015. Annual Report of the U.S. Atlantic Salmon Assessment Committee. Report No. 28 – 2015 Activities. Prepared for the U.S. Section to NASCO.

U.S. Fish and Wildlife Service (USFWS) and NOAA-Fisheries. 2016. Draft Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (*Salmo salar*). 61 pp.

U.S. Fish and Wildlife Service (USFWS). 2015. Press Release – American Eel Population Remains Stable – Does not Need ESA Protection. October 7, 2015.

Warner Nature Center. 2016. Painted Turtle. https://www.warnernaturecenter.org/animals/paintedturtle. Accessed 12/7/16.

Weiss-Glanz, L.S., J.G. Stanley, and J.R. Morning. 1986. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (North Atlantic) – American Shad. U.S. Fish and Wildlife Service Biological Report 82(11.59). U.S. Army Corps of Engineers, TR EL-82-4. 16pp.

Yoder, C.O., B.H. Kulik, J.M. Audet, and J.D. Bagley. 2006. The Spatial and Relative Abundance Characteristics of the Fish Assemblages in Three Maine Rivers. Technical Report MBI/12-05-1. September 1, 2006.

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

5.4.1 Regional Setting

Per the U.S. Forest Service (USFS) ecoregion classification system, the Pejepscot Project is located in the Laurentian Mixed Forest Province and, more specifically, the Central Maine Coastal and Interior Section. The Laurentian Mixed Forest Province lies between the boreal forest and broadleaf deciduous forest zones and, as such, is considered transitional (Bailey, 1995). The Central Maine Coastal and Interior Section is also regionally described as a transitional zone; from both west to east as well as from south to north. From west to east, the forest transitions from mixed hardwoods typical of the southern New England coastal plain to northern coastal spruce-fir and spruce-fir northern hardwood communities. From south to north, coastal communities typically transition to northern hardwood communities (Bailey, 1995). Within the Central Maine Coastal and Interior Section, the Project lies within the interior transitional zone.

The Project boundary generally follows the shoreline of the Pejepscot Impoundment at El. 75.0. Downstream of the dam, the Project boundary generally encompasses the Project facilities and river before terminating 260 feet downstream of the dam. 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 Pejepscot Impoundment were determined based on the Northeast Terrestrial Habitat Map (Ferree and Anderson, 2013), which is a continuous GIS coverage that maps upland wildlife 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 Pejepscot 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 (Ferree and Anderson, 2013).

Other habitat types found in the vicinity of the Project include Developed; Agriculture; Laurentian-Acadian Large River Floodplain; and Laurentian-Acadian Alkaline Conifer-

Hardwood Swamp. Habitat and vegetation associated with wetlands are discussed in Section 5.5.1.

5.4.2.1 Invasive Plant Species and Noxious Weeds

Review of the Maine Natural Areas Program (MNAP) invasive plant fact sheets found that there are currently nineteen plant species considered invasive in Maine. Of these nineteen species, only 10 have the potential to occur in the Project Area including: Mulitflora Rose, Purple Loosestrife, and Asiatic Bittersweet (MNAP, 2013). 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, 2013).

5.4.3 Terrestrial Wildlife Resources

The Project boundary essentially follows the impoundment shoreline and therefore encompasses limited terrestrial habitat. Along the Project 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.

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, 2016). Furbearers that may utilize the Project 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 (Bailey, 1995). 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, indicating that the White-tailed Deer populations may be present year-round (MDIFW, 2016).

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 (Ferree and Anderson, 2013). In addition, the Pejepscot Impoundment and surrounding areas provide habitat for migrating bird species (IPaC, 2016). A list of bird species which may occur in the Project Area is provided in Table 5.4.3-1.

5.4.3.1 Temporal and Spatial Distribution of Wildlife Resources

Species that are accustomed to light development, agriculture, and forested or wetland areas may be found year-round in the Project Area. Many avian species may be present in the Project Area seasonally, with some species present year-round.

Table 5.4.3-1: Representative Birds in the Project Area

Common Name	Scientific Name
American Bittern	*Botaurus lentiginosus*
American Crow	*Corvus brachyrhynchos*
American Oystercatcher	*Haematopus palliatus*
American Robin	*Turdus migratorius*
Bald Eagle	*Haliaeetus leucocephalus*
Bay-breasted Warbler	*Setophaga castanea*
Black Capped Chickadee	*Poecile atricapillus*
Black-billed Cuckoo	*Coccyzus erythropthalmus*
Blue jay	*Cyanocitta cristata*
Brown Creeper	*Certhia americana*
Canada Warbler	*Cardellina canadensis*
Cedar Waxwing	*Bombycilla cedrorum*
Common Raven	*Corvus corax*
Eastern Bluebird	*Sialia sialis*
Eastern Phoebe	*Sayornis phoebe*
European Starling	*Sturnus vulgaris*
Gray Catbird	*Dumetella carolinensis*
Gray Jay	*Perisoreus canadensis*
Great Cormorant	*Phalacrocorax carbo*
House Wren	*Troglodytes aedon*
Hudsonian Godwit	*Limosa haemastica*
Least Bittern	*Ixobrychus exilis*
Least Tern	*Sternula antillarum*
Northern Cardinal	*Cardinalis cardinalis*
Northern Mockingbird	*Mimus polyglottos*
Olive-sided Flycatcher	*Contopus cooperi*
Pied-billed Grebe	*Podilymbus podiceps*
Prairie Warbler	*Setophaga discolor*
Purple Sandpiper	*Calidris maritima*
Red-breasted Nuthatch	*Sitta canadensis*
Saltmarsh Sparrow	*Ammodramus caudacutus*
Short-eared Owl	*Asio flammeus*
Snowy Egret	*Egretta thula*
Tufted Titmouse	*Baeolophus bicolor*
Upland Sandpiper	*Bartramia longicauda*
White-breasted Nuthatch	*Sitta carolinensis*
Willow Flycatcher	*Empidonax traillii*
Winter Wren	*Troglodytes hiemalis*
Wood Thrush	*Hylocichla mustelina*

Source: IPaC 2016, Ferree and Anderson, 2013, and Baily 1995.

5.4.4 Invasive Wildlife Species

A number of 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 house mouse and Norway rat (MISN, 2016). Based on the habitat found within and surrounding the Project, invasive insects with the potential to occur within the Project Area and immediate vicinity include the European fire ant, gypsy moth, and winter moth. The European fire ant has been identified in coastal Kennebec County and is known to inhabit areas with urban development. Gypsy moth infestations are most prevalent in central and southern Maine and generally prefer hardwood trees (i.e., oak, aspen, and birch) for feeding. The winter moth occurs along the Maine coast, although may be more widespread and prefers to feed on hardwoods including oak, maple, ash, cherry, and apple trees (MISN, 2016).

5.4.5 References

Bailey, Robert G. March 1995. *Ecoregions of the United States*. United States Department of Agriculture: Forest Service. Rocky Mountain Research Station. https://www.fs.fed.us/land/ecosysmgmt/colorimagemap/images/212.html Accessed. December 2016.

Ferree, C and M. G. Anderson. 2013. A Map of Terrestrial Habitats of the Northeastern United States: Methods and Approach. The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. Boston, MA. https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/habitatmap/Pages/default.asp

Maine Department of Agriculture, Conservation and Forestry. 2016. Natural Communities and Ecosystems. Maine Natural Areas Program. http://www.maine.gov/dacf/mnap/features/community.htm Accessed December 2016.

Maine Department of Agriculture, Conservation, and Forestry. 2016. Maine Invasive Plant Fact Sheets. Maine Natural Areas Program 2013. http://www.maine.gov/dacf/mnap/features/invasive_plants/invsheets.htm Accessed April 2017.

Maine Department of Inland Fisheries & Wildlife. 2016. *Wildlife*. http://www.state.me.us/ifw/wildlife/index.html Accessed December 2016.

Maine Department of Inland Fisheries & Wildlife. 2016. *Small Mammals*. http://www.maine.gov/ifw/wildlife/species/mammals/small.html Accessed January 2017.

Maine Invasive Species Network. 2017. *Maine Invasives Mapping and Other Data* https://extension.umaine.edu/invasivespecies/home/maps/ Accessed July 2017.

United States Fish & Wildlife Service. 2016. *IPaC Trust Resources Report*. https://ecos.fws.gov/ipac/ Accessed December 2016.

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

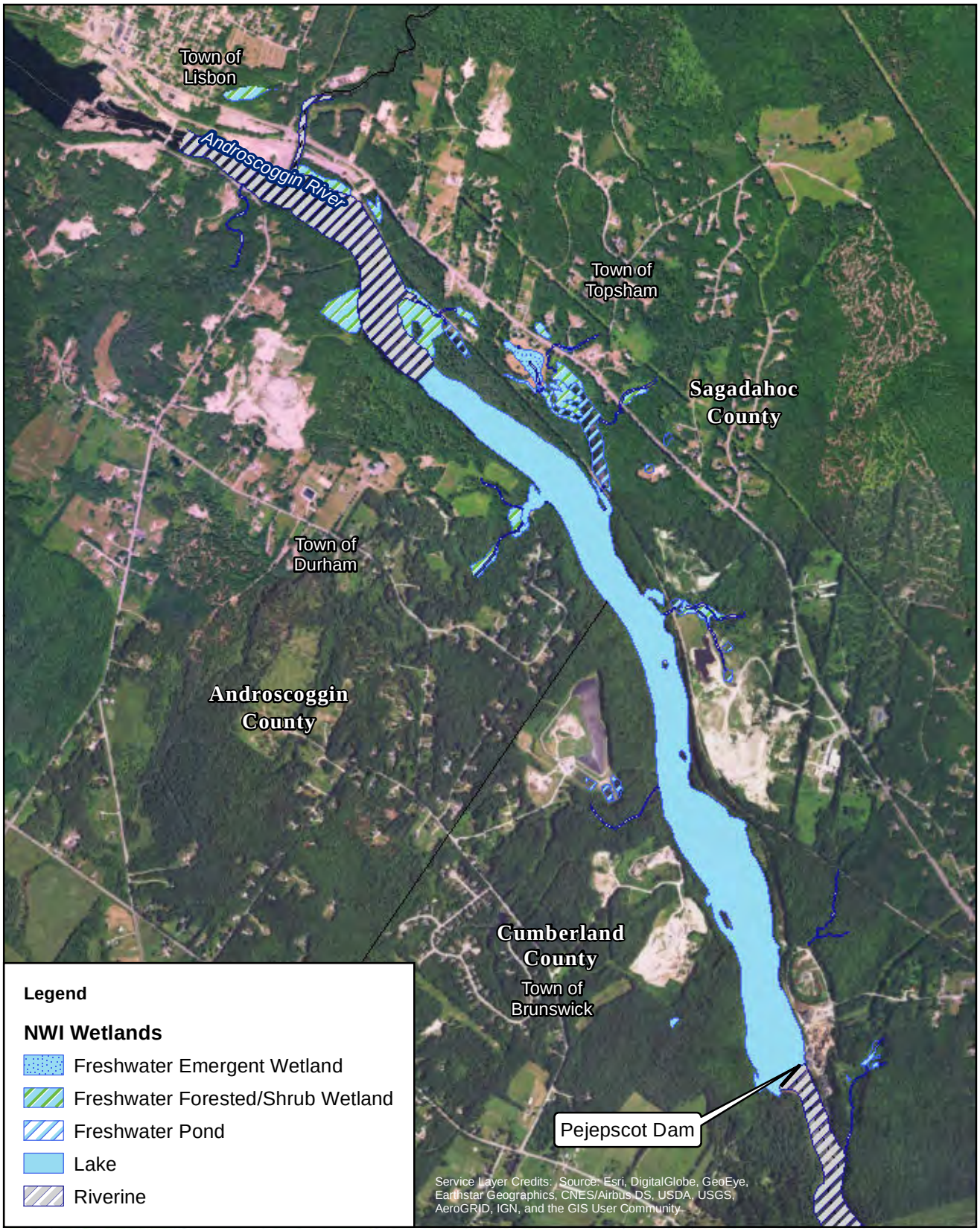
5.5.1 Wetland Habitat and Vegetation

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 291 acres categorized as wetlands (Figure 5.5.1-1). Of these, 258 acres are considered open water and are split between riverine, lake, and freshwater pond. The remaining 33 acres are considered either freshwater emergent or freshwater forested/shrub wetlands, which are further defined by the MDEP.

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, 2017).

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, 2017).



Brookfield

Pre-Application Document
Pejepscot Hydroelectric Project (FERC No. 4784)

N

0 1,000 2,000 4,000 Feet

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

Path: P:\1925\maps\pad\figure_5_5_1-1_wetlands.mxd

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. Riparian zone habitat and vegetation adjacent to the Pejepscot 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. At the dam, there is little to no riparian zone due to the presence of bedrock and riprap on the west side (right side looking downstream) and the powerhouse, railroad bed and industrial area on the east side (left side looking downstream). 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 considered to by 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 Pejepscot Dam includes approximately three miles of the Androscoggin River. The impoundment has a surface area of 225 acres, and gross storage of 3,278 acre-feet at a pond elevation of 67.5 feet. Google Earth 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.

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

5.5.5 References

Maine Department of Environmental Protection. 2017. Wetland types. http://www.maine.gov/dep/water/wetlands/types.html

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

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 MNAP. 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

Atlantic salmon are a federally endangered fish species. Their life history and habitat requirements are discussed extensively in Section 5.3. 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 and is discussed in Sections 5.3.2 and 5.3.3. Likewise, EFH for Atlantic salmon is discussed Section 5.3.2.

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

Atlantic salmon are the only federally endangered fish or freshwater aquatic species found in the Project Area. 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 early spring, and when juveniles (smolts) pass downstream through the area in the spring.

There are four species of amphibian and four species of reptile that are state-listed species of special concern, which may be present in the Project Area as well as one mussel species (Creeper) that is state-listed as a species of special concern that may be present in the Project Area. In addition, there are ten odonate species of special concern that may be present in the Project Area, which may be present year-round as juveniles in aquatic habitats or as adults after emerging during the warmer months. 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

Common Name	Scientific Name	Status
Atlantic salmon	*Salmo salar*	Federally Endangered
Northern spring salamander	*Gyrinophilus porphyriticus*	State Special Concern
Blue-spotted salamander	*Ambystoma laterale*	State Special Concern
Mink frog	*Lithobates septentrionalis*	State Special Concern
Northern leopard frog	*Lithobates pipiens*	State Special Concern
Northern brown snake	*Storeria d. dekayi*	State Special Concern
Eastern ribbon snake	*Thamnophis sauritus*	State Special Concern
Spotted turtle	*Clemmys guttata*	State Special Concern
Wood turtle	*Glyptemys insculpta*	State Special Concern
Creeper	*Strophitus undulatus*	State Special Concern

5.6.4 Threatened and Endangered Wildlife Species

There are several terrestrial species identified by USFWS and MDIFW as TE or Special Concern. The USFWS identified the northern long-eared bat, a threatened species as potentially occurring in the Project Area (USFWS, 2016). In addition, MDIFW has identified nine mammal species that are classified as TE or Special Concern (Table 5.6.4-1). The majority of this group is comprised of various bat species. Bat species' populations have been declining due to White Nose Syndrome, a fungal disease. Furthermore, MDIFW has identified 32 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.

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 (MDIFW, 2017). 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

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 Myotis	Myotis leibii	Threatened
Little Brown Bat	Myotis lucifugus	Endangered
Northern Long-Eared Myotis	Myotis septentrionalis	Endangered (Federally Threatened)
Tri-Colored Bat	(Perimyotis subflavus	Special Concern
New England Cottontail	Sylvilagus transitionalis	Endangered

Source: SWAP 2015

Table 5.6.4-2: Birds Identified as TE or Special Concern

Common Name	Scientific Name	State Status
Northern Harrier	*Circus cyaneus*	Special Concern
Harlequin Duck	*Histrionicus histrionicus*	Threatened
Chimney Swift	*Chaetura pelagica*	Special Concern
Upland Sandpiper	*Bartramia longicauda*	Threatened
Black Tern	*Chlidonias niger*	Endangered
Whimbrel	*Numenius phaeopus*	Special Concern
Common Tern	*Sternula hirundo*	Special Concern
Yellow-Billed Cuckoo	*Coccyzus americanus*	Special Concern
Peregrine Falcon	*Falco peregrinus*	Endangered
American Coot	*Fulica americana*	Special Concern
Grasshopper Sparrow	*Ammodramus savannarum*	Endangered
Canada Warbler	*Cardellina candensis*	Special Concern
Sedge Wren	*Cistothorus platensis*	Endangered
Olive-Sided Flycatcher	*Contopus cooperi*	Special Concern
Eastern Wood-Pewee	*Contopus virens*	Special Concern
Least Flycatcher	*Empidonax minimus*	Special Concern
Horned Lark	*Eremophila alpestris*	Special Concern
Barn Swallow	*Hirundo rustica*	Special Concern
Wood Thrush	*Hylocichla mustelina*	Special Concern
Orchard Oriole	*Icterus spurius*	Special Concern
Eastern Towhee	*Pipilo erythrophthalmus*	Special Concern
Prairie Warbler	*Setophaga discolor*	Special Concern
Yellow Warbler	*Setophaga petechia*	Special Concern
Northern Rough-Winged Swallow	*Stelgidopteryx serripens*	Special Concern
Eastern Meadowlark	*Sturnella magna*	Special Concern
Tree Swallow	*Tachycineta bicolor*	Special Concern
Brown Thrasher	*Toxostoma rufum*	Special Concern
White-Throated Sparrow	*Zonotrichia albicollis*	Special Concern
Great Blue Heron	*Ardea herodias*	Special Concern
Least Bittern	*Ixobrychus exilis*	Endangered

Common Name	Scientific Name	State Status
Black-Crowned Night-Heron	*Nycticorax nycticorax*	Endangered
Great Cormorant	*Phalacrocorax carbo*	Threatened

Source: SWAP 2015

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: Potential TE or Special Concern Botanical Resources in the Project Area

Common Name	Scientific Name	State Status	County
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	Androscoggin/Cumberland
White Adder's-mouth	*Malaxis monophyllos*	Endangered	Androscoggin
Spotted Pondweed	*Potamogeton pulcher*	Threatened	Cumberland
Smooth Winterberry Holly	*Ilex laevigata*	Special Concern	Androscoggin/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	Androscoggin/Cumberland

Source: MDACF 2016

5.6.6 References

Maine Department of Agriculture, Conservation and Forestry. 2016. *Natural Communities and Ecosystems.* Maine Natural Areas Program. http://www.maine.gov/dacf/mnap/features/community.htm Accessed December 2016

Maine Department of Inland Fisheries & Wildlife. 2015. *Maine's State Wildlife Action Plan* (SWAP). http://www.state.me.us/ifw/wildlife/reports/wap.html Accessed January 2017.

Maine Department of Inland Fisheries & Wildlife. 2016. *Small Mammals.* http://www.maine.gov/ifw/wildlife/species/mammals/small.html Accessed April 2017.

United States Fish & Wildlife Service. 2016. *IPaC Trust Resources Report*. https://ecos.fws.gov/ipac/ Accessed December 2016.

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

5.7.1 Overview

Recreational and non-recreational land use in the Project vicinity reflects the generally rural, forested, riverine location. Recreation along the Androscoggin River and surrounding area typically includes hiking, cross-country skiing, snowshoeing, snowmobiling, and mountain biking, as well as fishing, boating, hunting, picnicking, and wildlife watching. Selected recreation parameters for each of the three counties abutting the Project are discussed in Section 5.7.2.

Major land use classifications of the river basin and within the immediate Project vicinity are discussed in Section 3.2. As previously noted, the Project boundary is within four towns: the Towns of Durham and Lisbon in Androscoggin County, the Town of Topsham in Sagadahoc County, and the Town of Brunswick in Cumberland County (see Figure 3.4-1). Non-recreational land uses in the area include industrial, commercial, residential and agricultural uses. Commercial and residential development is concentrated within town centers and along transportation corridors, industrial development is concentrated near the eastern shore of the Androscoggin River, and agricultural uses are set back from both banks of the river.

No Project lands are included in, or under study for inclusion in, the National Trails System or the National Wilderness Preservation System (UM, 2016). 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, 2016) or included in the Nationwide Rivers Inventory (NRI) (NPS, 2009). The downstream tidewater section of the Androscoggin River from Merrymeeting Bay to Brunswick is listed in the NRI for outstanding fish, wildlife, botanical, hydrologic, recreational, and historic values. The river segment roughly 100 miles upstream of the Project in Oxford County, from south of Rumford Center to Hastings Island, is listed in the NRI as "a sparsely developed high order river" with an historic Atlantic salmon fishery (NPS, 2009).

5.7.2 Regional Recreation Opportunities

The Project Area lies within three of Maine's tourism regions: Mid-coast and Islands, Greater Portland and Casco Bay, and Lakes and Mountains (MOT, 2016). The three regions span a large portion of the state, and offer an array of recreational opportunities. The Maine Office of Tourism identifies commercial recreational opportunities downstream of the Project in Brunswick, including Thomas Point Beach & Campground and Brunswick Golf Course. Other opportunities listed in the immediate area include Bradbury Mountain State Park (located approximately 9 miles southwest of the Project), Pineland Public Reserved Land (located approximately 11 miles southeast of the Project), Androscoggin Riverlands State Park (located approximately 16 miles northeast of the Project), Outlet Beach (located approximately 16 miles east of the Project), and several private campgrounds. The Merrymeeting Bay area provides numerous recreation

opportunities on and off the water, including at John L. Baxter State Forest and the Steve Powell Wildlife Management Area on Swan Island (MOT, 2016).

Bradbury Mountain State Park provides over 800 acres of forested land for camping, hiking, picnicking, horseback riding, biking, snowshoeing, wildlife viewing, and snowmobiling. The park is situated off Route 9 in Pownal and open year-round. There is a small fee for admission to the park. Facilities include a campground, picnic area, group picnic shelter, playground, and showers (MOT, 2016).

Pineland Public Reserved Land, located on both sites of Route 231 in New Gloucester, Gray and North Yarmouth, contains over 600 acres of undeveloped land. Activities include cross country skiing, fishing, hiking, biking, snowshoeing, and wildlife viewing (MOT, 2016).

Outlet Beach is a family-owned beach on the north shore of Sabbathday Lake in New Gloucester. The beach is open for swimming and boating from Memorial Day through mid-September, and offers two floating docks, a floating diving board, an offshore slide, a snack bar, a picnic area, bathhouses, and restrooms. There is a small fee for admission to the beach and boat launch area. Canoes, paddleboats, kayaks and tubes are available for rent (MOT, 2016).

Located north of Lewiston, the 2,675 acre Androscoggin Riverlands State Park offers trails for hiking, cross-country skiing, snowshoeing, snowmobiling, and mountain biking, as well as opportunities for fishing, motorized and non-motorized boating, hunting, picnicking, and wildlife watching. The park has 12 miles of river frontage and is part of the larger Androscoggin Greenway (the southernmost section of the river) and the Androscoggin River Trail (MDACF, 2013). The Androscoggin River Trail connects public river access points along the river from Shelburne, NH, to Rumford, ME, allowing for boating trips of varying lengths along mostly flat water. The Androscoggin Greenway section of the trail provides access sites in the Project vicinity, including in the Towns of Lisbon, Durham, Topsham and Brunswick (ARWC, 2012).

Several smaller parks in the towns surrounding the Project Area provide hiking, biking, snowshoeing and cross country skiing trails, including Summer Street Park in the Town of Lisbon, Durham River Park in the Town of Durham, and Foreside Trails in the Town of Topsham. Table 5.7.2-1 provides an overview of select recreation parameters broken down by county.

Table 5.7.2-1: Select Recreation Parameters by County

	Androscoggin County	Cumberland County	Sagadahoc County
Boat Launches – Hand Carry Only	3	6	3
Boat Launches	13	39	11
Trails – ATV (mi.)	67	102	65
Trails – Snowmobile (mi.)	589	640	160
Conservation Land (acres)	9,189	38,163	18,502
Conservation Land - % of County	2.9%	6.5%	11.3%

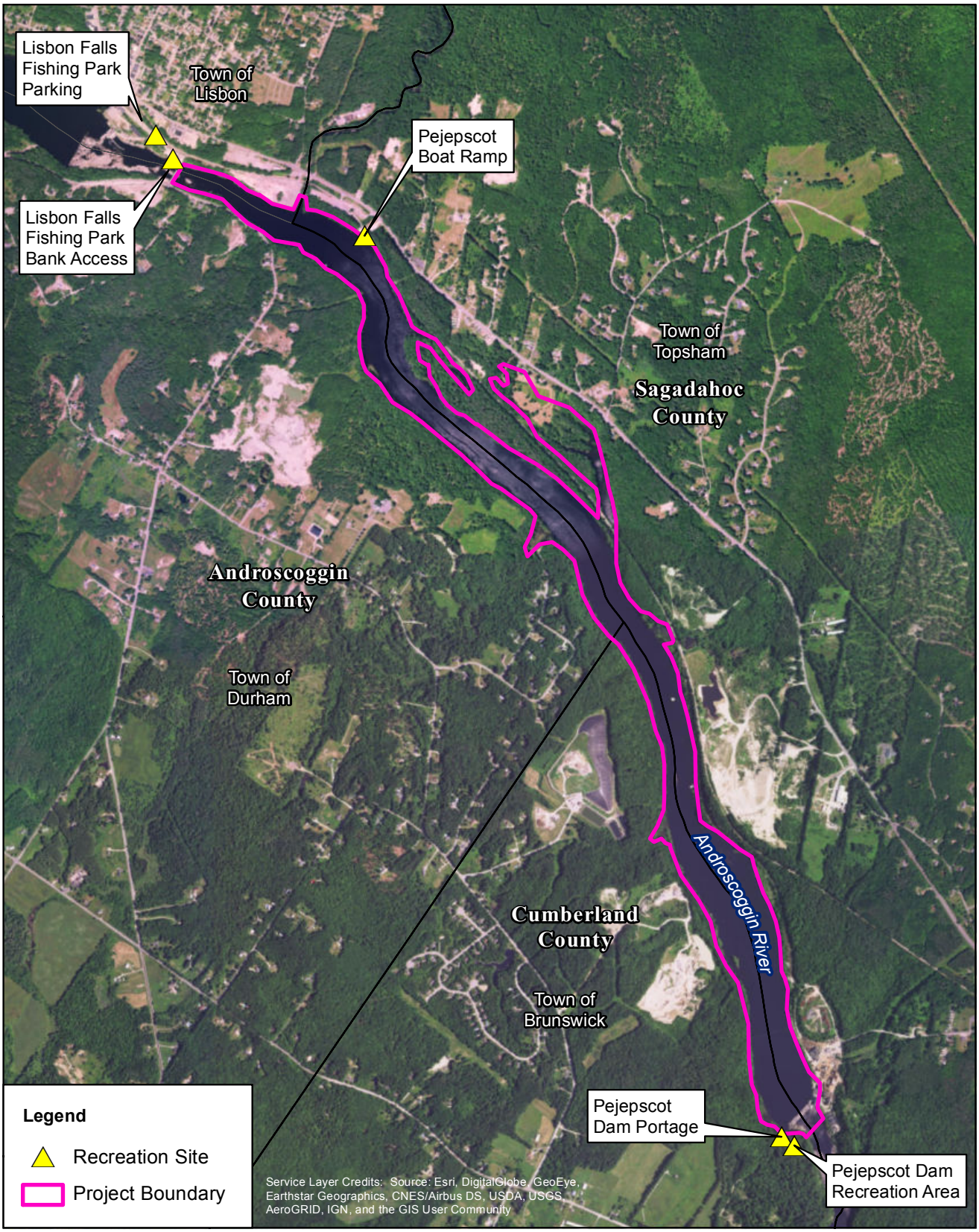
Source: MDOC, 2009

5.7.3 Existing Project Area Recreation Facilities

Topsham Hydro is required to report recreational facilities and estimated usage to FERC every six years on a Licensed Hydropower Recreation Report Form 80 (Form 80). According to the most recently filed Form 80 for the Pejepscot Project, 100 percent of the Project shoreline is available for public use (Topsham Hydro Partners, 2015).

The Project boundary encompasses three FERC approved Project recreational amenities owned or managed by Topsham Hydro: one boat launch, one portage, and one access point (Topsham Hydro Partners, 2015) and also partially encompasses the Lisbon Falls Fishing Park. These Project Area recreation facilities are shown in Figure 5.7.3-1 and described below:

- **Boat Launch**: Pejepscot Boat Ramp (alternately called Lisbon Falls Boat Launch or Topsham Hydro Boat Launch) is located in Topsham off Route 196, on the eastern shore of the river just downstream from Lisbon Falls. The site provides access for trailered and hand-carry boats just below Worumbo Dam via a concrete ramp with an asphalt approach. The site accommodates 10 to 15 vehicles on a sloping gravel lot. There are no amenities provided (ARWC, 2016c).
- **Access Point**: Pejepscot Dam Recreation Area (alternately called Pejepscot Fishing Park) is located off River Road in Brunswick, on the western shore of the river. The site provides access to the river just above the dam, as well as a trail and metal staircase for portaging around the dam (see below). Parking at the site accommodates about 4 vehicles. There are no amenities at the site (ARWC, 2016b).
- **Portage:** Pejepscot Dam Recreation Area offers a take out, trail, and put in for portaging around the Pejepscot Dam. The put in is comprised of a metal staircase with a boat slide for descending the rocky shoreline below the dam (ARWC, 2016b).
- In addition to the FERC approved recreational amenities described above, the Lisbon Falls Fishing Park is located adjacent to the Route 125 bridge and approximately 600 feet downstream of Worumbo Dam. The Fishing Park includes a parking area on the north side of Route 125 as well as two paths and one set of stairs leading to the river.



Brookfield

Pre-Application Document
Pejepscot Hydroelectric Project (FERC No. 4784)

N

0 1,000 2,000 4,000 Feet

Figure 5.7.3-1: Recreation Sites in the Vicinity of the Pejepscot Project

Path: P:\1925\maps\pad\figure_5_7_3-1_recreation.mxd

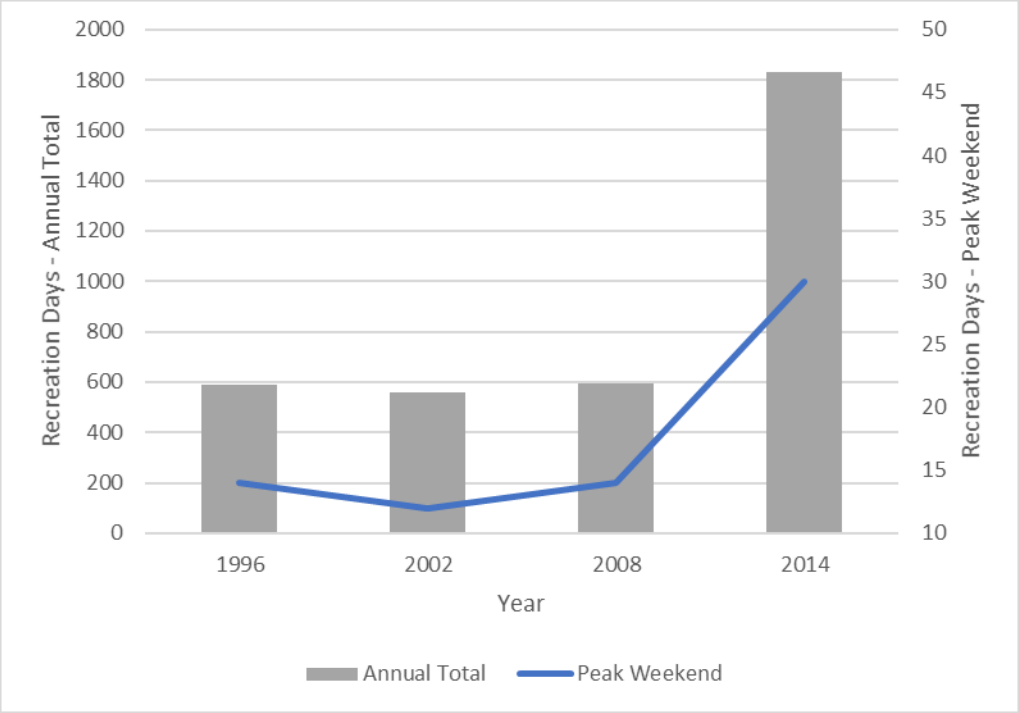
5.7.4 Project Recreation Use

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 most recent estimate of use available indicates an annual total of approximately 1,830 recreation days at publicly available areas at the Project, with a peak weekend average of 30 recreation days (Topsham Hydro Partners, 2015). This includes activity at the boat launch, the portage, and the access site. No overnight activity was reported for locations within the Project boundary.

A review of the Form 80's from 1997, 2003, 2009, and 2015 indicates that estimated recreational use within the Project boundary was consistent from 1996 to 2008; however, between 2008 and 2014, recreational use within the Project boundary nearly tripled (Figure 5.7.4-1). This may be an artifact of the different methodology used to estimate usage at the area facilities in the latter Form 80 survey.

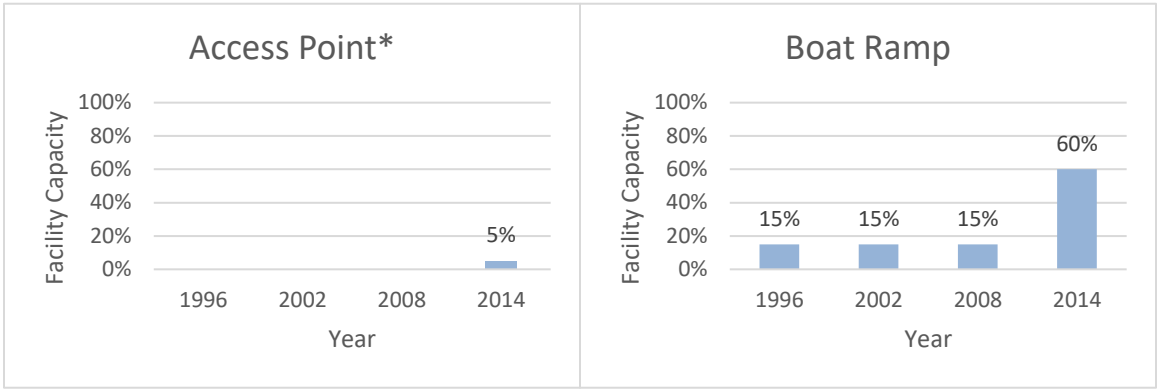
The 2015 Form 80 estimates Project use relative to capacity during the preceding 6 years. The boat launch site was used at approximately 60 percent of capacity, the portage site was used at 10 percent of capacity, and the access site at 5 percent of capacity. Figure 5.7.4-2 presents facility capacity for each Project amenity reported on Form 80's from 1996-2014.

Figure 5.7.4-1: Estimated Daytime Recreation Use at the Pejepscot Project, 1996-2014

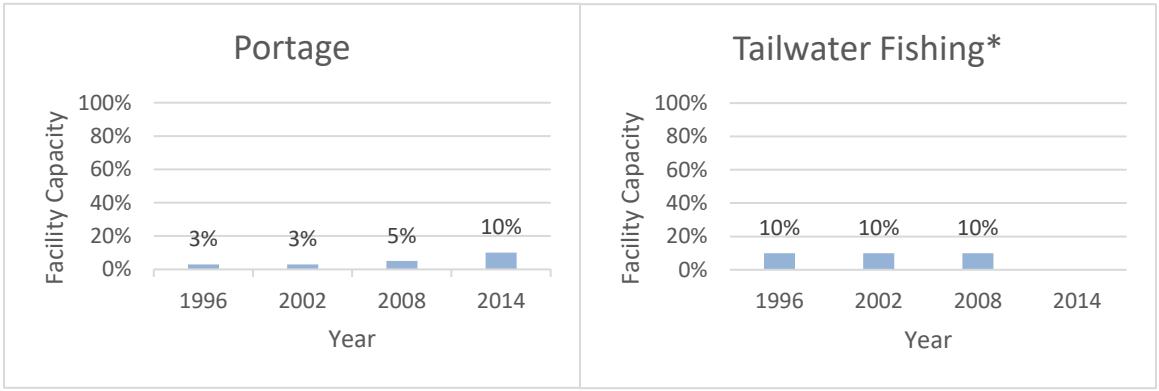


Source: Topsham Hydro Partners, 1997, 2003, 2009, 2015

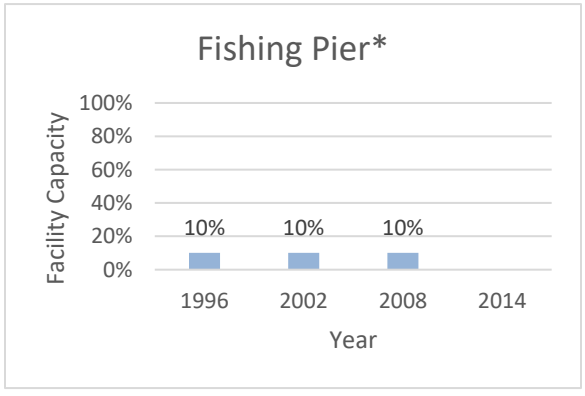
Figure 5.7.4-2: Estimated Capacity for Recreational Facilities, Pejepscot Project, 1996-2014



*Access point not listed on Form 80 prior to 2014.



*Tailwater fishing facility not listed on Form 80 in 2014.



*Fishing pier not listed on Form 80 in 2014.

Source: Topsham Hydro Partners, 1997, 2003, 2009, 2015

5.7.5 Project Vicinity Recreation Needs Identified in Management Plan

Two statewide plans serve as management plans for recreational needs in the Project vicinity: the Maine Statewide Comprehensive Outdoor Recreation Plan (SCORP) and the Strategic Plan for Providing Public Access to Maine Waters for Boating and Fishing. The Androscoggin Valley Council of Governments (AVCOG), a resource sharing organization for all the municipalities in Androscoggin, Franklin, and Oxford counties, has developed a regional comprehensive plan that includes Androscoggin County. In addition, each of the towns surrounding the Project has a Comprehensive Plan 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 Maine Bureau of Parks and Lands (BPL) reviews statewide recreational needs at five-year intervals. The most recent review is reported in the 2014-2019 SCORP. Within the SCORP, BPL 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 focus on connectivity: connecting Mainers of all ages with the health benefits of outdoor recreation, supporting regionally connected trail systems, and connecting to future tourism markets. The SCORP did not identify any strategies specific to the Project or in the vicinity of the Project (BPL, 2009).

5.7.5.2 Boating Facilities Strategic Plan

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

5.7.5.3 Western Maine Regional Open Space Policy

The Western Maine Regional Open Space Policy (WMROSP) was published by the AVCOG. The WMROSP does not identify any specific lands for conservation, but instead seeks to develop policies and direct conservation opportunities in the future. Among the goals of the WMROSP that may bear relevance to the Project are: (1) to promote open spaces as a way to improve Western Maine's "Quality of Place"; (2) to work with private land owners to continue the tradition of public access to private lands for outdoor recreation; and (3) conserve energy and encourage the growth of alternative energy sources including wind and hydroelectric (AVCOG, 2009).

5.7.5.4 Town Comprehensive Plans

The Comprehensive Planning and Land Use Act, adopted by the State of Maine in 1988, requires that towns in Maine have a comprehensive plan consistent with the state Growth

Management Act to impose certain ordinances or qualify for certain grant and loan programs.

The Town of Brunswick 2008 Comprehensive Plan Update contains key policies to meet the Town's overall needs, including a policy to protect open space and natural resources and to provide outdoor recreational opportunities. The Town anticipates needing additional recreational facilities to accommodate population growth. The Comprehensive Plan refers to the Town's 2002 Parks, Recreation, and Open Space Plan, which includes policies for improving recreation opportunities within the Town, including acquisition and development of additional recreational facilities and provision of water access. A key objective of the Comprehensive Plan is to implement the policies in the Parks, Recreation and Open Space Plan (Town of Brunswick, 2008).

The Town of Durham 2002 Comprehensive Plan establishes methods to strengthen land use and zoning ordinance categories that protect certain areas from new development, allowing for open space and limited recreational use. One of the Town's goals as established by the Plan is to "protect and promote the availability of recreational opportunities for all Durham residents." The corresponding Town policies include creating access to rivers and ponds for minimal-impact uses, with implementation measures specific to the Androscoggin River: (1) support the town's membership in the Androscoggin River Watershed Council; (2) ensure that Durham residents have access to the Androscoggin River by maintaining the existing public boat launch facility and river park; and (3) encourage improved access to rivers, ponds and trails (Town of Durham, 2002).

The Town of Lisbon Comprehensive Plan Update, adopted in 2007 and amended in 2011, identifies a need for additional formal recreation facilities and programs. Policies to meet this need include providing access to the Androscoggin River; encouraging the practice of allowing public access to private lands; and creating a recreation/open space/ball field on the waterfront above the Worumbo Dam. The Plan also recommends a regional approach to water resource management in the Androscoggin River basin (Town of Lisbon, 2011).

The 2005 Town of Topsham Comprehensive Plan acknowledges that the recreational needs of the community are changing; as the population ages, participation in recreational activities has increased. The Plan identifies an adequate supply of outdoor recreation space, but a need for increased indoor recreation space and a recreation master plan to accommodate shifting recreation trends. Specific actions related to recreation include exploring partnership opportunities with private and nonprofit recreation providers to expand the variety of recreation opportunities, creating a Downtown Waterfront Park along the Androscoggin River, and ensuring that existing and new facilities are maintained (Town of Topsham, 2005).

5.7.6 Land Use and Management within the Project Vicinity

Land use classifications found throughout the Androscoggin River watershed upstream of Pejepscot Dam as well as within 1,000 ft. of the Project boundary were discussed in

Section 3.2 and depicted in Figure 3.2-2. The majority of land surrounding the Project is privately owned. As previously noted, land adjacent to and within the Project boundary is primarily forested, with limited development within the boundary except Project facilities. Within the Project vicinity, land use is mixed, with significant commercial development concentrated near the centers of the Towns of Lisbon, Topsham and Brunswick and along the Maine Route 196 corridor. The town of Durham is mainly residential and sparsely developed. There are, however, significant commercial and industrial land uses in the Project vicinity including a metal recovery and recycling facility immediately adjacent to the Project powerhouses, an active railroad line along the eastern side of the impoundment, and several active rock and gravel pits in proximity to the Project. Alternatively, the majority of the southwest Project shoreline within the Town of Brunswick as well as the southeast shoreline of Little River is in conservation (Maine Office of GIS, 2016).

Management of lands external to the Project boundary fall under the jurisdiction of the town in which they are located. The State of Maine's Mandatory Shoreland Zoning Act (MSZA) requires that land within 250 feet of any river be subject to zoning and land use controls, allowing local municipalities authority, with State oversight, to establish shoreline buffer zones and regulations. The Maine Board of Environmental Protection (MBEP) is required to set, and update as needed, minimum guidelines for these municipal zoning and land use controls. The Towns of Lisbon, Durham, Topsham and Brunswick have adopted Shoreland Zoning Ordinances with shoreline buffer zones meeting MBEP minimum requirements, including setbacks for new construction and vegetation removal (MBEP, 2016).

As required per the MSZA, lands within 250 feet of the Androscoggin River are zoned with a Resource Protection overlay within all four towns abutting the Project boundary; however, the base zoning varies between towns. Only a small portion of the Project boundary is within the Town of Lisbon; these lands are zoned Industrial along the Androscoggin shoreline and Resource Protection along Little River (Town of Lisbon, 2012). Lands in the Town of Brunswick, along the southwestern portion of the Project boundary, are zoned County Residential 1 (Town of Brunswick, 2009). The northwestern portion of the Project boundary, within the Town of Durham, is zoned Rural (Town of Durham, 2004). Within the Town of Topsham, the northeastern portion of the Project boundary is zoned Rural Residential and the southeastern portion is zoned Industrial (Town of Topsham, 2015).

5.7.7 Land Use and Management of Project Lands

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

5.7.8 References

Androscoggin River Watershed Council (ARWC). 2012. Androscoggin River Trail Access Sites: Lower Androscoggin – Riverlands. August 2012. [Online] URL: http://arwc.camp7.org/Resources/Documents/Lower%20Androscoggin_Riverlands.pdf. Accessed 12/14/2016.

Androscoggin River Watershed Council (ARWC). 2016a. Androscoggin Greenway-Riverlands. [Online] URL: http://arwc.camp7.org/greenway. Accessed 12/14/2016.

Androscoggin River Watershed Council (ARWC). 2016b. Androscoggin Greenway-Riverlands: Pejepscot Fishing Park. [Online] URL: http://arwc.camp7.org/resources/Pictures/Pejepscot%20Fishing%20Park.pdf. Accessed 12/14/2016.

Androscoggin River Watershed Council (ARWC). 2016c. Androscoggin Greenway-Riverlands: Topsham Hydro [Online] URL: http://arwc.camp7.org/resources/Pictures/Topsham%20Hydro.pdf. Accessed 12/14/2016.

Androscoggin Valley Council of Governments (AVCOG). 2009. Western Maine Regional Open Space Policy. [Online] URL: http://www.avcog.org/DocumentCenter/Home/View/42. Accessed on 8/18/2017.

Maine Department of Environmental Protection (MBEP). 2016. Mandatory Shoreland Zoning. [Online] URL: http://www.maine.gov/dep/land/slz/. Accessed on 12/16/2016.

Maine Bureau of Parks & Lands (BPL). 2009. Maine State Comprehensive Outdoor Recreation Plan 2009-2014. [Online] URL: http://www.maine.gov/doc/parks/programs/SCORP/index.html. Accessed 12/8/2016.

Maine Bureau of Parks and Lands (BPL). 2013. Boating Facilities Program Priorities. [Online] URL: http://www.maine.gov/dacf/parks/about/boating_facilities_program/strategic_plan/priorities.html. Accessed on 12/8/2016.

Maine Department of Agriculture, Conservation and Forestry (MDACF). 2013. Androscoggin Riverlands. [Online] URL: http://www.maine.gov/cgi-bin/online/doc/parksearch/index.pl?search_radio=1&state_park=98&historic_site=&public_reserved_land=&shared_use_trails=&town=&distance=&submit=Go+%BB. Accessed on 12/14/2016.

Maine Department of Conservation, Boating Facilities Division (MDOC). 1995. Boating Facilities Strategic Plan. [Online] URL:

https://www1.maine.gov/dacf/parks/about/boating_facilities_program/strategic_plan/Strategic%20Plan.pdf. Accessed 12/8/2016.

Maine Department of Conservation, Bureau of Parks & Lands (MBPL). 2009. Maine State Comprehensive Outdoor Recreation Plan 2009-2014. [Online] URL: http://www.maine.gov/doc/parks/programs/SCORP/index.html. Accessed 12/8/2016.

Maine Office of GIS. 2016. Maine Office of GIS Data Catalog: Conserved Lands. July 18, 2016. [Online] URL: http://www.maine.gov/megis/catalog/. Accessed 12/16/2016.

Maine Office of Tourism (MOT). 2016. Interactive Map. [Online] URL: https://visitmaine.com/interactive-map/. Accessed 12/14/2016.

National Park Service (NPS). 2009. Nationwide Rivers Inventory: Maine Segments. [Online] URL: https://www.nps.gov/ncrc/programs/rtca/nri/states/me.html. Accessed 12/7/2016.

National Park Service (NPS). 2010. National Trails System Map. [Online] URL: https://www.nps.gov/nts/maps/National%20Trails%20map.pdf. Accessed 12/7/2016.

National Wild and Scenic Rivers System (NWSRS). 2016. Explore Designated Rivers/Maine. [Online] URL: https://www.rivers.gov/maine.php. Accessed 12/7/2016.

The University of Montana (UM). 2016. Wilderness.net. [Online] URL: http://www.wilderness.net/map.cfm. Accessed on 12/7/2016.

Topsham Hydro Partners. 1997. FERC Form 80 for Pejepscot Project for Reporting Year Ending 1996. March 24, 1997.

Topsham Hydro Partners. 2003. FERC Form 80 for Pejepscot Project for Reporting Year Ending 2002. March 31, 2003.

Topsham Hydro Partners. 2009. FERC Form 80 for Pejepscot Project for Reporting Year Ending 2008. March 31, 2009.

Topsham Hydro Partners LTD. 2015. FERC Form 80 for Pejepscot Project for Reporting Year Ending 2014. March 31, 2016.

Town of Brunswick. 2008. Comprehensive Plan Update. September 15, 2008. [Online] URL: http://www.brunswickme.org/wp-content/uploads/2013/06/Comp-Plan-Final-for-State-Review-091508rev.pdf. Accessed 8/18/2017.

Town of Brunswick. 2009. Zoning Map. August 19, 2009.

Town of Durham. 2002. Comprehensive Plan. [Online] URL: https://www.durhamme.com/sites/durhamme/files/uploads/durham_2002_compplan.pdf. Accessed August 8/18/2017.

Town of Durham. 2004. Zoning Map. March 2004.

Town of Lisbon. 2011. Comprehensive Plan Update. Amended April 19, 2011. [Online] URL: http://www.maine.gov/dacf/municipalplanning/comp_plans/Lisbon%202007%20(Amended%2011-04-19).pdf. Accessed 8/18/2017.

Town of Lisbon. 2012. Zoning Map. May 1, 2012.

Town of Topsham. 2005. Comprehensive Plan. May 19, 2005. [Online] URL: http://www.topshammaine.com/vertical/sites/%7B95A28B10-4485-4BEC-B8FC-5E8BF056A147%7D/uploads/%7BBA5D4C3D-82E3-45DA-9683-C9811D6C8253%7D.PDF. Accessed August 8/18/2017.

Town of Topsham. 2015. Zoning Map. May 20, 2015.

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

5.8.1 Overview

The Project vicinity is primarily forested and rural, with interspersed areas of industrial, residential and agricultural development. Medium and high intensity development occurs within the centers of the four towns abutting the Project boundary. Forested areas and low hills surround the Project Area. Sections 3.2 and 5.7 examine land use types and coverage in the Project vicinity and greater Androscoggin River watershed.

Route 196 traverses the eastern side of Project vicinity, offering limited views of the upper reaches of the impoundment. Route 125 on the western side of the embankment also provides limited views of the upper impoundment area as well as an industrial mill site on the opposite bank. A bridge spanning the river on Route 125 offers views of the Worumbo dam upriver and the Project Area downstream. Industrial development east of the river can also be seen from the Route 125 Bridge. Minor roads serving residential areas in the Project vicinity also offer limited views of the impoundment.

5.8.2 Visual Character of Project Lands and Water

The Androscoggin River in the Project vicinity has a history of industrial use. Mill sites line the northeastern portion of the Project boundary, several quarry and gravel pits border the eastern and western Project boundaries, and Grimmel Industries operates a metal recycling facility on Pejepscot Village Main Street just upstream of the dam on the east bank. The Town of Brunswick operates a landfill on Graham Road just west of the Project boundary. A railroad track runs the length of the impoundment on the east bank of the river, splitting upstream of the dam. One track continues southeast into the Town of Brunswick, while the other continues along the river and actively services Grimmel Industries. Transmission lines span the river within the Project boundary downstream of Worumbo Dam and just below the southern Project boundary (Google Earth, 2016). Section 5.1.4 further characterizes the Project Area shoreline.

Within the Project boundary, the river is wide and calm, with several small islands mid-river. There are no whitewater features (Town of Topsham, 2016a). The shoreline is composed of ledge and rock outcrops immediately above and below the dam.

The Pejepscot Dam and Project facilities are visible from the Pejepscot Dam Recreation Area and from the Grimmel Industries facility. The dam, spillway, fish passage facilities, and powerhouses are described in Section 4.2 and depicted in Figure 4.2-1. Figures 5.8.2-1 through 5.8.2-3 provide photos of the area in the vicinity of the Project.

Figure 5.8.2-1: View looking downstream from dam

Figure 5.8.2-2: View looking upstream from dam

Figure 5.8.2-3: View of Powerhouses and Grimmel Industries

5.8.3 Scenic Attractions

Several trails in the area, including the Androscoggin Riverwalk, offer scenic views of the river downstream of the Project, but no official trails provide views of the Project Area (Maine Trail Finder, 2017). The Androscoggin Riverwalk also offers views of the Bowdoin Mill and a swinging pedestrian bridge spanning the river upstream from the Brunswick Dam (Town of Topsham, 2016b). See Section 5.7 for a discussion of recreational opportunities offering scenic views in the Project vicinity.

There are no State or Federal Scenic Byways in the Project vicinity (FHA, 2016). Scenic attractions within a 20-30 minute drive of the Project include Bradbury Mountain State Park, Cathance River Nature Preserve, and numerous parks and features in and around the surrounding bays.

5.8.4 References

Federal Highway Administration (FHA). 2016. American Byways. [Online] URL: http://byways.org/explore/byways/11510. Accessed 1/13/2017.

Google Earth. 2016. Imagery Date: 5/9/16. Accessed 1/13/2017.

Maine Department of Transportation (MaineDOT). 2014. Maine State Rail Plan. July 2014. [Online] URL: http://maine.gov/mdot/ofbs/docs/Rail_Plan_7-9-2015.pdf. Accessed 1/13/2017.

Maine Trail Finder. 2017. Interactive Map. [Online] URL: http://www.mainetrailfinder.com/trails. Accessed 1/13/17.

Town of Topsham. 2016a. A Guide to Paddling Topsham's Waterways: Androscoggin River. [Online] URL: http://www.topshammaine.com/index.asp?Type=B_BASIC&SEC={0C9ED500-3153-44A1-B370-02AD7F3100F0}. Accessed 1/12/2017.

Town of Topsham. 2016b. A Guide to Topsham's Trails. [Online] URL: http://www.topshammaine.com/index.asp?SEC=110F5165-62BE-4EA4-BA45-2FD9CDBB42D2&Type=B_BASIC. Accessed 1/12/2017.

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

5.9.1 Archaeological Overview

The Androscoggin River is Maine's third largest river and was one of its more important waterways historically. While portions of this river valley have been archaeologically investigated, there are still large areas that have received little to no archaeological study. What is known is that the river was a major waterway for Native Tribes throughout much of the Precontact period, and continued to be for both them and Euroamerican settlers after contact. In the Post-Contact period, the river served as a means of travel and trade and soon became a source of industrial focus. The Pejepscot area of the Androscoggin River experienced much of this history.

5.9.1.1 Precontact Period History

Maine's archaeological record dates back more than 11,000 years before the present. Archaeologists have divided the Pre-Contact segment of this record into three major cultural periods: the Paleoindian, Archaic, and Ceramic cultural periods. Traditions within these cultural periods represent subdivisions that can be made based on similarities in artifact forms and cultural adaptations (Spiess 1990, 1994). Post-Contact history can also be divided into broad time periods reflecting the cultural integration of Euroamerican cultural lifeways and practices into the history of the state. These cultural periods, as displayed in Table 5.9.1.1-1, form the basis of archaeological context.

Paleoindian Period (11,500–8,000 B.P.)

As is the case throughout the Northeast, evidence for the earliest period of human occupation in Maine is extremely rare. Most sites of this period have been identified from isolated diagnostic artifact types in the collections of amateur archaeologists, with excavations of Paleoindian sites limited to only a handful in the state. The Paleoindian Cultural Period is the first known period in which humans inhabited the Northeast region. Evidence from the greater Northeast indicates that Paleoindians first settled in the area not long after the retreat of the Late Pleistocene Wisconsin glacial ice, which vacated New England by around 13,000 B.P. A tundra environment succeeded the Wisconsin glacier, and was, in turn, replaced by a spruce-parkland community (Davis and Jacobsen 1985; Gaudreau 1986; Jacobsen et al. 1987). They entered the region around 11,500 BP. Paleoindians living in these post-glacial ecological contexts have traditionally been characterized as hunters and gatherers who subsisted primarily on several large species of animals known to herd in the Northeast, including the mastodon and mammoth. Little evidence of human interaction with these "megafauna" has been forthcoming, however, and more recent interpretations have focused on smaller species, such as caribou and elk as primary food sources (Curran 1987; Curran and Dincauze 1977; Dincauze and Curran 1984; Gramly 1982). This generalization may over-emphasize the reliance placed on these herding species when a wider range of resources was almost certainly important to Paleoindian peoples. Fluted projectile points are lanceolate in shape and possess a long, groove-like scar caused by a flake struck from their base; they are considered the diagnostic artifact type of this period**.** Archaeological evidence indicates that during the

later Paleoindian period, fluted spear points were replaced by smaller, unfluted points or by long, slender lanceolate points with a distinctive parallel flaking technology (Doyle et al. 1985; Cox and Petersen 1997; Will and Moore 2002). These changes appear to coincide with the succession towards a closed forest environmental.

Little has been confirmed concerning the social structures, family life, and religion among the Paleoindians. No house features, burials, or ceremonial objects have been recovered from Paleoindian sites in the Northeast. Based on ethnographic analogy, it is assumed that peoples of this time were seasonally nomadic, following the movement of game with the changing weather conditions of the year. Similarities in artifact forms among Paleoindians all across North America argue for a generalized character of adaptation, with few specializations to local conditions evident (Haynes 1980:119). A correlate of this fact is that population densities among Paleoindians were almost certainly low. Raw materials utilized by these first inhabitants come from only a few sources, often from relatively distant locations (Spiess and Wilson 1989). This may indicate a high degree of mobility, established trade networks, and/or a high frequency of interaction among units of population. Sites of this period are sometimes found on hilltops, possibly because of their vantage points, which would have been useful for locating game.

Archaic Period (10,000–3000 B.P.)

The time period following the Paleoindian occupation, but predating the use of pottery and horticulture, has been designated the Archaic period by North American archaeologists. During the Early Archaic Period, profound environmental changes continued in New England, as the landscape adjusted to warmer post-glacial conditions. Lasting effects of melting glaciers included rising sea levels which inundated low-lying coastal plain areas. The regional climate became warmer and drier, and a mixed pine-hardwood forest came to dominate the landscape. Research indicates that Early Archaic social groups moved within smaller territories than their Paleoindian ancestors, practicing an increasingly generalized subsistence strategy based on river and lake systems and particularly wetland mosaic physiographic zones. The megafauna of the late Pleistocene had disappeared, leaving smaller mammalian species, such as moose and beaver. Deer were not likely abundant until the middle of the Archaic period when oak and other mast-producing trees became more numerous. Environmental conditions would have made seasonally available natural food resources somewhat more predictable and abundant than they had been during the Ice Age, allowing human populations to exploit a wider range of territories.

While bifurcate base projectile points are the traditional hallmark artifact of the Early Archaic period in southern New England, cultural adaptations in the region of Maine focused on the manufacture of simple unifacial tools from quartz, crude “chopping tools” of other local stone, and the development of ground stone technology. This early culture is referred to as the Gulf of Maine Archaic tradition, based on its initial association with deeply-buried sites in Maine (Peterson and Putnam 1992). Robinson (1992) has documented a complex burial ceremonial aspect of this culture. The Gulf of Maine

Archaic tradition continued to develop in northern and eastern Maine through the Middle Archaic period.

Late Archaic Period sites in New England are much more numerous than sites in previous periods and a significant diversity in site type and function is documented. Modern environmental conditions were present by then and the wild resources available were the same as those observed by the early European settlers and explorers. Population densities may have been sufficient to result in the development of multiple ethnic groups in the Northeast (Dincauze 1974). Three cultural traditions have been identified based on artifact materials: the Laurentian, Susquehanna, and Small Stemmed. Along with the development of multiple traditions, increased specialization and the exploitation of a broad spectrum of resources are interpreted for this time period. The relationship between the three recognized Late Archaic traditions has been the subject of extensive debate over several decades (Dincauze 1974, 1975; Ritchie 1971). It was hypothesized that the three traditions represent different populations, with the Laurentian and Susquehanna consisting of intrusive groups that peacefully coexisted with the indigenous Small Stemmed population for possibly thousands of years (Dincauze 1974, 1975). However, after many years of research, no documentation of isolated Laurentian or Susquehanna sites has been found in New England, casting doubt that these traditions could therefore represent the existence of communities. Rather more likely is that these traditions represent the use of particular tool types, with technological precedents to the west for the Lake Forest tradition, and towards the southeastern United States for the Susquehanna. Small Stemmed, or Narrow Point tradition, artifacts are widely viewed as a pan-Northeastern phenomenon, probably deriving from the indigenous people of the northeastern Middle Archaic. Therefore, this characterization of the Late Archaic is undergoing a shift away from the idea of three cultural traditions, towards one Algonquian ancestral population of Small Stemmed peoples, with some technological borrowings from neighboring areas.

It is thought that people of the Late Archaic period in New England developed a more locally focused subsistence economy than during previous times. This may be due to increasing population levels, requiring groups to remain in more confined territories to avoid encroaching on others. Some degree of sedentism is suggested by at least the end of the period, based on changes in subsistence strategy. Shell middens dating to this cultural period begin to appear in some coastal locations, indicating increased use of shoreline resources (Bourque 1976, 1995, 2001).

Woodland Period (3000–500 B.P.)

The cultural period following the Archaic Period and before the Contact Period is generally referred to as the Woodland Period throughout most of the eastern United States. However, in Maine, the same time period is called the Ceramic Cultural Period (Sanger 1979). While both of these contemporaneous cultural adaptations are signified by the advent of ceramic technology around 3,000 years ago, they differ in their subsistence strategies. Woodland cultures developed a reliance on horticulture and a tendency toward larger, more permanent settlement patterns, while the Ceramic culture continued a hunting and gathering lifestyle.

Ceramic period sites are found along both the coast and in the Maine interior (Sanger 1979); however, the coast may have been the main area of occupation as the diet of this period indicates a heavy reliance on marine fish (Bourque 2001). Coastal shell midden sites of this period have long been identifiable due to their highly visible nature. These shell midden sites contain not only discarded marine shells, but also a wealth of data concerning terrestrial and marine animals utilized, pottery technology and sequencing, and stone and bone tools. Preservation of artifacts that in most other environmental locations in Maine would not survive, is a notable feature of these midden sites (Bourque 2001; Sanger 1979). Sites in the interior are commonly found close to both moving and non-moving water bodies. The abundance of sites and the intensification of faunal exploitation may indicate population growth over the course of this time period. In addition, artifacts recovered from Ceramic period sites indicate trade and communication with peoples from different regions far outside of Maine (Bourque 2001). By the end of this period, historical accounts and archaeological evidence suggests horticulture was practiced in southern Maine at least.

The synthesis of the archaeological data from Ceramic period sites appears to indicate cultural adaptations of a people that had lived in an area long enough to exhibit a diversified use of local resources (Bourque 2001; Sanger 1979). The Ceramic period ends with European contact around 500-450 years ago, after which many of the artifacts attributable to the Precontact inhabitants of Maine disappear from the archaeological record, replaced instead with European trade goods. While the Native artifacts disappeared, the historical descendants of these cultural peoples remained.

Table 5.9.1.1-1: Cultural Period Contexts in Maine, after Spiess 1990, 1994

Cultural Period	Time Period (RCYBP)	Tradition	Time Period (RCYBP)
Paleoindian	11,500 – 8,000	Fluted Point Paleoindian Tradition	11,500 - 10,200
		Late Paleoindian Tradition	10,200 – 8,000
Archaic	10,000 - 3,000	Early and Middle Archaic Traditions	10,000 - 6,000
		Laurentian Tradition	6,000 - 4,200
		Small-Stemmed Point Tradition	6,000 - 2,000
		Moorehead Phase	4,500 - 3,700
		Susquehanna Tradition	3,900 - 3,000
Ceramic Period	3,000 – 500		
Early Contact	500 - 325		
Later Contact and Colonization	325 - 240		
Integration with Euroamerican Life	240 - Present		

5.9.1.2 Contact and Post-Contact Period (500-Present B.P.)

European contact with the peoples of the North American continent occurred as early as the 11th century with the Norse exploration of the Canadian maritime provinces. The Norwegian penny recovered at the Precontact Goddard site is evidence that this earliest contact, while not conclusively reaching Maine, had an effect on the peoples of the region (Bourque 2001). After the European "discovery" of the "New World" in 1492, the coast of Maine was explored as early as 1524 by Giovanni da Verrazano, who made contact with local inhabitants. The same year, Estevan Gomez kidnapped and sold into slavery 58 Maine natives. After this, a long period of Native and European contact occurred off the Maine coast between natives and Basque fishermen, initiating a trade system. European exploration continued into the early 17th century including early attempts by the French in 1604 and the English in 1607 to establish settlements in the region of Maine (Maine History Online 2017). However, the European introduction of epidemic diseases to the Native people, who had no natural resistance to them, began to take a sudden and terrible toll on the Native population of Maine and New England. This dramatic decrease in the Native population of the region lead the way for European colonization of Maine and New England. The surviving Native populations were too few to be able to resist European settlement. European and Native groups forged trading partnerships, allowing Europeans to acquire furs and Natives to gain European goods which often replaced many of their traditional tools.

Relations with the Native inhabitants and the European explorers 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 Native 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 Native groups in Maine had allied themselves with the French, so with their defeat they were forced to sign treaties with the English settlers that were unfavorable to them. After this period, Native groups in Maine and New England 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.

5.9.2 Identification of Historic and Archeological Sites in the Vicinity of the Project

Site documentary information was obtained from the Maine Historic Preservation Commission (MHPC), which is located in Augusta. The MHPC maintains archaeological site files for both Precontact period and Euroamerican (Post-contact) archaeological sites. Use of these files is restricted to archaeologists who are either approved to undertake cultural resources management in Maine or who have legitimate archaeological research projects. Local repositories of historic documents (historical societies and libraries) were

also consulted; however, no additional resources have been identified from this information at this time.

5.9.3 Identified Sites

5.9.3.1 Precontact Period Sites

MHPC archaeological site files indicate very few Precontact archaeological sites have been identified within the region of the Androscoggin River watershed in which the Pejepscot Project Area is located. Only three sites have been identified to date within or near to the Project Area, one of which falls within the project boundaries (Table 5.9.3.1-1).

The Pejepscot site (ME 14-108) was identified during a 1985 survey of the Pejepscot Dam impoundment and fall within the current Project Area. Phase I and II research was undertaken on the Pejepscot Project by the University of Maine at Farmington Archaeology Research Center (UMF ARC) in 1989 and 1992 (Hamilton et. al. 1985; Hamilton et. al. 1986). This site was found to be either a small camp site or an ancillary activity area of a larger site. Importantly, it was identified as relating to a single occupation belonging to the late Ceramic Period.

Site ME 14-138 is located upstream of the Project Area and consists of a small scatter of Late Ceramic Period ceramic sherds, possibly buried below the ground surface. Site ME 14-152 is located downstream of the Project Area and consists of a small scatter of lithic debitage, from an unknown Precontact cultural period, located at or near the ground surface.

Historical records of the area of Lisbon Falls indicate that there was a Native American village located somewhere close to the present location of the village of Lisbon Falls (Hamilton et. al. 1985). To date, no official record has been made for a possible location of this site, which may span the Precontact to Contact periods.

Table 5.9.3.1-1: Precontact Archaeological Sites within the Project Vicinity

Site Number	Site Name	UTM		Time Period	National Register Status
		East	North		
Topsham, Sagadahoc County					
ME 14-108	Pejepscot Site	416280	4870400	Late Ceramic Period	Insufficient information
ME 14-152		414300	4872000	Unknown Precontact	Insufficient information
Lisbon, Androscoggin County					
ME 14-138		419600	4864800	Late Ceramic Period	Insufficient information

5.9.3.2 Euroamerican sites

While the previous survey within the Pejepscot Project Area did identify 19th and 20th century artifacts, no Euroamerican sites have yet been identified within the Project Area or within a half mile study radius of the Project Area.

5.9.4 Prior Cultural Resource Investigations within the Project Area

Only one prior cultural resource investigation has taken place within the Project Area, the above-mentioned Phase I investigation of the Pejepscot Dam impoundment by UMF ARC in 1985 (Hamilton et. al. 1985), followed by a Phase II investigation of the only site identified during that previous survey. The Project Area for this investigation was slightly smaller than the current Project Area, totaling only 4.8 kilometers (3 miles) on both banks of the Androscoggin River. The Phase I investigation involved an initial walk-over of the Project Area, through which the investigators looked for surface evidence of archaeological sites and determined areas to test. A total of 135 shovel test pits were excavated on 16 sampling transects. The Phase I survey found a wide scatter of historical artifacts from the 19th and 20th century, which were deemed historically unimportant, and identified the Pejepscot site (ME 14-108) that was later investigated for the Phase II.

5.9.5 Historic Structures Overview

5.9.5.1 Historic Period (Exploration to Present)

The Project Area extends from Pejepscot Village in Topsham, Sagadahoc County, upstream along the Androscoggin River to Lisbon Falls in Androscoggin County. Maine's rivers were vital to the economic success of industry in the state. As Maine's third largest river, the Androscoggin River played a major role in Maine's industrial history. The mainstem of the Androscoggin was too large and powerful to permit the construction of dams and their associated mills prior to improvements in construction technology in the mid-nineteenth century. Prior to that period, development occurred along the river's tributaries and at locations, such as Lisbon Falls and Topsham, where natural rock ledges simplified the task of damming the river.

Within the Project Area, industrial development began in Lisbon Falls, the second falls from the sea, where between 1790 and 1800 six saw mills, a grist mill, and a carding mill operated. These mills largely closed during the period of the War of 1812. Large scape industrial development in Lisbon Falls began in 1864, with the establishment of the Worumbo Manufacturing Company's woolen mill. By the late-nineteenth century, a network of dams, water conveyance systems, and mills lined the length of the Androscoggin where a fall of water offered development potential.

Industrial development at the lower end of the Project Area, at Pejepscot Village, began in the mid-1890s, with the construction of a pulp and paper mill owned by the Pejepscot Paper Company. Owned by F.C. Whitehouse, the Pejepscot Paper Company operated three paper mills on the river with "daily capacity of three hundred and twenty tons of news and wrappers, and three pulp mills able to produce daily three hundred tons of ground-wood and seventy tons of sulphite-fibre" (Weeks 1916: 321). The mills were

located in Topsham, Pejepscot Village, and Lisbon Falls. Construction began on the mill at Pejepscot, located on the north bank of the river between the firm's Topsham and Lisbon Falls mills, in 1893. The Pejepscot Mill supplied pulp to the firm's Bowdoin Mill in Topsham and was capable of producing seventy tons of ground wood per day. Eventually the mill was expanded to produce paper. The Pejepscot Paper Company mill opened in 1896. Following the ownership of F.C. Whitehouse, the company changed hands several times. The mill at Lisbon Falls closed during the Depression. The Hearst Corporation bought the company in 1947, eventually selling it to the St. Raymond Corporation, which went bankrupt.

A large population of Hungarian-Slovak and Austrian immigrants migrated to the Pejepscot area to work in the mills. At the height of production, in 1898, the mill employed about 180 men. The mill was the backbone of the community, providing housing, education, recreation, and water/sewer systems. The Pejepscot Paper Company constructed all twenty-five of the buildings that constituted Pejepscot Village. Eighteen of these buildings were industrial structures. Between 1896 and 1898, the Pejepscot Paper Company built worker housing near the mill. The Colonial Revival style boarding house, built in 1896, included, "a dining room, parlor, smoking room, barber shop, living room, store room, washroom, 22 bedrooms and a bath" (Proud Pejepscot Village, MHPC vertical files). When the boarding house closed, the building was converted into a Community Hall. The building is currently used as storage.

5.9.6 Identification of Historic Sites in the Vicinity of the Project

Since the closing of the Pejepscot Paper Company in 1985, the population of Pejepscot Village has dramatically decreased. Today only five mill worker buildings exist, all of which have been significantly altered. The majority of the buildings have been demolished, and those that survive have been converted into storage or function as a scrap metal recycling facility. There are no significant historic resources extant in close proximity to the site. The nearest property noted in the National Register of Historic Places is the Pejepscot Village School, about 0.5 miles from the river. The Pejepscot Village School was built in 1899 by Joseph Philbrook of Brunswick on land deeded to the town by the Pejepscot Paper Company on November 9, 1899. In addition, the Pejepscot Paper Company donated $400 to the school. The historic schoolhouse is the only remaining community building in the village (Maine Historic Preservation Commission 2007).

The Maine Historic Preservation Commission's Cultural and Architectural Resource Management Archive (CARMA) was used to identify historic properties within a half-mile vicinity of the Project Area. Table 5.9.6-1 below summarizes the historic resources reported in the CARMA database.

Table 5.9.6-1: Reported Historic Resources within 0.5-mile of the Project Area

Resource Name	Resource Type	Description	Location (Town)	NRHP Status	Notes
823 Newell Brook Road, Route 9	Building	Barn	Durham	Not eligible	One-story connected barn c.1920-1940 located on the south side of the Androscoggin River, outside of the Project boundary.
823 Newell Brook Road, Route 9	Building	1-story residential home	Durham	Not eligible	Single family home with connected barn located on the south side of the Androscoggin River, outside of the Project boundary.
21 Pinkham Brook Road, Route 125	Building	2-story residential home	Durham	Not Determined	The Federal style multi-family home c. 1810-1825 is located on the south side of the Androscoggin River outside of Project boundary.
17 Pinkham Brook Road, Route 125	Building	Garage	Durham	Not eligible	One-story garage c. 1930-1960 is located on the south side of the Androscoggin River outside of Project boundary.
17 Pinkham Brook Road, Route 125	Building	1 ½ story residential home	Durham	Not eligible	Single family home c. 1930-1960 located on the south side of the Androscoggin River outside of Project boundary.
835 Newell Brook Road, Route 9	Building	1 ½ story residential home	Durham	Not eligible	Single-family home c. 1920-1930 is located on the south side of the Androscoggin, outside of the Project boundary.

Resource Name	Resource Type	Description	Location (Town)	NRHP Status	Notes
Durham Bridge	Structure	Bridge	Durham	Not eligible	Steel bridge c. 1937 (Note: was scheduled to be replaced in 2013) on Canal Street crossing over the Androscoggin at the Project boundary line.
Lisbon Falls Fiber Company	Building	2 1/2 -story industrial building	Lisbon	Not eligible	Two-and-a-half industrial building c. 1880-1920. Little is left to the original mill due to significant alterations c. 1960-1980. Building is located on the north side of the Androscoggin River, just outside of the Project boundary.
Worumbo Mill Complex Bridge #2	Structure	Bridge	Lisbon	Listed	Concrete arch bridge c. 1920 on the north side of the Androscoggin River outside of the Project boundary.
Worumbo Mill Bridge Complex, Bridge #1	Structure	Bridge	Lisbon	Listed	Concrete arch bridge c. 1920 on the north side of the Androscoggin River outside of the Project boundary.
Worumbo Mill Complex, Building #1	Building	2-story industrial building	Lisbon	Listed	Built c. 1864-1920, this building is one of four buildings on the NR listing that survived the 1987 fire. Building is located on the north side of the Androscoggin, outside of the Project boundary.

Resource Name	Resource Type	Description	Location (Town)	NRHP Status	Notes
Worumbo Mill Complex, Building #4	Building	3-story industrial building	Lisbon	Listed	Built c. 1920, this Art Deco mill building is on the north side of the Androscoggin River, outside of the Project boundary.
Worumbo Mill Complex	Building	1 ½-story industrial building	Lisbon	Listed	Art Deco mill building c. 1920. that the canal runs under. Located on the north side of the Androscoggin River, outside of the Project boundary.
Worumbo Mill Complex, Office Building	Building	2-story office building	Lisbon	Listed	The 2-story brick Italianate building c. 1864 is on the north side of the Androscoggin River, outside of the Project boundary.

5.9.7 References

Bourque, Bruce J. 1995. Diversity and Complex Society in Prehistoric Maritime Societies: A Gulf of Maine Perspective. Plenum Press, New York.

1976 The Turner Farm Site: A Preliminary Report. *Man in the Northeast* 22:21–30.

2001 *Twelve Thousand Years: American Indians in Maine*. University of Nebraska Press. Lincoln, NB.

Cox, Belinda and James Petersen. 1997. The Varney Farm (ME 36-57): A Late Paleoindian Encampment in Western Maine. Bulletin of the Maine Archaeological Society 37(2):25- 48.

Curran, M.L. 1987. *The Spatial Organization of Paleoindian Populations in the Late Pleistocene of the Northeast*. Ph.D. dissertation, Department of Anthropology, University of Massachusetts, Amherst.

Curran, M.L., and D.F. Dincauze. 1977 Paleo-Indians and Paleo-Lakes: New Data from the Connecticut Drainage. *Annals of the New York Academy of Sciences* 288:333–348.

Davis, R., and G. Jacobsen, Jr. 1985. Late Glacial and Early Holocene Landscapes in Northern New England and Adjacent Areas of Canada. *Quaternary Research* 23:341–368.

Dincauze, Dena F. 1974. An Introduction to Archaeology in the Greater Boston Area. *Archaeology of Eastern North America* 2:39–67.

1975 The Late Archaic Period in Southern New England. *Arctic Anthropology* 12(2):23–34.

Dincauze, Dena F., and M.L. Curran. 1984. Paleoindians as Flexible Generalists: An Ecological Perspective. Paper presented at the 24th Annual Meeting of the Eastern States Archaeological Federation, Hartford, Connecticut.

Doyle, Richard, Jr., Nathan Hamilton, James Petersen, and David Sanger 1985 Late Paleo-Indian Remains from Maine and their Correlations in Northeastern Prehistory. Archaeology of Eastern North America 13:1-34.

Gramly, R. Michael 1982. *The Vail Site: A Palaeo-Indian Encampment in Maine.* Buffalo Museum of Science.

Gaudreau, D. 1986. Late-Quaternary Vegetational History of the Northeast: Paleoecological Implications of Topographic Patterns in Pollen Distributions. Ph.D. dissertation, Yale University. University Microfilms, Ann Arbor.

Haynes, C.V. 1980 The Clovis Culture. *Canadian Journal of Anthropology* 1:115–121

Jacobsen, G., T. Webb and E. Grimm. 1987. Patterns and Rates of Vegetation Change During the Deglaciation of Eastern North America. In *North America and Adjacent Oceans During the Last Deglaciation*, pp. 277–288. Edited by W. Ruddiman and H. E. Wright, Jr. The Geology of North America, V. K-3, Geological Society of America

Maine Historic Preservation Commission. 2007 Pejepscot Village School National Register Nomination

Maine History Online. 2017. 1500-1667 Contact and Conflict. [Online] URL: https://www.mainememory.net/sitebuilder/site/895/page/1306/display [Accessed August, 2017].

Petersen, J. and D. Putnam. 1986. Archaeological Phase II Testing in the Williams Hydroelectric Dam Increased Pool Project, Somerset County, Maine. Report on file with the Maine Historic Preservation Commission, Augusta.

Proud Pejepscot Village, MHPC vertical files 2017

Ritchie, William. 1971. The Archaic in New York. New York State Archaeological Association Bulletin 52:2–12.

Robinson, Brian S. 1992. Early and Middle Archaic Occupation in the Gulf of Maine Region: Mortuary and Technological Patterning. In Early Holocene Occupation in Northern New England, edited By B. S. Robins, J. B. Petersen, and A. K. Robinson. Occasional Publications in Maine Archaeology, no. 9. The Maine Historic Preservation Commission, Augusta.

Sanger, David. 1979. The Ceramic Period in Maine. In Discovering Maine's Archaeological Heritage, edited by D. Sanger. Maine Historic Preservation Commission, Augusta.

Spiess, Arthur. 1990. Maine's Unwritten Past: State Plan for Prehistoric Archaeological. Second Draft. Maine Historic Preservation Commission Augusta.

1994. CRM Archaeology and Hydro Relicensing in Maine. 1994. In Cultural Resource Management: Archaeological Research, Preservation Planning, and Public Education in the Northeastern United States, pp 155-190. Edited by Jordan E. Kerber. Bergin & Garvey, Westport, CN.

Spiess, Arthur, D. Wilson, J. Bradley. 1998. Peleoindian Occupation in the New England-Maritimes Region: Beyond Cultural Ecology. In Archaeology of Eastern North America 26:41-54.

Weeks, Lyman Horace

1916 *A History of Paper-Manufacturing in the United States, 1690-1916*. The Lockwood Trade Journal Company, New York.

Will, Richard, and Edward Moore. 2002. Recent Late Paleoindian Finds in Maine. Maine Archaeological Society Bulletin 42:1:1-14.

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

5.10.1 Overview

The Pejepscot Project boundary is within three counties (see Figure 3.4-1). Nearly the entire eastern portion of the Project boundary is within Sagadahoc County, which, at 370 square miles, is the smallest county in Maine (Census, 2010). Cumberland County, which encompasses the southwestern portion of the Project boundary, is the most populated county in the state despite a relatively small area of 1,217 square miles (Census, 2010). The remainder of the Project boundary, including the northwestern portion, is within the relatively small 497-square-mile Androscoggin County (Census, 2010). The following sections summarize socioeconomic conditions of the municipalities abutting the Project boundary, including the aforementioned counties and the Towns of Durham, Lisbon, Brunswick, and Topsham.

5.10.2 General Land Use Patterns

The municipalities abutting the Project vary from 100% rural to 82% urban, with population densities ranging from just over 100 persons per square mile to well over 434 persons per square mile. Census data depicting general land use patterns for the abutting municipalities are presented in Table 5.10.2-1 and discussed below. Land use types and coverage are discussed in Sections 3.2 and 5.7.

The majority of Androscoggin County is rural, with a population density of around 230 persons per square mile. The urban centers of the County are the Cities of Auburn, which is the County seat, and Lewiston; both are located upriver from the Project. The Town of Durham by contrast is entirely rural, with a much lower density of roughly 100 persons per square mile. The Town of Lisbon, with a density of roughly 395 persons per square mile, is much more urban than either the County as a whole or the neighboring Town of Durham.

Cumberland County is nearly 70 percent urban. The Cities of Portland (the County seat), South Portland, and Westbrook contribute to the County's relatively high density of around 337 persons per square mile. The mostly urban Town of Brunswick also contributes with a density of 434 persons per square mile, nearly 400 persons per square mile more than the state as a whole.

Sagadahoc County is mostly rural and has a low density of 139 persons per square mile. The Town of Topsham, however, is mainly urban with a higher density of 273 persons per square mile. The City of Bath, roughly 10 miles southeast of the Project, is the only city in Sagadahoc and serves as the County seat.

Table 5.10.2-1: Place of Residence and Density, 2010

	Androscoggin County	Town of Durham	Town of Lisbon	Cumberland County	Town of Brunswick	Sagadahoc County	Town of Topsham	State of Maine
Place of residence: Urban[1]	42%	0%	75%	68%	82%	43%	59%	42%
Place of residence: Rural[1]	58%	100%	25%	32%	18%	57%	41%	58%
Population[2]	107,702	3,848	9,009	281,674	20,278	35,293	8,784	1,328,361
Persons per square mile[2]	230.2	100.5	394.8	337.2	434.0	139.1	272.8	43.1
Housing units[2]	49,090	1,548	3,948	138,657	9,599	18,288	4,167	721,830
Housing units per square mile[2]	104.9	40.4	173.0	166.0	205.4	72.1	129.4	23.4

Source[1]: Census, 2000b

Source[2]: Census, 2010

5.10.3 Population Patterns

Current and historical populations for the municipalities abutting the Project are presented in Table 5.10.3-1. Growth projections from the State of Maine Office of Policy and Management (OPM) are presented in Table 5.10.3-2. While cumulative growth rates of the municipalities varied widely from 2000 to 2015, recent data show populations of all four abutting Towns along with Androscoggin County declined slightly, while Cumberland and Sagadahoc Counties continued to grow at very slow rates. OPM projections from 2014 to 2034 show all abutting municipalities growing by a little over 2 percent, with the exceptions of the Town of Durham, which is expected to experience a much higher growth rate, and the Towns of Lisbon and Brunswick, which are expected to experience population declines.

Androscoggin County experienced a 3.8 percent growth rate from 2000 to 2010, followed by a 0.4 percent decline from 2010 to 2015. The County's population is projected to grow slightly and then decline between 2014 and 2034, resulting in zero net growth. The Town of Durham had a much higher growth rate than that of the County, at 12.6 percent from 2000 to 2010, followed by 2.4 percent growth from 2010 to 2015. The Town is projected to grow by 8.1 percent by 2034, which is the largest projected growth rate for all municipalities abutting the Project Area by nearly 6 percent. The Town of Lisbon grew by a modest 0.2 percent from 2000 to 2010, followed by a 2.2 percent decline from 2010 to 2015. The Town's population is projected to decline steadily between 2014 and 2034, with an overall 5.5 percent population decline.

Cumberland County grew by 6 percent from 2000 to 2010, followed by a slower 2.9 percent growth rate from 2010 to 2015. The County's growth is projected to slow and eventually decline from 2014 to 2034, for a total growth rate of 2.3 percent. The Town of Brunswick experienced a 2.9 percent decline from 2000 to 2010, and a slightly lower 0.9 percent decline from 2010 to 2015. Overall, the Town's population declined by 3.9 percent from 2000 to 2015 and is projected to continue declining through 2034.

Sagadahoc County experienced very slight growth at 0.2 percent from 2000 to 2010 followed by a slight decline of 0.4 percent from 2010 to 2015. The County population is projected to grow a total of 2.3 percent between 2014 and 2034. The Town of Topsham's population declined by 1.8 percent from 2000 to 2010 and by 2.3 percent from 2010 to 2015. However, the Town is projected to grow by 2.1 percent between 2014 and 2034.

Table 5.10.3-1: Population - 2000 to 2015

Municipality	Census		Population Estimate				
	2000[1]	2010[2]	2011[2]	2012[2]	2103[2]	2014[2]	2015[2]
Androscoggin County	103,793	107,702	107,403	107,558	107,365	107,408	107,233
Change		3.8%	-0.3%	0.1%	-0.2%	0.0%	-0.2%
Cumulative from 2000		3.8%	3.4%	3.5%	3.3%	3.4%	3.2%
Town of Durham	3,381	3,808	3,821	3,853	3,867	3,879	3,902
Change		12.6%	-0.3%	0.1%	-0.2%	0.0%	-0.2%
Cumulative from 2000		12.6%	11.5%	12.3%	12.6%	12.8%	13.4%
Town of Lisbon	9,077	9,092	9,065	9,023	8,957	8,936	8,895
Change		0.2%	-0.3%	0.1%	-0.2%	0.0%	-0.2%
Cumulative from 2000		0.2%	-0.1%	-0.6%	-1.3%	-1.6%	-2.0%
Cumberland County	265,612	281,674	282,758	284,103	285,882	287,875	289,977
Change		6.0%	0.4%	0.5%	0.6%	0.7%	0.7%
Cumulative from 2000		6.0%	6.1%	6.5%	7.1%	7.7%	8.4%
Town of Brunswick	21,172	20,557	20,457	20,376	20,319	20,329	20,378
Change		-2.9%	-0.3%	0.1%	-0.2%	0.0%	-0.2%
Cumulative from 2000		-2.9%	-3.5%	-3.9%	-4.2%	-4.1%	-3.9%
Sagadahoc County	35,214	35,293	35,102	35,114	35,033	35,063	35,149
Change		0.2%	-0.5%	0.0%	-0.2%	0.1%	0.2%
Cumulative from 2000		0.2%	-0.3%	-0.3%	-0.5%	-0.4%	-0.2%
Town of Topsham	9,100	8,938	8,869	8,819	8,750	8,728	8,734
Change		-1.8%	-0.3%	0.1%	-0.2%	0.0%	-0.2%
Cumulative from 2000		-1.8%	-2.6%	-3.2%	-4.0%	-4.3%	-4.2%
State of Maine	1,274,923	1,328,361	1,328,257	1,328,888	1,328,778	1,330,256	1,329,328
Change		4.2%	0.0%	0.0%	0.0%	0.1%	-0.1%

Municipality	Census		Population Estimate				
	2000[1]	2010[2]	2011[2]	2012[2]	2103[2]	2014[2]	2015[2]
Cumulative from 2000		4.2%	4.0%	4.1%	4.1%	4.2%	4.1%

Source[1]: Census, 2000a

Source[2]: Census, 2015a

Table 5.10.3-2: Population Projections to 2034

	Observed	Projected				Percent change from previous period				Total Percent Change
	2014	2019	2024	2029	2034	2014-2019	2019-2024	2024-2029	2029-2034	2014-2034
Androscoggin County	107,408	108,061	108,304	108,118	107,433	0.6%	0.2%	-0.2%	-0.6%	0.0%
Town of Durham	3,906	4,011	4,099	4,172	4,224	2.7%	2.2%	1.8%	1.2%	8.1%
Town of Lisbon	8,880	8,808	8,706	8,568	8,392	-0.8%	-1.2%	-1.6%	-2.1%	-5.5%
Cumberland County	287,875	291,783	294,589	295,441	294,431	1.4%	1.0%	0.3%	-0.3%	2.3%
Town of Brunswick	20,425	20,370	20,207	19,906	19,479	-0.3%	-0.8%	-1.5%	-2.1%	-4.6%
Sagadahoc County	35,063	35,598	35,926	36,005	35,869	1.5%	0.9%	0.2%	-0.4%	2.3%
Town of Topsham	8,720	8,844	8,924	8,942	8,906	1.4%	0.9%	0.2%	-0.4%	2.1%
State of Maine	1,330,256	1,332,944	1,330,903	1,322,023	1,305,910	0.2%	-0.2%	-0.7%	-1.2%	-1.8%

Source: OPM, 2016

5.10.4 Households/Family Distribution and Income

Household, income and poverty status data for the municipalities abutting the Project Area are presented in Table 5.10.4-1. The data show that all municipalities are comparable to the State of Maine's average household size of 2.32, with the Town of Durham coming in slightly larger at 2.57 and the Town of Brunswick slightly smaller at 2.19 persons per household. All municipalities except Androscoggin County have a higher median household income than the State, with the Town of Durham's coming in over $20,000 higher at $71,908. Androscoggin County's median household income is less than $2,000 lower than that of the State. Each abutting municipality comes within 10 percent of the statewide per capita income with the exception of the Town of Durham and Cumberland County, which come in at roughly 146 and 122 percent of the State's, respectively. With the exception of Androscoggin County, the overall poverty status in each municipality is lower than that of the State, with the Towns of Durham, Lisbon and Topsham at nearly 4 percentage points lower than the statewide percentage of 13.9.

Table 5.10.4-1: Income and Poverty, 2015

	Androscoggin County	Town of Durham	Town of Lisbon	Cumberland County	Town of Brunswick	Sagadahoc County	Town of Topsham	State of Maine
Total households	44,315	1,496	3,696	117,339	8,469	15,088	3,720	557,219
Average household size	2.37	2.57	2.43	2.32	2.19	2.32	2.32	2.32
Median household income	$47,537	$71,908	$52,702	$60,051	$53,737	$53,298	$62,404	$49,331
Percentage of State	96.4%	145.8%	106.8%	121.7%	108.9%	108.0%	126.5%	100.0%
Percentage of U.S.[1]	88.2%	133.4%	97.8%	111.4%	99.7%	98.9%	115.8%	91.5%
Per capita income	$25,011	$33,000	$24,676	$34,081	$31,338	$30,062	$32,869	$27,655
Percentage of State	90.4%	119.3%	89.2%	123.2%	113.3%	108.7%	118.9%	100.0%
Percentage of U.S.[2]	86.5%	114.1%	85.3%	117.8%	108.3%	103.9%	113.6%	95.6%
Poverty Status: All People	15.7%	8.4%	8.0%	11.6%	11.4%	12.1%	8.1%	13.9%
Poverty Status:	23.5%	15.2%	6.8%	14.9%	12.4%	19.9%	13.0%	18.6%

	Androscoggin County	Town of Durham	Town of Lisbon	Cumberland County	Town of Brunswick	Sagadahoc County	Town of Topsham	State of Maine
Total households	44,315	1,496	3,696	117,339	8,469	15,088	3,720	557,219
Average household size	2.37	2.57	2.43	2.32	2.19	2.32	2.32	2.32
Under 18 yrs.								
Poverty Status: 18-64 years	14.3%	6.5%	8.4%	11.6%	13.4%	11.8%	8.0%	14.0%
Poverty Status: 65 yrs. & over	10.0%	6.4%	7.5%	7.6%	5.4%	4.6%	4.6%	8.6%

[1]US Median Household Income: $53,889

[2]US Per Capita Income: $28,930

Source: Census, 2015b

5.10.5 Project Vicinity Employment Sources

Labor force and unemployment data for each municipality abutting the Project Area are presented in Table 5.10.5-1. Roughly 23 percent of Maine's labor force resides in Cumberland County. Androscoggin County contains 8 percent and Sagadahoc contains under 3 percent of the State's labor force. Androscoggin County has the highest unemployment rate of all the municipalities abutting the Project Area, although at 6.8 percent, the County is still over one percentage point lower than the statewide rate.

Table 5.10.5-2 presents industry and occupation statistics for the abutting municipalities. For each of the municipalities, the largest industry sector is educational, health and social services, with retail trade coming in as second largest. Manufacturing is the third largest industry sector for all municipalities except Cumberland County, where professional, scientific, management, administrative and waste management services comes in third, and the Town of Brunswick, where arts, entertainment, recreation, accommodation and food services is the third largest sector.

The two most common occupational categories in all abutting municipalities are management, business, science and arts, which is the most common category for all municipalities except the Town of Lisbon, where sales and office is the most common category. Service occupations are the third most common in all abutting municipalities. The 25 largest employers for each of the abutting counties are presented in Tables 5.10.5-3 to 5.10.5-5.

Table 5.10.5-1: Labor Force and Unemployment, 2015

	Androscoggin County	Town of Durham	Town of Lisbon	Cumberland County	Town of Brunswick	Sagadahoc County	Town of Topsham	State of Maine
Labor Force	57,139	2,385	4,624	161,178	10,915	18,835	4,941	697,913
Unemployment	6.8%	2.6%	5.7%	5.4%	6.3%	5.7%	3.7%	8.3%

Source: Census, 2015b

Table 5.10.5-2: Industry and Occupation for Civilian Population 16 years and over, 2015

	Androscoggin County	Town of Durham	Town of Lisbon	Cumberland County	Town of Brunswick	Sagadahoc County	Town of Topsham	State of Maine
Occupation								
Management, business, science, & arts	31.5%	44.4%	26.0%	43.3%	43.9%	36.7%	36.4%	35.4%
Service	18.5%	13.1%	19.8%	16.6%	19.0%	19.4%	19.2%	18.5%
Sales & office	25.7%	22.8%	29.6%	24.4%	19.9%	22.9%	22.1%	23.9%
Natural resources, construction, maintenance	10.1%	8.0%	9.9%	7.7%	9.4%	10.4%	7.6%	10.7%
Production, transportation, material moving	14.2%	11.8%	14.7%	8.0%	7.8%	10.6%	11.7%	11.4%
Industry								
Agriculture, forestry, fishing, hunting, mining	1.3%	1.1%	0.5%	1.2%	1.4%	1.8%	0.2%	2.5%
Construction	6.5%	4.3%	6.1%	5.5%	5.8%	6.2%	3.9%	6.9%
Manufacturing	11.8%	12.5%	10.9%	7.2%	5.9%	14.0%	12.2%	9.3%
Wholesale trade	2.0%	1.2%	0.7%	2.6%	1.6%	2.4%	3.0%	2.3%
Retail trade	14.8%	18.5%	19.5%	13.0%	13.5%	15.5%	15.8%	13.4%
Transportation & warehousing, & utilities	4.1%	3.1%	4.2%	3.2%	2.7%	2.7%	2.8%	3.8%
Information	2.3%	5.4%	2.8%	2.2%	1.1%	1.1%	1.3%	1.8%
Finance, insurance, real estate & rental	6.9%	8.6%	6.8%	9.2%	5.6%	4.4%	4.8%	6.2%

	Androscoggin County	Town of Durham	Town of Lisbon	Cumberland County	Town of Brunswick	Sagadahoc County	Town of Topsham	State of Maine
Professional, scientific, management, administrative, & waste management services	7.9%	11.6%	7.4%	11.8%	8.6%	8.2%	8.9%	8.6%
Educational, health & social services	27.0%	25.1%	24.7%	27.5%	33.9%	25.0%	28.2%	27.5%
Arts, entertainment, recreation, accommodation & food services	7.7%	4.6%	5.4%	9.4%	11.1%	9.1%	7.5%	8.9%
Other services (except public administration)	4.0%	2.9%	5.1%	4.5%	5.7%	4.4%	3.9%	4.4%
Public administration	3.7%	1.1%	5.8%	2.7%	3.0%	5.2%	7.6%	4.4%

Source: Census, 2015b

Table 5.10.5-3: Top 10 Private Employers in Androscoggin County by Average Monthly Employment (1st Quarter 2016)

Rank	Name	Employment Range	Business Description
1	Central Maine Healthcare Corp	2,501 to 3,000	General medical and surgical hospitals
2	TD Bank N A	1,501 to 2,000	Commercial banking
3	St Mary's Regional Medical Ctr	1,501 to 2,000	General medical and surgical hospitals
4	Wal-Mart / Sam's Club	1,001 to 1,500	Warehouse clubs and supercenters
5	Bates College	501 to 1,000	Colleges and universities
6	Murphy Homes Inc, John F	501 to 1,000	Residential developmental disability homes
7	L.L. Bean, Inc.	501 to 1,000	Mail-order houses
8	Pioneer Plastics Corporation	1 to 500	Laminated plastics plate, sheet, and shapes
9	Tambrands Inc.	1 to 500	Sanitary paper product manufacturing
10	P.S.T. Services, Inc.	1 to 500	Other accounting services

Source: MaineDOL, 2016

Table 5.10.5-4: Top 10 Private Employers in Cumberland County by Average Monthly Employment (1st Quarter 2016)

Rank	Name	Employment Range	Business Description
1	MaineHealth	8,001 to 8,500	General medical and surgical hospitals
2	L.L. Bean, Inc.	3,501 to 4,000	Mail-order houses
3	Unum Provident	3,001 to 3,500	Direct life insurance carriers
4	Hannaford Bros Co	2,501 to 3,000	Supermarkets and other grocery stores
5	Mercy Hospital	1,501 to 2,000	General medical and surgical hospitals
6	Mid Coast Hospital	1,001 to 1,500	General medical and surgical hospitals
7	Wal-Mart / Sam's Club	1,001 to 1,500	Warehouse clubs and supercenters
8	T D Bank N A	1,001 to 1,500	Commercial banking
9	Bowdoin College	1,001 to 1,500	Colleges and universities
10	Idexx Laboratories Inc.	1,001 to 1,500	Pharmaceutical preparation manufacturing

Source: MaineDOL, 2016

Table 5.10.5-5: Top 10 Private Employers in Sagadahoc County by Average Monthly Employment (1st Quarter 2016)

Rank	Name	Employment Range	Business Description
1	Bath Iron Works Corporation	5,501 to 6,000	Ship building and repairing
2	Grace Management Inc.	1 to 500	Continuing care retirement communities
3	Reed & Reed Inc.	1 to 500	Highway, street, and bridge construction
4	Hannaford Bros Co	1 to 500	Supermarkets and other grocery stores
5	Crooker Construction Llc	1 to 500	Highway, street, and bridge construction
6	Target Corporation	1 to 500	Discount department stores
7	Shaws Supermarkets Inc.	1 to 500	Supermarkets and other grocery stores
8	Bath Area Family YMCA	1 to 500	Civic and social organizations
9	Home Depot USA Inc.	1 to 500	Home centers
10	Computer Sciences Corporation	1 to 500	Computer facilities management services

Source: MaineDOL, 2016

5.10.6 References

Maine Department of Labor (MaineDOL). 2016. Top 25 Private Employers in Maine by Average Monthly Employment by County (1st Quarter 2016). [Online] URL: https://www1.maine.gov/labor/cwri/publications/pdf/MaineCountyTop25Employers.pdf. Accessed 1/16/2017.

State of Maine Office of Policy and Management (OPM). 2016. Maine Demographic Projections. [Online] URL: http://maine.gov/economist/projections/index.shtml. Accessed 1/17/2017.

United States Census Bureau (Census). 2000a. Profile of General Demographic Characteristics: 2000. [Online] URL: https://factfinder.census.gov/bkmk/table/1.0/en/DEC/00_SF1/DP1/0400000US23. Accessed 1/16/2017.

United States Census Bureau (Census). 2000b. Urban and Rural - 2000 Census Summary File 2. [Online] URL: https://factfinder.census.gov/bkmk/table/1.0/en/DEC/00_SF2/HCT001/0400000US23. Accessed 1/16/2017.

United States Census Bureau (Census). 2010. Population, Housing Units, Area, and Density: 2010 - State -- Place and (in selected states) County Subdivision. [Online] URL: https://factfinder.census.gov/bkmk/table/1.0/en/DEC/10_SF1/GCTPH1.CY07/0500000US23001|0500000US23005|0500000US23023. Accessed 1/16/2017.

United States Census Bureau (Census). 2015a. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2015. [Online] URL: https://factfinder.census.gov/bkmk/table/1.0/en/PEP/2015/PEPANNRES/0500000US23001. Accessed 1/16/2017.

United States Census Bureau (Census). 2015b. Selected Economic Characteristics: 2011-2015 American Community Survey 5-Year Estimates. [Online] URL: https://factfinder.census.gov/bkmk/table/1.0/en/ACS/15_5YR/DP03/0100000US|0400000US23|0500000US23001|0500000US23005|0500000US23023|0600000US2300119105|0600000US2300140035|0600000US2300508430|0600000US2302376960. Accessed 1/16/2017.

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

5.11.1 Overview

The Project includes no Tribal lands. The Licensee 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 potential effects of licensing the continued operation of the existing Project. For the purposes of this PAD, Project effects are any changes to the natural and human environment attributable to licensing the continued operation of the Project.

6.1.1 Anticipated Project Effects

FERC issued a new license for the Pejepscot Project in 1982. The Project has operated for 35 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 Pejepscot Project (no changes to project structures or operations are being proposed at this time).

Regarding fish passage, the listing of Atlantic salmon under ESA has triggered a separate but related 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 Pejepscot relicensing.

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

This section identifies issues associated with the potential effects of relicensing continued Project operations, initial study proposals based upon these issues, and current and proposed protection, mitigation, and enhancement (PM&E) measures by the Licensee to address these issues. This includes:

Potential Issues – Identification of issues is a key step in the relicensing process because any specific concerns or questions arising from the proposed continued Project operations may need to be addressed in the context of the relicensing proceeding. The Licensee has attempted to identify all of the known issues that have a nexus to licensing continued Project operations.

Proposed Study Plans – Where noted, the Licensee has included summaries for specific studies that it anticipates will be undertaken. The Licensee will file the formal "Study Plan" in accordance with 18 CFR §5.11 within 45 days following the deadline for filing comments on the PAD and the issuance of a Scoping Document by FERC. The Licensee understands that FERC's Scoping meetings and additional comments by resource agencies, tribes, or the public may alter suggested studies or require additional studies. Any information or study requests must comply with the requirements of 18 CFR §5.9(b). The Commission will subsequently issue a study plan determination in mid-summer 2018 establishing the study requirements for the Project. Regardless of the timing of the study plan determination, the Licensee may agree to certain studies and information gathering activities prior to the determination and may voluntarily initiate those activities or studies prior to the determination.

Continued or Proposed PM&E Measures – The issues identified for each resource area may or may not ultimately warrant specific PM&E measures or may already be addressed through PM&E measures required by the existing Project license or undertaken voluntarily by the Licensee. Existing relevant information and additional information obtained through studies will be used to determine if additional PM&E measures are needed.

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. It is not anticipated that the continued run-of-river operation of the Project is likely to affect geologic resources or to cause significant erosion.

6.2.1.2 Proposed Studies

No studies are being proposed specific to geologic or soil resources. Additional observations of the condition of the shoreline relative to Project-induced erosion will be made during the conduct of other reconnaissance surveys for the relicensing. Any areas of significant Project-induced erosion will be identified and addressed as necessary during relicensing.

6.2.1.3 Continued or Proposed PM&E Measures

The Pejepscot 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 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

Historical data indicates that water quality conditions upstream and downstream of the Project meet state standards and it is not anticipated that continued operations will adversely affect water quality. The Licensee proposes, however, to supplement the existing data with Project specific water quality sampling as outlined below.

6.2.2.2 Proposed Studies

The Licensee 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 2014). The objective of these studies will be to confirm that the Project impoundment and tailwater meet Maine Water Quality Standards.

Impoundment Trophic State Study

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, DO 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.

Tailwater Temperature and Dissolved Oxygen Study

The Licensee will monitor water temperature and DO in the tailwater area using data sonde(s) to collect continuous hourly data from July through August. Initial measurements of temperature and DO will be taken at quarter points across the river channel to determine if there are any significant differences in DO 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.

6.2.2.3 Continued or Proposed PM&E Measures

The Pejepscot Project, in accordance with the current FERC license, operates as run-of-river with very little fluctuation in the impoundment level, and also discharges a continuous minimum flow of 1,710 cfs, or inflow, whichever is less, below the Project. 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 Pejepscot Project is operated as run-of-river relative to pond levels, and discharges a continuous minimum flow of 1,710 cfs, or inflow, whichever is less, below the Project. The Licensee 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.

6.2.3.2 Proposed Studies

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

Tailwater Benthic Macroinvertebrate Study

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 30th) for 28 days ± 4 days.

Visual Eel Monitoring Surveys

The Licensee proposes to conduct a total of 12 nighttime visual monitoring surveys during the primary period of upstream eel migration (June 15 - August 31). Surveys will be conducted twice weekly from June 23 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 be conducted immediately following 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.

Adult Alewife and American shad Upstream Passage Evaluation

The Licensee proposes to conduct counts of upstream migrating alewife, American shad and other migratory species at the Project fish lift during the course of the passage season. Counts will be conducted by real-time visual observation and/or video recording during one passage season. The resulting counts at the Project fish lift will be used in combination with counts taken at the Brunswick Project fish lift to evaluate passage for each species at the Project.

Downstream Atlantic salmon Smolt Survival Study

As described in Section 5.3, the Licensee has been engaged in several ongoing studies associated with Atlantic salmon fish passage; these efforts are separate from the relicensing process though they are expected to inform the eventual relicensing proposal. These efforts were included in the five-year interim Species Protection Plan (2012-2016) that proposed monitoring studies of upstream (pre-spawn adults) and downstream (smolts and kelts) migrating Atlantic salmon for three years (2013-2015). Due to the low numbers of adult salmon passed at Brunswick Dam, efforts thus far have only evaluated smolt survival through the Project.

A subsequent Species Protection Plan was developed in 2016 and contained measures to protect Atlantic salmon for the period from 2017 to when a new license is issued (current license expires August 31, 2022). Among the measures proposed was a one-year downstream passage effectiveness study of smolts in 2018 to evaluate whole station survival under additional spill conditions at the Project. The results of this study and previous ones will be used to inform the relicensing process on this issue.

6.2.3.3 Continued or Proposed PM&E Measures

The Pejepscot Project, in accordance with the current FERC license, operates as run-of-river with very little fluctuation in the impoundment level, and also discharges a continuous minimum flow of 1,710 cfs, or inflow, whichever is less to enhance fish and aquatic resources. 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

The Licensee proposes to conduct reconnaissance level habitat surveys to document the wildlife and botanical resources in the Project Area and document any Threatened and Endangered species.

Proposed methods include updating existing information relative to Threatened and Endangered species that may be found in the study area and conducting a reconnaissance-level field survey. The study area will include areas enclosed in the Project boundary as well as adjacent areas up to 200 feet from the Project Impoundment. The study area will be traversed by boat and on foot to describe and field-verify NWI mapped wetland types, describe and map riparian shoreline and terrestrial habitat, as well as documenting invasive species and associated wildlife observed in the Project impoundment, adjacent shoreline, and downstream within and adjacent to the Project boundary.

6.2.4.3 Continued or Proposed PM&E Measures

The Pejepscot 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

See reconnaissance level terrestrial surveys discussed in Section 6.2.4.2.

6.2.5.3 Continued or Proposed PM&E Measures

The Pejepscot 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 within the Project boundary. Critical habitat 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 Lewiston Falls. This includes the areas around the Pejepscot Project, which are considered critical for their movement through the area to spawning locations upstream. Future upstream and downstream salmon passage at the Pejepscot Project is being addressed separately but concurrently with the relicensing process.

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 process. See Section 6.2.3.2 for a description of the recent and ongoing studies related to Atlantic salmon passage efforts. Also, see Section 6.2.4.2 for a description of proposed surveys related to terrestrial Threatened and Endangered species.

6.2.6.3 Continued or Proposed PM&E Measures

Except for the continuing measures to provide for the protection of Atlantic salmon, there are no 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

The Licensee proposes to conduct a recreation use and condition assessment at the Project recreation facilities. The proposed methodology consists of installing a trail camera or traffic counter(s) at the Pejepscot Boat Ramp and Pejepscot Dam Recreation Area, and a trail camera along the canoe portage route to quantify recreation use. This equipment will be installed for one field season during the primary open water recreation period (Memorial Day through Columbus Day). Any traffic counters used will have data downloaded regularly, and calibration counts will be performed two (2) times per month to record the number of vehicles and duration on site, number of people per vehicle, and observed activities. Trail camera photographs of the canoe portage route will be reviewed and the recreational activity will be identified, to the extent possible.

The condition assessment of the recreation facilities will include photographs of the sites, an estimate of parking capacity provided at each site (to be used as a proxy for site capacity), an assessment of the overall condition of each site, and general observations on site use and accessibility.

6.2.7.3 Continued or Proposed PM&E Measures

The Licensee 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

No studies are proposed.

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 Pejepscot 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

The Licensee 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 Pejepscot 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

No studies are proposed 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 Tribal Resources

6.2.11.1 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.

6.2.11.2 Proposed Studies

No studies are proposed.

6.2.11.3 Continued or Proposed PM&E Measures

No measures have been identified and none are proposed.

6.3 Potentially Relevant Qualifying Federal and State or Tribal Comprehensive Waterway Plans

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. 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. 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. 2000. Interstate Fishery Management Plan for American eel (*Anguilla rostrata*). (Report No. 36). April 2000.

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

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

Maine State Planning Office. 1987. Maine Comprehensive Rivers Management Plan. Augusta, Maine. May 1987.

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

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

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

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.

6.4 Potentially Relevant Resource Management Plans

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

6.5 References

Federal Energy Regulatory Commission (FERC). 2016. List of Comprehensive Plans. FERC Office of Energy Projects. December 2016.

APPENDIX A – SUMMARY OF CONTACTS AND CORRESPONDENCE LETTERS

This page intentionally left blank.

Pursuant to 18 CFR 5.6(d)(5), Topsham Hydro 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
July 17, 2017	Frank Dunlap	Distribution list	Topsham Hydro request for information for the Pejepscot relicensing
July 18, 2017	Jay Clement	Tim Sullivan	U.S. Army Corps of Engineers response to information request
July 18, 2017	Matt Buhyoff	Tim Sullivan	National Marine Fisheries Service response to information request
July 18, 2017	Megan Hopkin	Tim Sullivan	Maine Historic Preservation Commission response to information request
July 19, 2017	Kathy Howatt	Tim Sullivan	Maine Department of Environmental Protection response to information request
August 2017	Harold Peterson	Kirk Smith	Bureau of Indian Affairs response to information request
August 9, 2017	Steven Shepard	Tim Sullivan	U.S. Fish and Wildlife Service response to information request
August 10, 2017	Dr. Arthur Spiess	Tim Sullivan	Maine Historic Preservation response to information request
August 11, 2017	Rich Roedner	Tim Sullivan	Town of Topsham response to information request

Brookfield

Brookfield Renewable
Topsham Hydro Partners Limited Partnership
150 Main Street
Lewiston, ME 04240

Tel 207.755.5600
Fax 207.755.5655
www.brookfieldrenewable.com

July 17, 2017

DISTRIBUTION LIST

Request for Information for the Relicensing of the Pejepscot Hydroelectric Project (FERC No. 4784)

Dear Sir/Madam:

Brookfield Renewable, on behalf of Topsham Hydro Partners Limited Partnership (THP or Licensee), is preparing to relicense the Pejepscot Hydroelectric Project (the Project) (FERC No. 4784) with the Federal Energy Regulatory Commission (FERC). The Project is located on the Androscoggin River straddling the border between Cumberland and Sagadahoc Counties in the village of Pejepscot and Town of Topsham, Maine. The FERC license for the Project expires on August 31, 2022. As such, the Notice of Intent (NOI) and Pre-Application Document (PAD) must be filed with FERC no later than August 31, 2017.

The purpose of this letter is to:

1. Notify potentially interested entities of the upcoming relicensing effort, and;
2. Request existing relevant and reasonably available information that describes either the existing environmental conditions at the Project or any known or potential issues relating to continuing Project operations.

The 14.575-MW Project generally consists of the dam, spillway, fish passage facilities, two powerhouses, a sheet-pile floodwall, and ancillary equipment. The current license requires the Project to discharge a continuous minimum flow of 1,710 cubic feet per second (cfs), or inflow to the impoundment, whichever is less. The attached **Figure 1** provides a regional map of the Project's location, while **Figure 2** depicts major Project features.

THP is contacting potentially interested parties regarding the Project to solicit background information for use in developing the PAD. The PAD is a document that summarizes readily available background information on the Project. Below is a brief table of contents for the PAD:

1. Introduction
2. Plans, Schedule, and Protocols
    a. Process Plan and Schedule through Filing the License Application
    b. Proposed Communications Protocol
3. General Description of the River Basin
    a. Overview
    b. Major Land Uses
    c. Major Water Uses
    d. Basin Dams
    e. Tributary Streams
    f. Climate
4. Project Location, Facilities, and Operations

   a. Project Location
   b. Project Facilities
   c. Project Operations
   d. Other Project Information
5. Description of Existing Environmental Resources
   a. Geology and Soils
   b. Water Resources
   c. Fisheries & Aquatic Resources
   d. Wildlife & Botanical Resources
   e. Wetlands, Riparian, Littoral Habitat
   f. Rare, Threatened, and Endangered Species
   g. Recreation & Land Use
   h. Aesthetic Resources
   i. Cultural Resources
   j. Socio-Economic Resources
   k. Tribal Resources
6. Preliminary Issues and Studies List
   a. Issues pertaining to the identified resources
   b. Potential studies or information gathering requirements associated with the identified issues
7. Summary of Contacts
8. References

THP respectfully requests any information your organization may have collected regarding the environmental, recreational, and/or cultural resources along the Androscoggin River in the vicinity of the Project. In addition, to assist THP in obtaining available data as well as assessing potential issues for the relicensing, we ask that you complete the attached PAD Questionnaire and provide copies of any pertinent information by August 11, 2017. Paper or electronic copies of pertinent information can be sent to:

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

Thank you in advance for your cooperation. If you have any questions, please do not hesitate to contact me at Frank.Dunlap@brookfieldrenewable.com or (207) 755-5603.

Sincerely,

Frank Dunlap
Licensing Specialist

Attachments

Pre-Application Document Questionnaire
Project Map and Aerial Photograph

Cc: Distribution List

S. Murphy, Brookfield
K. Smith, Gomez and Sullivan

Pejepscot Hydroelectric Project (FERC No. 4784)
FERC Relicensing Pre-Application Document Questionnaire

Topsham Hydro Partners Limited Partnership (THP) is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the existing Pejepscot Hydroelectric Project (FERC No. 4784). The Project is located at the second dam on the main stem of the Androscoggin River, in the Village of Pejepscot and Town of Topsham, Maine. THP is preparing a Pre-Application Document (PAD) for the Project that provides FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project to help identify issues and related information needs, develop study requests and study plans, and prepare documents analyzing Project impacts. The PAD Questionnaire will be used to help identify sources of existing, relevant, and reasonably available information that is not in THP's possession.

1. Information about 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
__ water resources
__ fish & aquatic resources
__ wildlife & botanical resources
__ wetlands, riparian, & littoral habitat
__ rare, threatened or endangered species
__ 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 *(additional information may be provided on page 3 of this questionnaire).*

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

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by THP's representative for the resource area(s) checked above *(additional information may be provided on page 4 of this questionnaire).*

Representative Contact Information

Name	
Address	
Phone	
Email Address	

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)? *(Additional information may be provided on page 4 of this questionnaire.)*

__ Yes *(please list specific issues below)* __No

Resource Area	Specific Issue

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

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

   Comments

Please return this questionnaire and any pertinent information by August 11, 2017 to;

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

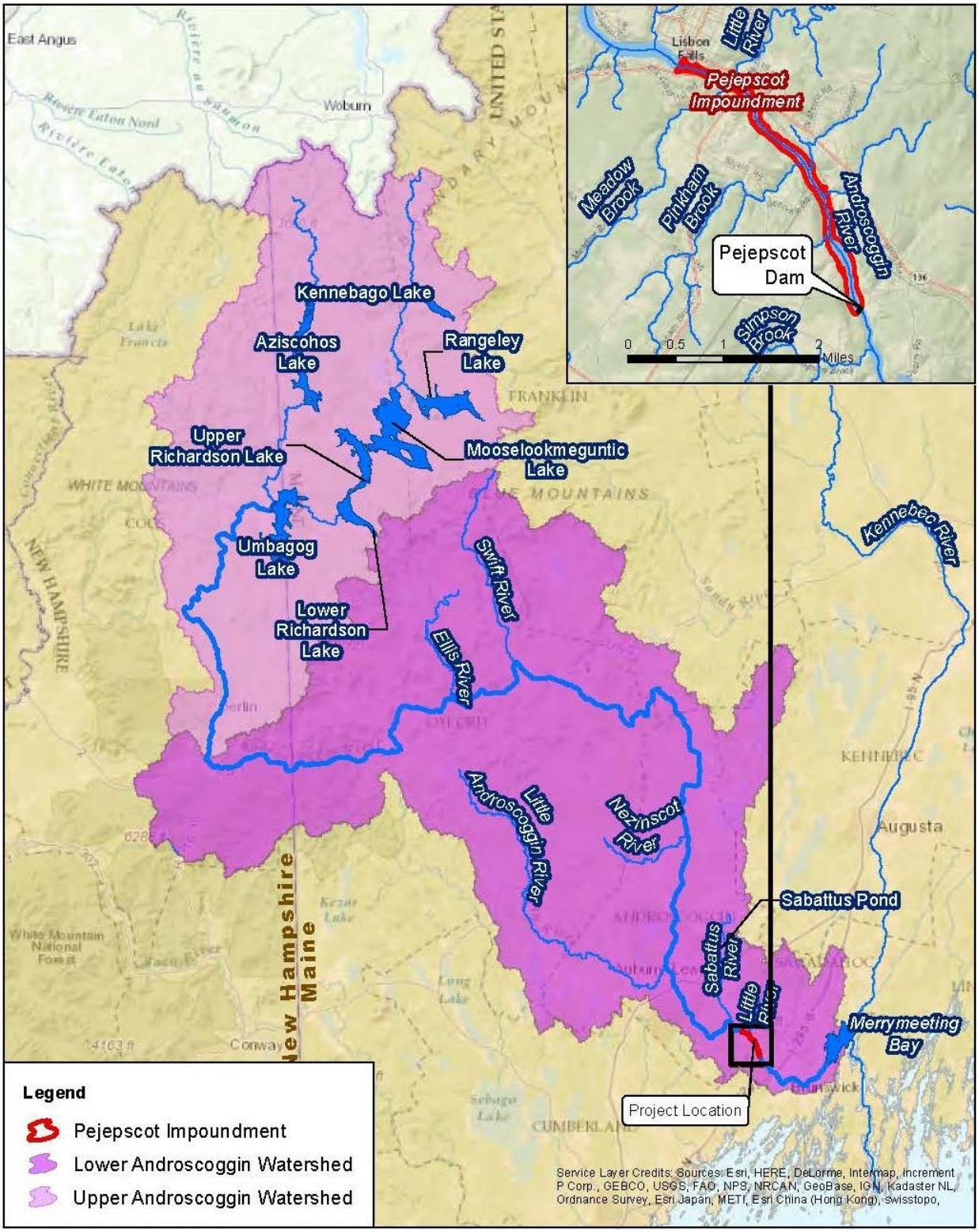


Figure 1: *Regional Map of the Pejepscot Hydroelectric Project*

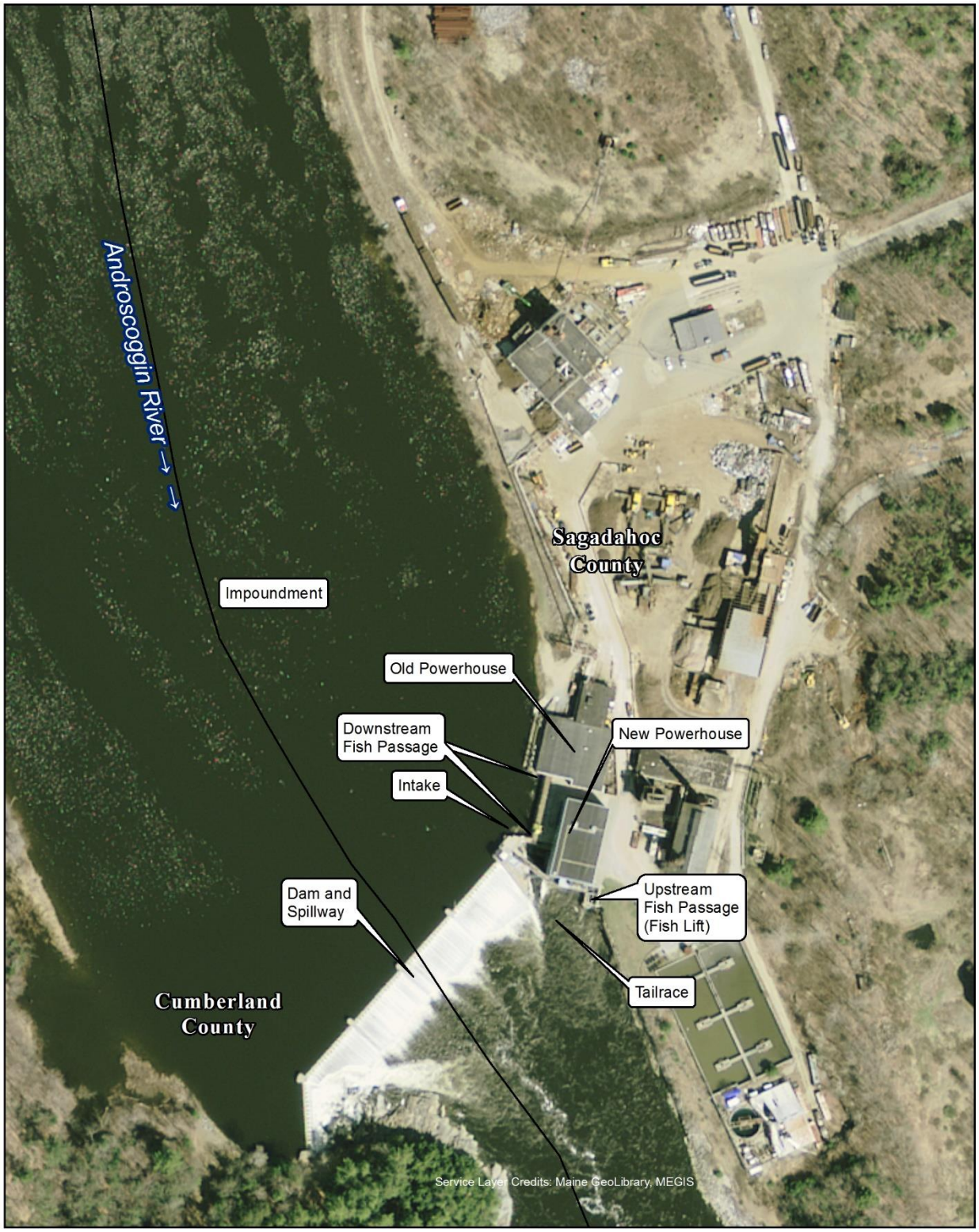


Figure 2: *Project Area Map of the Pejepscot Hydroelectric Project*

ATTACHMENT 1: Distribution List

Federal Agencies

Mr. John Spain
Regional Engineer
Federal Energy Regulatory Commission
Division of Dam Safety and Inspections
New York Regional Office
19 W 34th Street, Suite 400
New York, NY 10001

Regional Director
U.S. Fish and Wildlife Service
300 Westgate Center Dr.
Northeast Regional Office
Hadley, MA 01035

Mr. Steve Shepard
Maine Hydro Licensing Coordinator
U.S. Fish and Wildlife Service
P.O. Box A
306 Hatchery Way
East Orland, ME 04431

Mr. Antonio Bentivoglio
U.S. Fish and Wildlife Service
P.O. Box A
306 Hatchery Way
East Orland, ME 04431

Mr. Sean McDermott
National Oceanic & Atmospheric Administration
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930

Mr. Jeff Murphy
National Oceanic & Atmospheric Administration
Main Field Office
17 Godfrey Drive- Suite 1
Orono, ME 04473

Mr. Ralph Abele
Instream Flow Coordinator
Region 1- Office of Ecosystem Protection
US Environmental Protection Agency
5 Post Office Square, Suite 100
Mail Code: OEP06-2
Boston, MA 02109-3912

Mr. John T. Eddins
Office of Project Review
Advisory Council on Historic Preservation
The Old Post Office
1100 Pennsylvania Ave NW Suite 809
Washington, DC 20004-2501

Mr. Jay Clement
U.S. Army Corps of Engineers
675 Western Avenue #3
Manchester, ME 04351

Mr. Kevin Mendik
Hydro Program Manager
Northeast Region
National Park Service
15 State Street, 10th Floor
Boston, MA 02109-3572

Mr. Ryan Hansen
Federal Energy Regulatory Commission
888 First Street, NE,
Washington, DC 20426

Mr. Greg Stewart
Data Section Chief
U.S. Geological Survey
196 Whitten Rd.
Augusta, ME 04333

Mr. Weldon Loudermilk
Director
Bureau of Indian Affairs
U.S. Department of the Interior
MS 4606 MIB
1849 C Street NW
Washington, DC 20240

Mr. Harold Peterson
Bureau of Indian Affairs
Eastern Regional Office
545 Marriot Drive, Suite 700
Nashville, TN 37214

Mr. Andrew L. Raddant
Regional Environmental Officer
U.S. Fish and Wildlife Service
Office of Environmental Policy and Compliance
Northeast Region
15 State Street, Suite 400
Boston, MA 02109

State Agencies

Ms. Kathy Howatt
Hydropower Coordinator
Maine Department of Environmental Protection
17 State House Station
28 Tyson Drive
Augusta, ME 04333-0017

Mr. Mark Bergeron
Director
Bureau of Land Resource Regulation
Maine Department of Environmental Protection
17 State House Station
28 Tyson Drive
Augusta, ME 04333-0017

Mr. Robert G. Marvinney
State Geologist
Maine Geological Survey
Maine Department of Agriculture, Conservation and Forestry
22 State House Station
18 Elkins Lane
Augusta, ME 04333-0022

Mr. Jim Vogel
Maine Department of Agriculture, Conservation and Forestry
Bureau of Parks and Lands
22 State House Station
18 Elkins Lane
Augusta, ME 04333-0022

Ms. Kathleen Leyden
Maine Coastal Program
Maine Department of Agriculture, Conservation and Forestry
22 State House Station
18 Elkins Lane
Augusta, ME 04333-0022

Mr. John Perry
Environmental Coordinator
Maine Department of Inland Fisheries and Wildlife
41 State House Station
284 State Street
Augusta, ME 04333-0041

Mr. James Pellerin
Regional Fisheries Biologist – Region A
Maine Department of Inland Fisheries and Wildlife
RR1, 358 Shaker Road
Gray, ME 04039

Mr. Scott Lindsay
Regional Wildlife Biologist – Region A
Maine Department of Inland Fisheries and Wildlife
RR1, 358 Shaker Road
Gray, ME 04039

Ms. Gail Wippelhauser
Maine Department of Marine Resources
21 State House Station
Augusta, ME 04333-0021

Mr. Paul Christman
Maine Department of Marine Resources
21 State House Station
Augusta, ME 04333

Mr. Kirk Mohney
Director and State Historic Preservation Officer
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333-0065

Dr. Arthur Spiess
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333-0065

Municipal Government

Town of Topsham
100 Main Street
Topsham, ME 04086

Town of Brunswick
85 Union Street
Brunswick, ME 04011

Town of Durham
630 Hallowell Road
Durham, ME 04222

Town of Lisbon
300 Lisbon Street
Lisbon, Me 04250

Cumberland County Government
142 Federal Street
Portland, ME 04101

Sagadahoc County Government
752 High Street
Bath, ME 04530

Androscoggin County Government
2 Turner Street
Auburn, ME 04210

Non-Government Organizations

Mr. Brian Graber
Director
American Rivers
Northeast Field Office
516 West Hampton Road
Southampton, MA 01062

Mr. Kevin Colburn
National Stewardship Director
American Whitewater
2725 Highland Avenue
Missoula, MT 59802

Mr. John R.J. Burrows
Atlantic Salmon Federation
Fort Andross, Suite 406
14 Maine Street
Brunswick, ME 04011

Mr. Bill Oleszczuk
Chair
Maine Council of Trout Unlimited
185 Tobey Road
New Gloucester, ME 04260

Mr. Jeffrey Reardon
Maine Brook Trout Program Director
Trout Unlimited
9 Union Street
Hallowell, ME 04347

Mr. Ed Friedman
Friends of Merrymeeting Bay
PO Box 233
Richmond, ME 04357

Native American Tribes

Chief Edward Peter Paul
Aroostook Band of Micmacs
Micmac Cultural, Community and
Educational Center
7 Northern Road
Presque Isle, ME 04769

Ms. Jennifer Pictou
THPO
Aroostook Band of Micmacs
7 Northern Road
Presque Island, ME 04769

Chief Kirk Francis
Penobscot Indian Nation
12 Wabanaki Way
Indian Island, ME 04468

Mr. Christopher Sockalexis
THPO
Penobscot Indian Nation
Cultural & Historic Preservation Department
12 Wabanaki Way
Indian Island, ME 04468

Mr. Donald Soctomah
THPO
Passamaquoddy Tribe
PO Box 159
Princeton, ME 04668

Chief William J. Nicholas, Sr.
Passamaquoddy Tribe
Indian Township
P.O. Box 301
Princeton, ME 04668

Ms. Susan Young
Houlton Band of Maliseet Indians
88 Bell Road
Littleton, ME 04730

Chief Brenda Commander
Houlton Band of Maliseet Indians
88 Bell Road
Littleton, ME 04730

Tim Sullivan

From: Clement, Jay L CIV USARMY CENAE (US) <Jay.L.Clement@usace.army.mil>
Sent: Tuesday, July 18, 2017 6:11 AM
To: Tim Sullivan
Cc: Frank.Dunlap@BrookfieldRenewable.com; Murphy, Steve; Kirk Smith
Subject: RE: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

As Frank Dunlap knows, relicensing per se does not generally require action from the Corps of Engineers. However, if relicensing includes maintenance or improvement actions at the facility that require the permanent or temporary discharge of fill material into the waterway or any adjacent wetlands, a Corps of Engineers permit will be required pursuant to Section 404 of the Clean Water Act. Should this be the case, we request that you contact us separately and directly to orchestrate pre-application coordination. You may also wish to involve the Maine DEP in this coordination.

If you have any questions concerning this matter, please contact me.

Jay Clement
Senior Project Manager
US Army Corps of Engineers
Maine Project Office
207-623-8367

-----Original Message-----
From: Tim Sullivan [mailto:timsullivan@gomezandsullivan.com]
Sent: Monday, July 17, 2017 9:11 PM
Cc: Frank.Dunlap@BrookfieldRenewable.com; Murphy, Steve <steven.murphy@brookfieldrenewable.com>; Kirk Smith <ksmith@gomezandsullivan.com>
Subject: [Non-DoD Source] Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Dear Sir/Madam:

Brookfield Renewable, on behalf of Topsham Hydro Partners Limited Partnership (THP), is preparing to relicense the Pejepscot Hydroelectric Project with the Federal Energy Regulatory Commission. The purpose of this email and accompanying attachment is to notify potentially interested entities of the upcoming relicensing effort and to request existing relevant and reasonably available information pertaining to the Project. THP respectfully requests any information your organization may have collected that may be relevant to the relicensing effort.

If you have any questions, please contact Frank Dunlap - Licensing Specialist, at Frank.Dunlap@brookfieldrenewable.com <mailto:Frank.Dunlap@brookfieldrenewable.com> or (207) 755-5603. Thank you in advance for your cooperation.

Regards,

Tim Sullivan

Tim Sullivan

From: Matt Buhyoff - NOAA Federal <matt.buhyoff@noaa.gov>
Sent: Tuesday, July 18, 2017 9:39 AM
To: Tim Sullivan; frank.dunlap@brookfieldrenewable.com
Subject: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Good Morning,

I'll be serving as the primary point of contact for NOAA in the upcoming Pejepscot relicensing. Would you please add me to any applicable email or mailing lists?

Thanks,

Matt Buhyoff

_____
Matt Buhyoff
Atlantic Salmon Recovery Coordinator | Merrymeeting Bay
NOAA - Fisheries
17 Godfrey Dr., Orono, ME
207.866.4238

Tim Sullivan

From: Hopkin, Megan M <Megan.M.Hopkin@maine.gov>
Sent: Tuesday, July 18, 2017 8:50 AM
To: Tim Sullivan
Subject: FW: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing
Attachments: Pejepscot Request for Information Letter.pdf

Please submit this request in hard copy to our office. We do not accept electronic submissions.

Megan M. Hopkin
Review & Compliance/CLG Coordinator
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine, 04333
207.287.2992

From: Mohney, Kirk
Sent: Tuesday, July 18, 2017 8:40 AM
To: Hopkin, Megan M
Subject: FW: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

---

From: Tim Sullivan [mailto:timsullivan@gomezandsullivan.com]
Sent: Monday, July 17, 2017 9:11 PM
Cc: Frank.Dunlap@BrookfieldRenewable.com; Murphy, Steve; Kirk Smith
Subject: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Dear Sir/Madam:

Brookfield Renewable, on behalf of Topsham Hydro Partners Limited Partnership (THP), is preparing to relicense the Pejepscot Hydroelectric Project with the Federal Energy Regulatory Commission. The purpose of this email and accompanying attachment is to notify potentially interested entities of the upcoming relicensing effort and to request existing relevant and reasonably available information pertaining to the Project. THP respectfully requests any information your organization may have collected that may be relevant to the relicensing effort.

If you have any questions, please contact Frank Dunlap - Licensing Specialist, at Frank.Dunlap@brookfieldrenewable.com or (207) 755-5603. Thank you in advance for your cooperation.

Regards,
Tim Sullivan

Tim Sullivan, GISP
Regulatory Specialist
Gomez and Sullivan Engineers, DPC
P.O. Box 2179
Henniker, NH 03242
O: (603) 428-4960

Tim Sullivan

From: Howatt, Kathy <Kathy.Howatt@maine.gov>
Sent: Wednesday, July 19, 2017 10:35 AM
To: Tim Sullivan
Cc: Dunlap,Frank (Frank.Dunlap@brookfieldrenewable.com)
Subject: RE: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Hi Tim,
The Department conducted a water quality study in 2010 of the Lower Androscoggin River, south of Lewiston. I'm including a link to the Department's webpage that contains the reports of that study. You will likely find some useful information.
http://www.maine.gov/dep/water/monitoring/rivers_and_streams/modelinganddatareports/
Kathy

Kathy Davis Howatt
Hydropower Coordinator
Bureau of Land Resources, Land Division
Maine Department of Environmental Protection
Phone: 207-446-2642
kathy.howatt@maine.gov

Correspondence to and from this office is considered a public record and may be subject to a request under the Maine Freedom of Access Act. Information that you wish to keep confidential should not be included in email correspondence.

From: Tim Sullivan [mailto:timsullivan@gomezandsullivan.com]
Sent: Monday, July 17, 2017 9:11 PM
Cc: Frank.Dunlap@BrookfieldRenewable.com; Murphy, Steve; Kirk Smith
Subject: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Dear Sir/Madam:

Brookfield Renewable, on behalf of Topsham Hydro Partners Limited Partnership (THP), is preparing to relicense the Pejepscot Hydroelectric Project with the Federal Energy Regulatory Commission. The purpose of this email and accompanying attachment is to notify potentially interested entities of the upcoming relicensing effort and to request existing relevant and reasonably available information pertaining to the Project. THP respectfully requests any information your organization may have collected that may be relevant to the relicensing effort.

If you have any questions, please contact Frank Dunlap - Licensing Specialist, at Frank.Dunlap@brookfieldrenewable.com or (207) 755-5603. Thank you in advance for your cooperation.

Regards,
Tim Sullivan

Tim Sullivan, GISP
Regulatory Specialist
Gomez and Sullivan Engineers, DPC
P.O. Box 2179
Henniker, NH 03242
O: (603) 428-4960

Pejepscot Hydroelectric Project (FERC No. 4784)
FERC Relicensing Pre-Application Document Questionnaire

Topsham Hydro Partners Limited Partnership (THP) is beginning the Federal Energy Regulatory Commission (FERC) relicensing process for the existing Pejepscot Hydroelectric Project (FERC No. 4784). The Project is located at the second dam on the main stem of the Androscoggin River, in the Village of Pejepscot and Town of Topsham, Maine. THP is preparing a Pre-Application Document (PAD) for the Project that provides FERC and other entities with existing, relevant, and reasonably available information pertaining to the Project to help identify issues and related information needs, develop study requests and study plans, and prepare documents analyzing Project impacts. The PAD Questionnaire will be used to help identify sources of existing, relevant, and reasonably available information that is not in THP's possession.

1. Information about person completing the questionnaire:

Name & Title	Harold Peterson, Natural Resources Officer
Organization	Bureau of Indian Affairs Eastern Regional Office
Address	545 Marriott Dr Ste 700 Nashville, TN 37214
Phone	615-564-6838
Email Address	harold.peterson@bia.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:

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

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

We recommend continued consultation with Penobscot Nation and Aroostook Band of Micmacs

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

www.bia.gov has a Tribal Leaders Directory

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by THP's representative for the resource area(s) checked above *(additional information may be provided on page 4 of this questionnaire).*

Representative Contact Information

Name	
Address	
Phone	
Email Address	

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)? *(Additional information may be provided on page 4 of this questionnaire.)*

__ Yes *(please list specific issues below)* X No

Resource Area	Specific Issue

3. Do you or your organization plan to participate in the Pejepscot Hydroelectric Project relicensing proceedings? X Yes __ No

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

   Comments

Please return this questionnaire and any pertinent information by August 11, 2017 to;

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

Tim Sullivan

From: Shepard, Steven <steven_shepard@fws.gov>
Sent: Wednesday, August 09, 2017 7:04 AM
To: Tim Sullivan
Cc: Antonio Bentivoglio; Frank.Dunlap@BrookfieldRenewable.com; Kirk Smith; matt buyhoff
Subject: Re: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Tim

New information has been developed in response to the expanded ESA listing of Atlantic salmon. This is a joint listing between the FWS and NOAA. The Licensee and/or NOAA (cc'd here) have developed this information and can provide the relevant documents.

Please include Antonio Bentivoglio (FWS, Falmouth office) in any future correspondence.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
Steven Shepard, C.F.P.
U.S. Fish and Wildlife Service
P.O. Box A
306 Hatchery Road
East Orland, Maine 04431
Direct: 207-902-1572
Mobile: 207-949-1288
Check us out on FaceBook
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
The liberties of a people are not secure when the acts of their rulers are concealed from them—Patrick Henry

On Wed, Aug 9, 2017 at 1:40 AM, Tim Sullivan <timsullivan@gomezandsullivan.com> wrote:

> Dear Sir/Madam:
>
> A friendly reminder that if you plan on responding to the request for information below, please do so by August 11th. If you have any questions, please contact Frank Dunlap - Licensing Specialist, at Frank.Dunlap@brookfieldrenewable.com or (207) 755-5603.
>
> Regards,
>
> Tim Sullivan
>
> **From:** Tim Sullivan
> **Sent:** Monday, July 17, 2017 9:11 PM

Cc: 'Frank.Dunlap@BrookfieldRenewable.com' <Frank.Dunlap@BrookfieldRenewable.com>; Murphy, Steve <steven.murphy@brookfieldrenewable.com>; 'Kirk Smith ' <ksmith@gomezandsullivan.com>
Subject: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Dear Sir/Madam:

Brookfield Renewable, on behalf of Topsham Hydro Partners Limited Partnership (THP), is preparing to relicense the Pejepscot Hydroelectric Project with the Federal Energy Regulatory Commission. The purpose of this email and accompanying attachment is to notify potentially interested entities of the upcoming relicensing effort and to request existing relevant and reasonably available information pertaining to the Project. THP respectfully requests any information your organization may have collected that may be relevant to the relicensing effort.

If you have any questions, please contact Frank Dunlap - Licensing Specialist, at Frank.Dunlap@brookfieldrenewable.com or (207) 755-5603. Thank you in advance for your cooperation.

Regards,

Tim Sullivan

Tim Sullivan, GISP

Regulatory Specialist

Gomez and Sullivan Engineers, DPC

P.O. Box 2179

Henniker, NH 03242

O: (603) 428-4960

timsullivan@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

Tim Sullivan

From: Spiess, Arthur <Arthur.Spiess@maine.gov>
Sent: Thursday, August 10, 2017 9:56 AM
To: Tim Sullivan
Subject: RE: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Hello Mr. Sullivan:
Historic and prehistoric archaeological survey for the Pejepscot relicensing will be necessary, although a preliminary round of archaeological work was done in the 1980s (see below for details).

There is only one prehistoric site currently known on the banks of the Pejepscot impoundment -- 14.108. There are NO known historic archaeological sites in our inventory, because no systematic archaeological survey for historic archaeological sites has been done along the banks of the Androscoggin River for the Pejepscot project.

The Pejepscot project was subjected to a Phase I prehistoric archaeological survey in 1985 (MHPC report 2181), which we consider inadequate to meet current Phase I hydro relicensing survey standards. That survey located one site (14.108), and that site was subsequently examined in a Phase II. The Phase II is adequate for that one site (14.108). (It would be a good idea to relocate site 14.108 and get GPS co-ordinates and assess the issue of on-going erosion at the site, if any.)

The 1985 Phase I survey coverage is inadequate. The focus was on testing on alluvial land forms, and (with the exception of 14.108) all testing was done with 50x50 cm testpits to somewhere around 40 to 80 cm depth. For the last two decades or more, we have required 1 out of 5 testpits in alluvial sediment to be 1x1 m squares, dug to 1.3 to 1.5 m depth or the base of the alluvium – whichever is more shallow. In addition, the 1985 Phase I survey ignored steeper land forms of glacial outwash (many with gravel pits associated) that might be eroding. And they ignored the inundated stream mouths and cut-off river meanders that are inundated by the impoundment. So, more Phase I prehistoric archaeological survey work needs to be done -- not necessarily duplicating the transects that were done in 1985, which tested shallowly, but at least picking places where deeper testpits can be dug, as well as looking at locations that were skipped in the 1985 work.

In addition, as mentioned above, we need background work and a Phase I survey dealing with the issue of possible historic archaeological sites.

Sincerely, Art Spiess

Dr. Arthur Spiess
Senior Archaeologist, Maine Historic Preservation
State House Station 65
Augusta, ME 04333
desk phone: 207-287-2789

From: Tim Sullivan [mailto:timsullivan@gomezandsullivan.com]
Sent: Wednesday, August 09, 2017 1:40 AM
Cc: Frank.Dunlap@BrookfieldRenewable.com; Kirk Smith <ksmith@gomezandsullivan.com>
Subject: RE: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Dear Sir/Madam:

A friendly reminder that if you plan on responding to the request for information below, please do so by August 11th. If you have any questions, please contact Frank Dunlap - Licensing Specialist, at Frank.Dunlap@brookfieldrenewable.com or (207) 755-5603.

Regards,
Tim Sullivan

From: Tim Sullivan
Sent: Monday, July 17, 2017 9:11 PM
Cc: 'Frank.Dunlap@BrookfieldRenewable.com' <Frank.Dunlap@BrookfieldRenewable.com>; Murphy, Steve <steven.murphy@brookfieldrenewable.com>; 'Kirk Smith ' <ksmith@gomezandsullivan.com>
Subject: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Dear Sir/Madam:

Brookfield Renewable, on behalf of Topsham Hydro Partners Limited Partnership (THP), is preparing to relicense the Pejepscot Hydroelectric Project with the Federal Energy Regulatory Commission. The purpose of this email and accompanying attachment is to notify potentially interested entities of the upcoming relicensing effort and to request existing relevant and reasonably available information pertaining to the Project. THP respectfully requests any information your organization may have collected that may be relevant to the relicensing effort.

If you have any questions, please contact Frank Dunlap - Licensing Specialist, at Frank.Dunlap@brookfieldrenewable.com or (207) 755-5603. Thank you in advance for your cooperation.

Regards,
Tim Sullivan

Tim Sullivan, GISP
Regulatory Specialist
Gomez and Sullivan Engineers, DPC
P.O. Box 2179
Henniker, NH 03242
O: (603) 428-4960
timsullivan@gomezandsullivan.com

GOMEZ AND SULLIVAN ENGINEERS

GSE CONFIDENTIALITY NOTICE: *This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you are not the intended recipient, please do not read or review the content and/or metadata and do not disseminate, distribute or copy this communication. Anyone who receives this message in error should notify the sender (timsullivan@gomezandsullivan.com) immediately by return e-mail and delete it from his or her computer.*

Tim Sullivan

From: Rich Roedner <rroedner@topshammaine.com>
Sent: Friday, August 11, 2017 1:32 PM
To: Tim Sullivan
Cc: Rich Roedner
Subject: RE: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing
Attachments: Report on Reconnaissance Level Survey of Topsham's Built Environment January 1991.pdf

Dear Tim

Topsham has a fair amount of information regarding the Pejepscot Mill Dam, and is aware of additional information.

- We have the property record cards, both real estate and personal property. The last third party appraisal report from 2008.
- Additionally, I believe the Hydro project holds the easement for the boat ramp near the Topsham / Lisbon town line. There is a copy of the site plan for the ramp in the assessing office.
- Perhaps the Sag County Hazard Mitigation Plan Risk Assessment from 2016? It can be found at http://sagcounty.com/wp-content/uploads/2014/06/SECTION-4-RISK-revised-17Jan17.pdf

In addition, there is a 1991 report on Topsham's built environment (attached) that may provide additional information.

Any of the information we have is available to you at our offices.

Rich

Rich Roedner
Town Manager
Topsham, ME

207-725-5821

rroedner@topshammaine.com

Please be advised that pursuant to Title 1 M.R.S.A. Section 402(3), a public record includes any written, printed or graphic matter or any mechanical or electronic data in the possession or custody of an agency or public official that has been received or prepared for use in connection with the transaction of public or governmental business and contains information relating to the transaction of said business; therefore, the public is advised that any correspondence, whether by traditional method or e-mail with Town offices or Town officials, with certain limited exceptions, is public record and is available for review by any interested party.

From: Tim Sullivan [mailto:timsullivan@gomezandsullivan.com]
Sent: Wednesday, August 09, 2017 1:40 AM
Cc: Frank.Dunlap@BrookfieldRenewable.com; Kirk Smith <ksmith@gomezandsullivan.com>
Subject: RE: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Dear Sir/Madam:

A friendly reminder that if you plan on responding to the request for information below, please do so by August 11th. If you have any questions, please contact Frank Dunlap - Licensing Specialist, at Frank.Dunlap@brookfieldrenewable.com or (207) 755-5603.

Regards,
Tim Sullivan

From: Tim Sullivan
Sent: Monday, July 17, 2017 9:11 PM
Cc: 'Frank.Dunlap@BrookfieldRenewable.com' <Frank.Dunlap@BrookfieldRenewable.com>; Murphy, Steve <steven.murphy@brookfieldrenewable.com>; 'Kirk Smith ' <ksmith@gomezandsullivan.com>
Subject: Pejepscot Hydroelectric Project - Request for Information in Anticipation of Relicensing

Dear Sir/Madam:

Brookfield Renewable, on behalf of Topsham Hydro Partners Limited Partnership (THP), is preparing to relicense the Pejepscot Hydroelectric Project with the Federal Energy Regulatory Commission. The purpose of this email and accompanying attachment is to notify potentially interested entities of the upcoming relicensing effort and to request existing relevant and reasonably available information pertaining to the Project. THP respectfully requests any information your organization may have collected that may be relevant to the relicensing effort.

If you have any questions, please contact Frank Dunlap - Licensing Specialist, at Frank.Dunlap@brookfieldrenewable.com or (207) 755-5603. Thank you in advance for your cooperation.

Regards,
Tim Sullivan

Tim Sullivan, GISP
Regulatory Specialist
Gomez and Sullivan Engineers, DPC
P.O. Box 2179
Henniker, NH 03242
O: (603) 428-4960
timsullivan@gomezandsullivan.com

GSE CONFIDENTIALITY NOTICE: *This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you are not the intended recipient, please do not read or review the content and/or metadata and do not disseminate, distribute or copy this communication. Anyone who receives this message in error should notify the sender (timsullivan@gomezandsullivan.com) immediately by return e-mail and delete it from his or her computer.*

Total Control Panel Login

To: rroedner@topshammaine.com
From: timsullivan@gomezandsullivan.com

Message Score: 20
My Spam Blocking Level: Medium

Block this sender

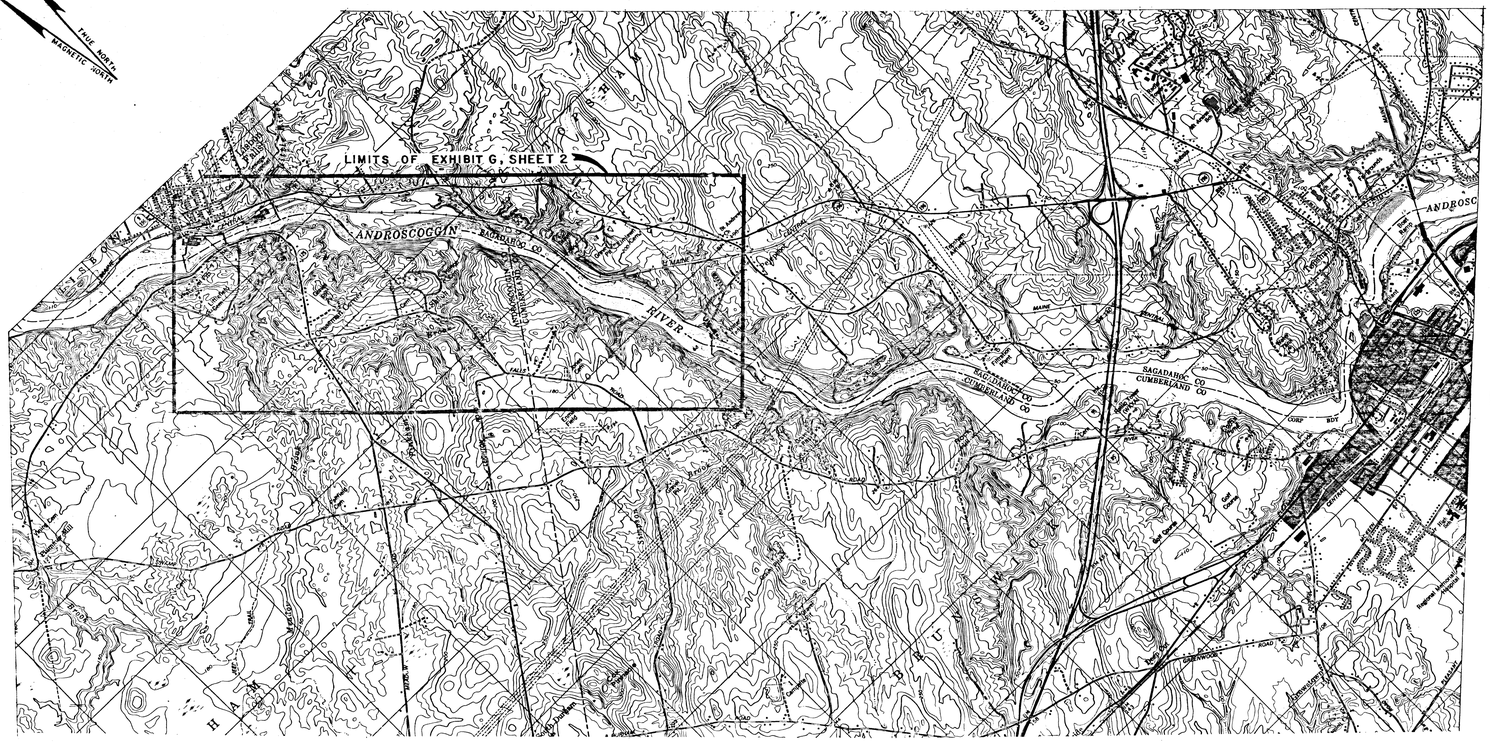
High (60): Pass
Medium (75): Pass
Low (90): Pass

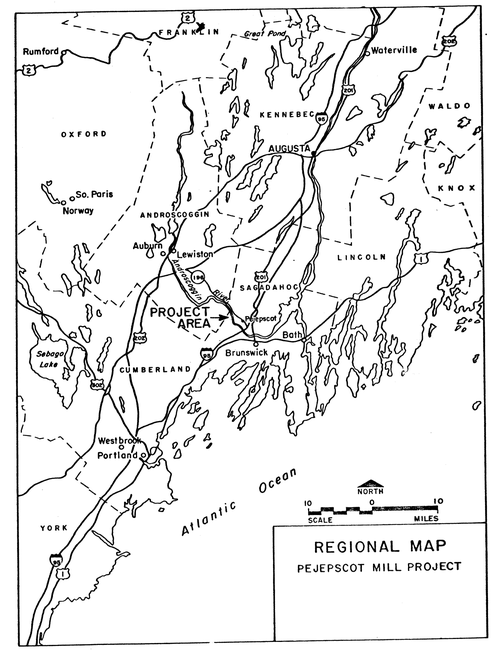
This page intentionally left blank.

APPENDIX B – EXHIBIT G DRAWINGS

This page intentionally left blank.

17°
1979
TRUE NORTH
MAGNETIC NORTH





TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP
ACRES INTERNATIONAL CORPORATION
PEJEPSCOT PROJECT
FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 4784

GENERAL AREA MAP

EXHIBIT G.1

17°
1979
MAGNETIC NORTH
TRUE NORTH

Lisbon
ANDROSCOGGIN COUNTY

Rte. 196

Lisbon Falls Bank Fishing Site
(See Exhibit G.6 for Additional Details)

Flowage Limit

Pejepscot Boat Ramp
(See Exhibit Exhibit G.7 for Additional Details).

Topsham
SAGADAHOC COUNTY

ANDROSCOGGIN RIVER

Rte. 125

GMP Easement

Project Boundary

N420000

Flowage

Flow

Durham
ANDROSCOGGIN COUNTY

MATCH LINE

ANDROSCOGGIN COUNTY
Durham
Brunswick
CUMBERLAND COUNTY

MATCH LINE

Project Boundary

Topsham
SAGADAHOC COUNTY

ANDROSCOGGIN RIVER

Brunswick
CUMBERLAND COUNTY

Flow

Project Boundary

Old Lewiston Road
Maine State Rte. 196

M.C.R.R.

GMP ROW

GMP ROW

Pejepscot Boat Ramp

PEJEPSCOT
PAPER COMPANY

Project Boundary
See Note 3.

Pejepscot Bank Fishing Site
(See Exhibit G.8 for Additional Details

Brunswick Road
Easement

River Road

400 0 400 800 1200 1600 2000 FEET

NOTES:

1. Contours are based upon U.S.G.S. 1927 Vertical Datum.
2. Property lines were traced from a property map (No. 4383-E) in the files of the Androscoggin Water Power Company.
3. For more detail in the vicinity of the Powerhouse Parcel and the paper mill see Exhibit G.3. For more detail of the Brunswick Roadway Easement see Exhibit G.4.
4. The Project Boundary follows the contour level of 75.00 feet above mean sea level, except in the vicinity of the dam and powerhouse and at the upstream limit of the reservoir.
5. Parcel ownership is described in Exhibit G.5.

LEGEND

- Project Boundary
- Parcel Limits
- Town & County Boundaries
- Edge Of Water at 67.5 ft above Maine Sea Level
- Highways & Streets
- Railroads
- (4) Parcel Number

REVISED JULY 1993

TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP
ACRES INTERNATIONAL CORPORATION

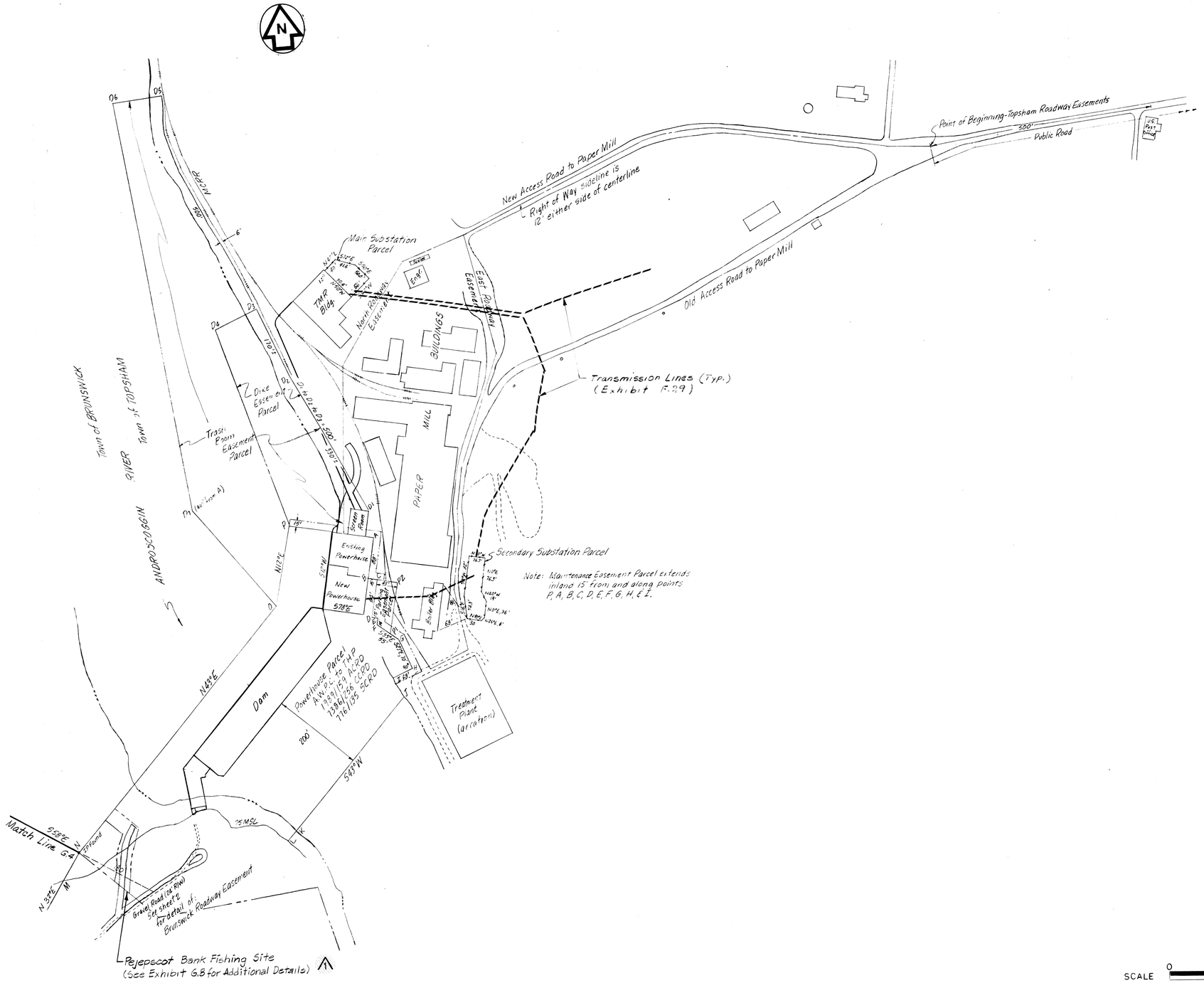
PEJEPSCOT PROJECT

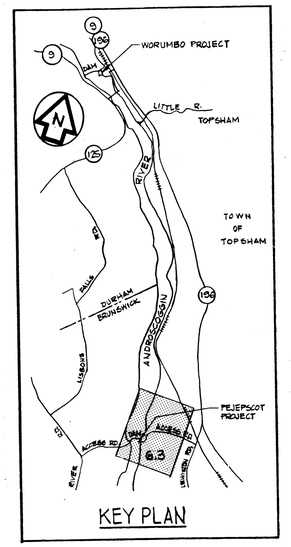
FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 4784

MAP OF IMPOUNDMENT

EXHIBIT G.2

4784-38





KEY PLAN

COURSES AND DISTANCES OF POWERHOUSE PARCEL

From Point	To Point	Course	Distance (Feet)
A*	B	S12°W	88
B	C	S78°E	16
C	D	S12°W	84
D	E	S78°E	15
E	F	S12°W	14
F	G	S55°E	55
G	H	S23°E	70
H	I	S67°W	68± to East shore of River
I	J	Along east shore to a point 200' downstream from the toe of the dam.	
J	K	S43°W	To West shore of river
K	L	S43°W	To 75' msl contour
L	M	Along 75' msl contour to Southeasterly boundary of land formerly of Simpson.	
M	N	Northeasterly along said Southeasterly boundary to the most easterly corner of said land	
N	O	N43°E	550'
O	P	N12°E	To westerly extension of north wall of Old Powerhouse
P	A	S78°E	To point of beginning

* NE Corner of Old Powerhouse Exclusive of Screening Room Addition

COURSES AND DISTANCES OF PARKING PARCEL

From Point	To Point	Course	Distance (Feet)
C	D	S12°W	84
D	E	S78°E	15
E	F	S12°W	14
F	P1	S55°E	To a point 45' from the extension of Line C-D
P1	P2	N12°E	112± to extension of Line B-C
P2	C	N78°W	45'

COURSES AND DISTANCES OF TRASH BOOM PARCEL

From Point	To Point	Course	Distance (Feet)
D1	D2	Northwesterly	330'±
D2	D3	Parallel to Railroad Spur	170'±
D3	D5	Parallel to Railroad Spur	500
D5	D6	Perpendicular to Railroad Spur	100
D6	D7	Southerly	To extension of north wall of Old Powerhouse
D8	O	Southeasterly	To extension of north wall of Old Powerhouse
P	SW Corner of Screening Room	S78°E	125±
SW Corner of Screening Room	NW Corner of Screening Room	N12°E	55±
NW Corner of Screening Room	D1	S78°E	35±

COURSES AND DISTANCE OF DIKE PARCEL

From Point	To Point	Course	Distance (Feet
D1*	D2	Northwesterly	330±
D2	D3	Parallel to Railroad Spur	180±
D1 to D2 to D3	Northwesterly		500.00'
D3	D4	Perpendicular to Railroad Spur	100'
D4	P	Southerly	Unknown
P	SW Corner of Screening Room	S78°E	125±
SW Corner of Screening Room	NW Corner of Screening Room	N12°E	55±
NW Corner of Screening Room	D1	S78°E	35±

COURSES AND DISTANCES OF MAINTENANCE PARCEL (Not Shown on Drawing)

A 15 foot strip of land extending inland from and parallel to the Powerhouse Parcel and adjacent to Points P, A, B, C, D, E, F, G, H and I.

SCALE 0 100 200 FEET

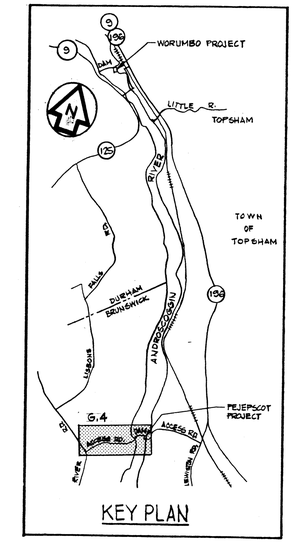
1 REVISED JULY 1983.

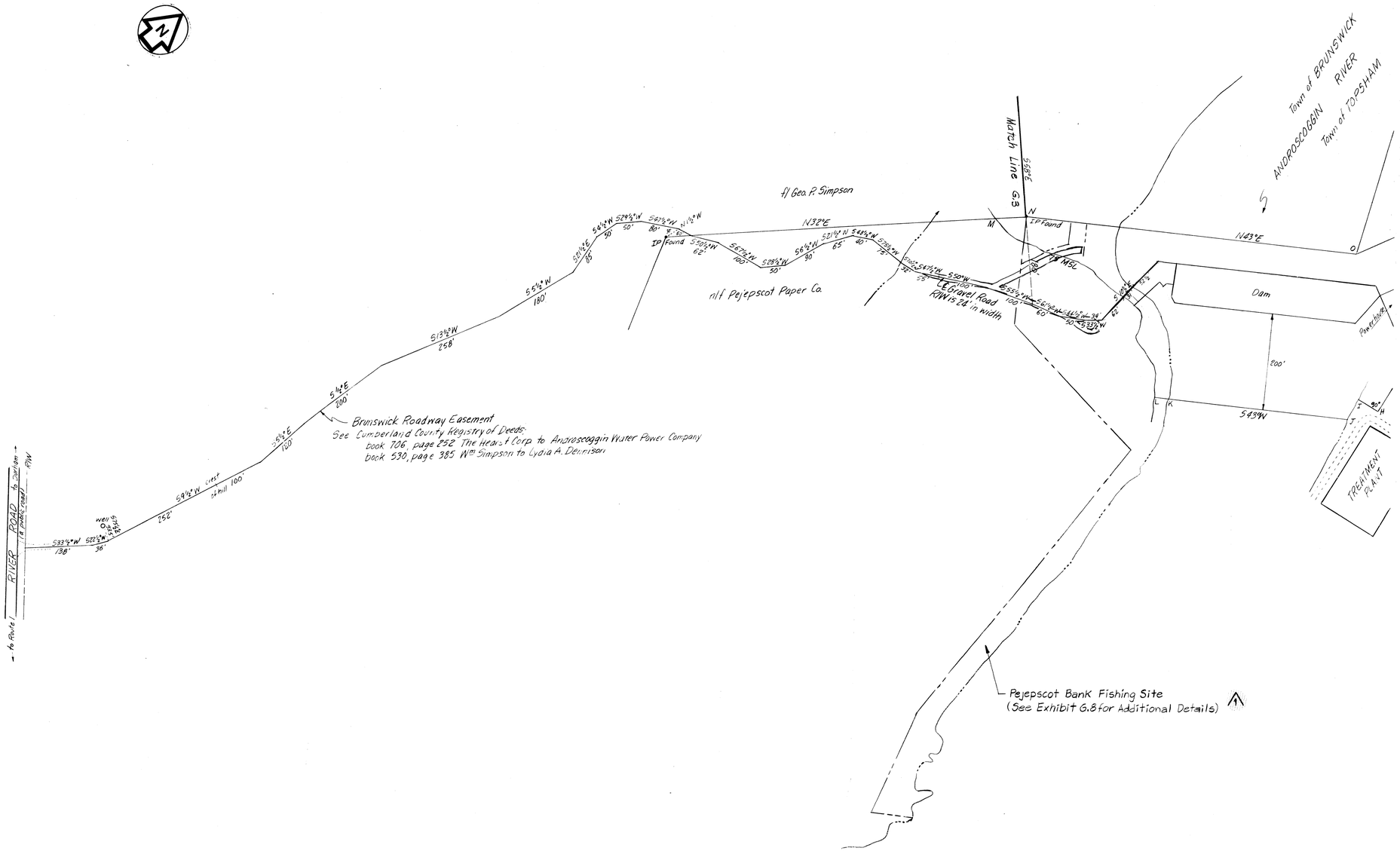
TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP
ACRES INTERNATIONAL CORPORATION
PEJEPSCOT PROJECT
FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 4784

PLAN OF FACILITIES & POWERHOUSE AREA

EXHIBIT G.3

4784-39





REVISED JULY 1993.

TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP

ACRES INTERNATIONAL CORPORATION

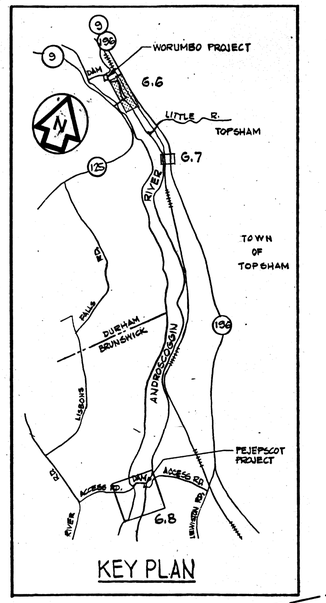
PEJEPSCOT PROJECT

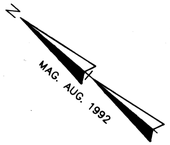
FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 4784

PLAN OF DAM & WEST BANK ACCESS ROAD

EXHIBIT G.4

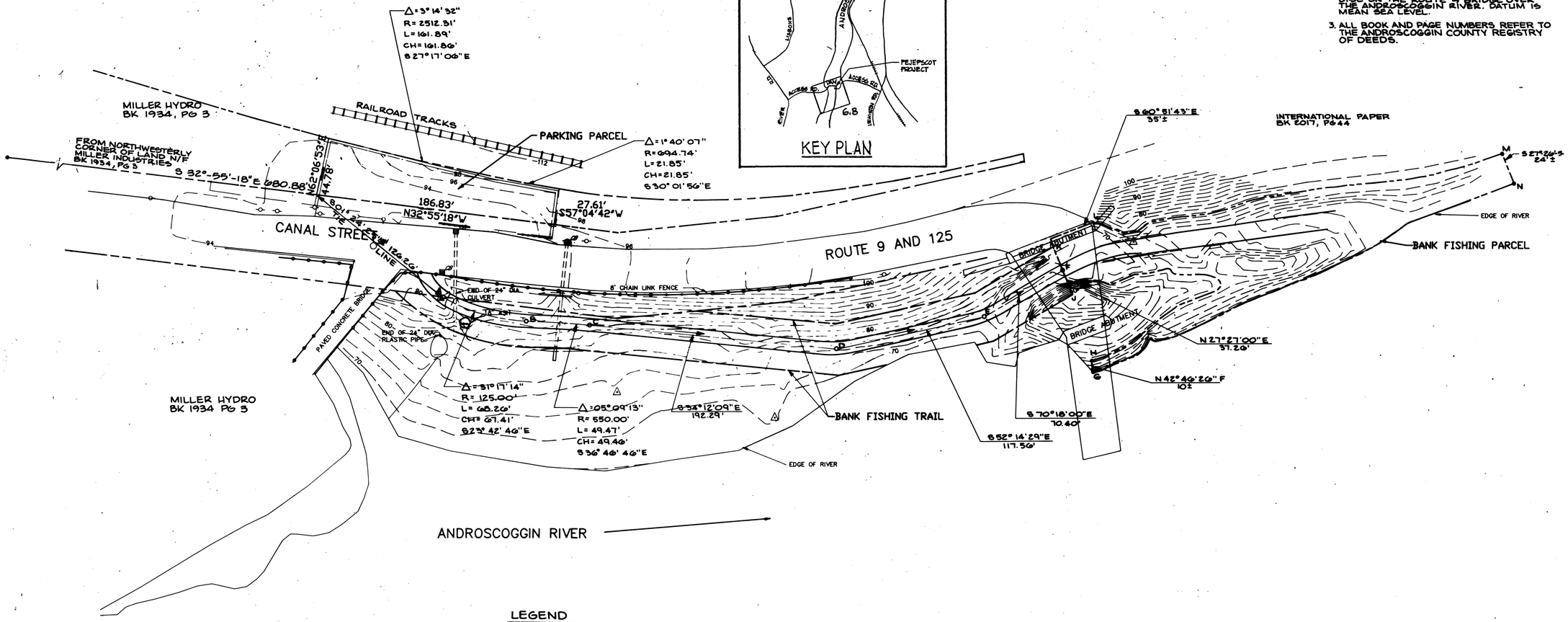
4784-40





NOTES:

1. BEARINGS BASED ON AN OBSERVATION OF MAGNETIC NORTH BY WRIGHT-PIERCE ON AUGUST 5, 1992.
2. ELEVATIONS ARE BASED ON USGS DISC ON THE ROUTE 9 BRIDGE OVER THE ANDROSCOGGIN RIVER. DATUM IS MEAN SEA LEVEL.
3. ALL BOOK AND PAGE NUMBERS REFER TO THE ANDROSCOGGIN COUNTY REGISTRY OF DEEDS.



LEGEND

- RIGHT-OF-WAY/EASEMENT
- CENTERLINE
- WALL

GRAPHIC SCALE

40 0 20 40 80 160

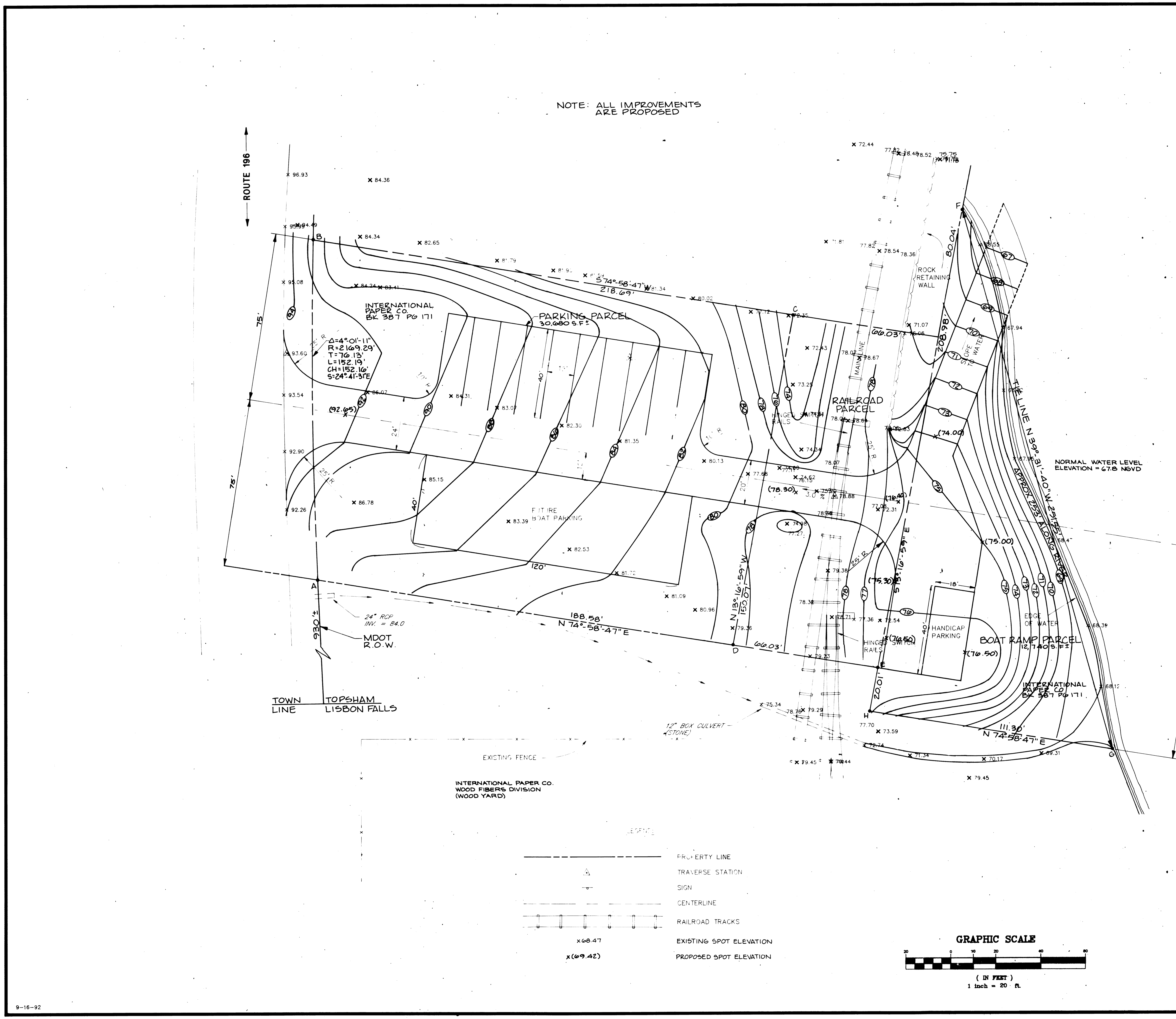
(IN FEET)
1 inch = 40 ft.

TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP
WRIGHT-PIERCE ENGINEERS
PEJEPSCOT HYDROELECTRIC PROJECT
FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 4784-ME
LISBON FALLS BANK FISHING SITE

EXHIBIT G.6

11/11/92

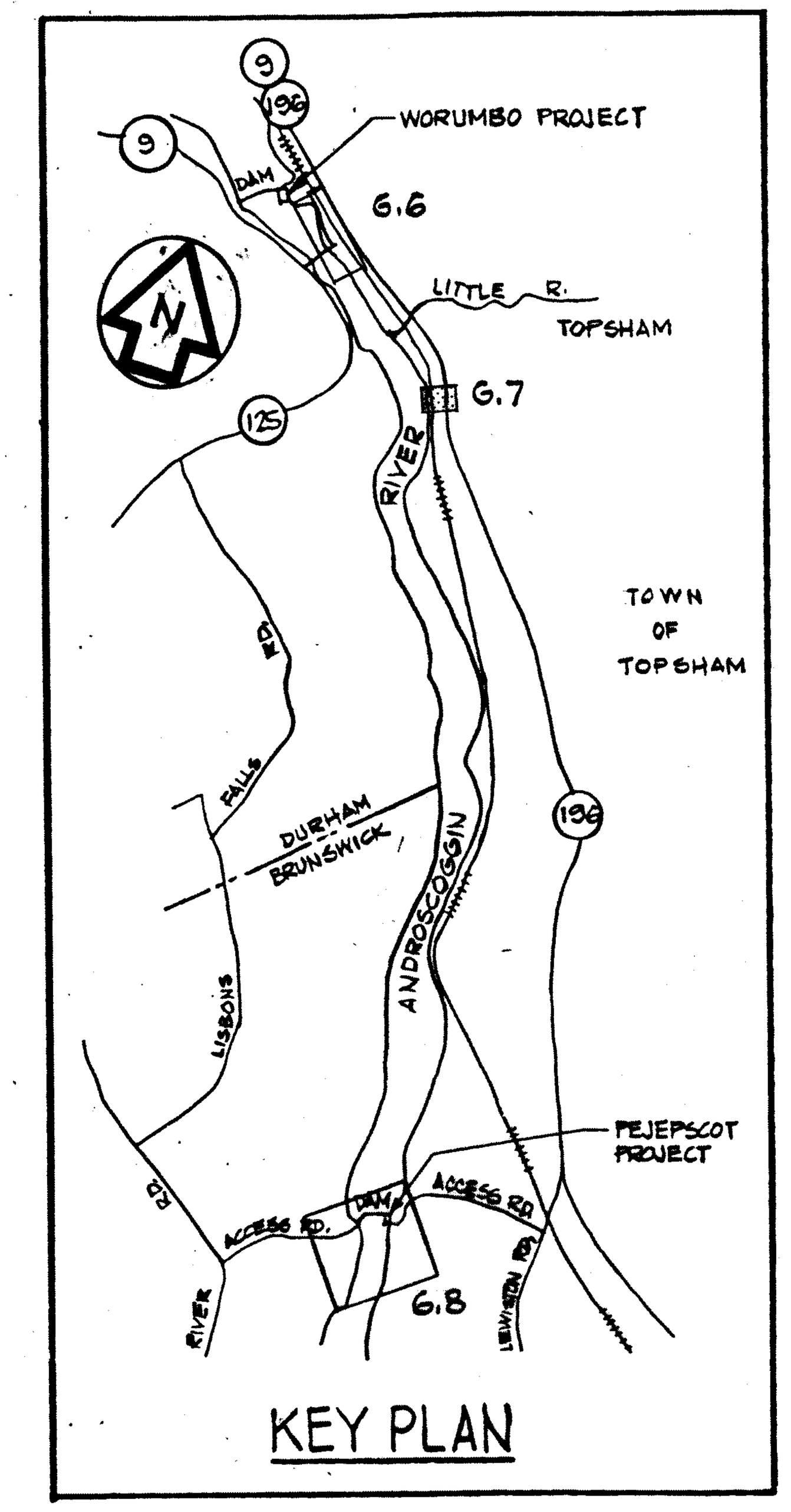
4784-41



NOTES:

1. BEARING BASED ON MAGNETIC NORTH TAKEN BY WRIGHT-PIERCE JUNE 1992.

2. ELEVATIONS ARE BASED ON NORMAL WATER LEVEL OF 67.80 NGVD



TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP

WRIGHT-PIERCE ENGINEERS

PEJEPSCOT HYDROELECTRIC PROJECT

FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 4784-ME

PEJEPSCOT BOAT RAMP

EXHIBIT G.7

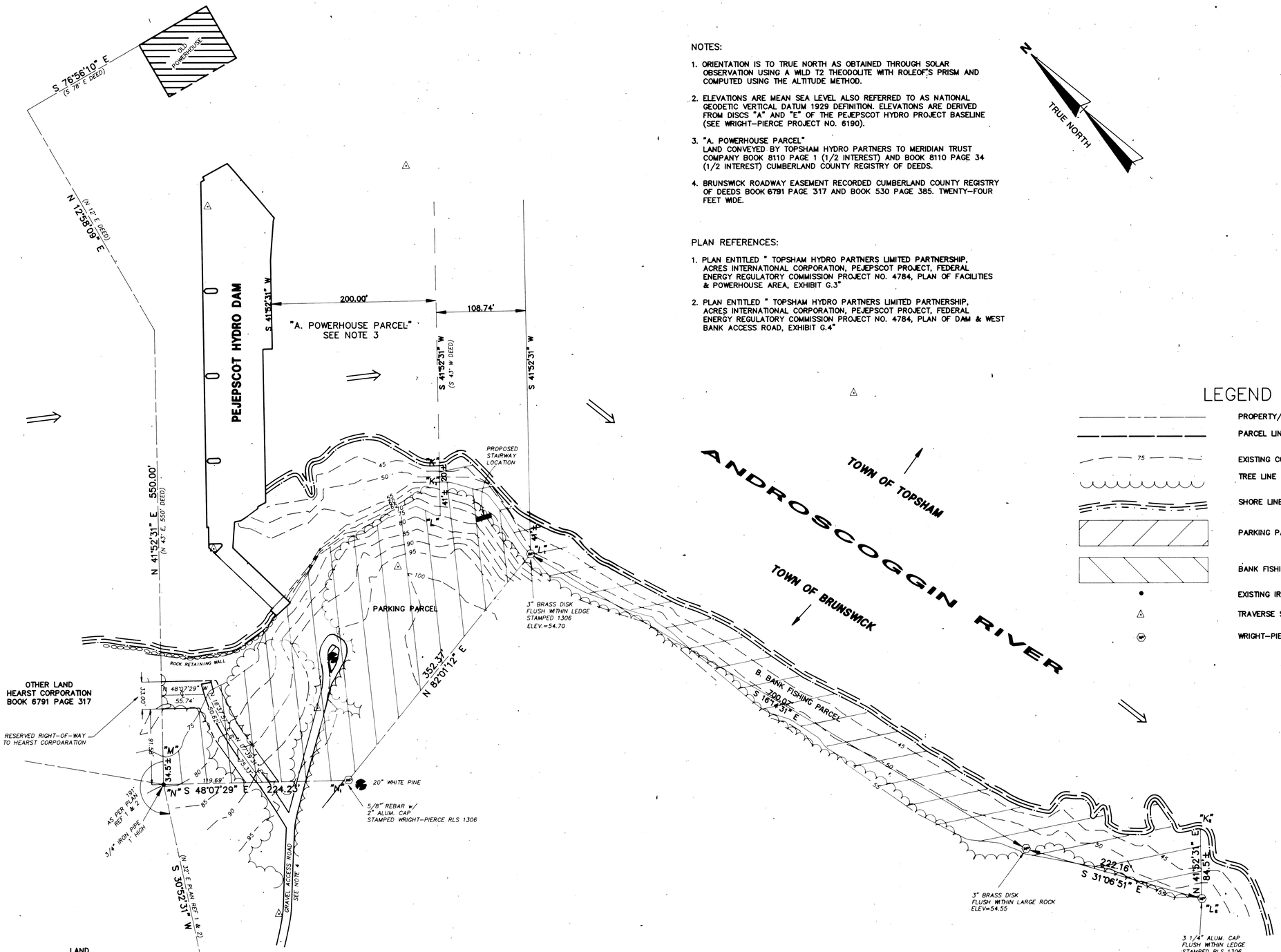
4784-42

NOTES:

1. ORIENTATION IS TO TRUE NORTH AS OBTAINED THROUGH SOLAR OBSERVATION USING A WILD T2 THEODOLITE WITH ROLEOF'S PRISM AND COMPUTED USING THE ALTITUDE METHOD.
2. ELEVATIONS ARE MEAN SEA LEVEL ALSO REFERRED TO AS NATIONAL GEODETIC VERTICAL DATUM 1929 DEFINITION. ELEVATIONS ARE DERIVED FROM DISCS "A" AND "E" OF THE PEJEPSCOT HYDRO PROJECT BASELINE (SEE WRIGHT-PIERCE PROJECT NO. 6190).
3. "A. POWERHOUSE PARCEL"
   LAND CONVEYED BY TOPSHAM HYDRO PARTNERS TO MERIDIAN TRUST COMPANY BOOK 8110 PAGE 1 (1/2 INTEREST) AND BOOK 8110 PAGE 34 (1/2 INTEREST) CUMBERLAND COUNTY REGISTRY OF DEEDS.
4. BRUNSWICK ROADWAY EASEMENT RECORDED CUMBERLAND COUNTY REGISTRY OF DEEDS BOOK 6791 PAGE 317 AND BOOK 530 PAGE 385. TWENTY-FOUR FEET WIDE.

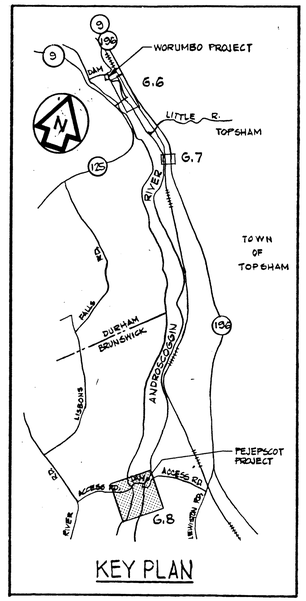
PLAN REFERENCES:

1. PLAN ENTITLED " TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP, ACRES INTERNATIONAL CORPORATION, PEJEPSCOT PROJECT, FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 4784, PLAN OF FACILITIES & POWERHOUSE AREA, EXHIBIT G.3"
2. PLAN ENTITLED " TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP, ACRES INTERNATIONAL CORPORATION, PEJEPSCOT PROJECT, FEDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 4784, PLAN OF DAM & WEST BANK ACCESS ROAD, EXHIBIT G.4"



LEGEND

- PROPERTY/EASEMENT LINE
- PARCEL LINE
- 75 EXISTING CONTOUR LINE
- TREE LINE
- SHORE LINE 9-5-1990
- PARKING PARCEL
- BANK FISHING EASEMENT PARCEL
- EXISTING IRON PIPE OR ROD
- TRAVERSE STATION
- WP WRIGHT-PIERCE MONUMENT SET 1990



GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

TOPSHAM HYDRO PARTNERS LIMITED PARTNERSHIP
WRIGHT-PIERCE ENGINEERS
PEJEPSCOT HYDROELECTRIC PROJECT
FÉDERAL ENERGY REGULATORY COMMISSION PROJECT NO. 4784-ME
PEJEPSCOT BANK FISHING SITE

EXHIBIT G.8

11/04/92

4784-43

This page intentionally left blank.

APPENDIX C – CURRENT LICENSE AND AMENDMENT ORDERS

This page intentionally left blank.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

THIS DOCUMENT CONTAINS
POOR QUALITY PAGES

20 FERC ¶62,483

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Worumbo Hydro, Incorporated	)	Project No. 3631-000
Androscoggin Water Power Company	)	Project No. 4784-000

ORDER ISSUING LICENSE (MAJOR) AND DENYING APPLICATION FOR PRELIMINARY PERMIT

(Issued September 16, 1982)

The Androscoggin Water Power Company (AWP) filed on June 2, 1981, and revised on November 2, 1981,an application for a license under the Federal Power Act (Act) for the proposed Pejepscot Project, FERC No. 4784. 1/ 2/ The project would be located on the Androscoggin River in the towns of Topsham, Lisbon, Brunswick and Durham, in Sagadahoc, Cumberland and Androscoggin Counties, Maine. The Androscoggin River, in the reach of the project, is a navigable water of the United States. 3/

The project consists of an existing dam, reservoir at elevation 64.5 feet m.s.l. and powerhouse with seven turbine-generators with a total rated capacity of 2.5 MW. The existing project works were constructed at the turn of the century and have been operated since then. Applicant proposes to expand the existing powerhouse to accommodate five new turbine-generators with a total rated capacity of 9,125 kW which would replace all but two

---

1/ Authority to act on this matter is delegated to the Director, Office of Electric Power Regulation, under §375.308 of the Commission's regulations, 18 C.F.R. §375.308 (1981). This order may be appealed to the Commission by any party within 30 days of its issuance pursuant to Rule 1902, 18 C.F.R. 385.1902, 47 Fed. Reg. 19047 (1982). Filing an appeal and final Commission action on that appeal are prerequisites for filing an application for rehearing as provided in Section 313(a) of the Act. Filing an appeal does not operate as a stay of the effective date of this order or of any other date specified in this order, except as specifically directed by the Commission.

2/ Previously an application for preliminary permit was filed by Worumbo Hydro, Inc., on October 30, 1980; for the same project as FERC Project No. 3631-000.

3/ Public Service Company of New Hampshire, Project No. 2288, 27 F.P.C. 830, 834 (1962).

8209210245

19820921-0245 FERC PDF (Unofficial) 09/16/1982

of the existing turbines. The two units to be retained have a total rated capacity of 900 kW. Downstream fish passage facilities would be provided at the project dam with provisions for upstream passage facilities, if needed, in the future. The enlarged project would generate up to 60,000,000 kWh annually. 4/

Energy produced at the project would be sold to Central Maine Power Company, to another electric utility or electric customer or would be available for consumption by Applicant's affiliated papermill operations.

Public Notice, Intervention and Agency Comments

Public notice of the application was given on November 21, 1981, with January 4, 1982, as the last date to file comments, protests or petitions to intervene. On December 30, 1981, Miller Hydro Group (Miller) filed a petition to intervene. Miller was primarily concerned with the possible adverse impact of the proposed project if, at some point in the licensing proceeding, AWP would modify its application or amend a subsequent license to increase the elevation of its existing reservoir. Miller, representing Worumbo Hydro, Inc. which has a preliminary permit in effect for the upstream proposed Worumbo Hydroelectric Project No. 3428, indicated that an increase of reservoir elevation of Pejepscot Project above its existing level would diminish the available head upstream and would thus reduce the potential energy production at the Worumbo Project. Miller further indicated that it has no objection to the Commission granting AWP a license for the Pejepscot Project as currently proposed. Miller's petition was subsequently granted.

On December 30, 1981, Central Maine Power Company and Union Water Power Company (Petitioners) filed a petition to intervene. Petitioners operate hydroelectric and water storage projects upstream of the proposed project which are currently under license or under preliminary permits. Petitioners projects would have a beneficial affect upon the generation of electric energy through upstream regulation and storage releases. Petitioner requested intervenor status primarily to assure that the costs for the upstream storage are equitably shared by Petitioner, AWP and other Licensees on the river. Pursuant to Section 10(f) of the Act and Article 11 of this license, if AWP"... is directly benefited by the construction work of another Licensee, or the United States by a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement

---

4/ The project would save up to 98,500 barrels of oil or 27,800 tons of coal annually.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission." In the event that an agreement cannot be reached between AWP and Petitioners, one of the parties may file pursuant to Section 13.1 of the Commission's regulations a request for determination of such headwater benefits. Petitioners intervention has been subsequently granted.

The Commission staff also solicited and received comments on the application from various Federal, State and local agencies. Substantive comments are discussed below.

Competing Applications

The preliminary permit application filed by Worumbo Hydro, Incorporated (Worumbo) FERC Project No. 3631-000 would include a new powerhouse at the existing Pejepscot Dam containing four new turbine-generators with a total rated capacity of 10 MW generating 55,000,000 kWh annually. Staff has compared the proposals made by Worumbo and AWP and finds that the two proposals would equally develop, conserve, and utilize the same water resources. AWP has demonstrated its ability to carry out its plans. Pursuant to Section 4.33(f) of the Commissions regulations [18 C.F.R. 4.33(f)] the Commission will favor the Applicant for license.

Evaluation of Design, Construction and Performance

The New York Regional Office (NYRO) has inspected the existing project works and classified the dam as having a significant hazard potential because of the downstream populated area and its proximity to the Brunswick-Topsham Project No. 2284 located 5 miles downstream. The NYRO inspection also concluded that the project structures appear to be in sound condition.

The dam was analyzed under normal and earthquake conditions and was found stable. The spillway capacity was determined to be adequate. During extreme flood conditions the dam would become submerged. If the dam were to fail under flood conditions, the small storage released would not significantly increase the flows downstream. 5/ It is concluded that the project structures are safe and adequate.

5/ As with any licensed project, the Commissions dam safety regulations under 18 C.F.R. Part 12 would apply.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Comprehensive Development and Economic Feasibility

The proposed project has been analyzed and it is concluded that the project would develop all the flow and fall of the reach of the Androscoggin River that is practical to be utilized. The project as proposed with the existing dam and with a reservoir elevation of 64.5 feet m.s.l., is not in conflict with any planned development and would be best adapted to the comprehensive development of the Androscoggin River Basin upon compliance with the terms and conditions of the license.

The economic feasibility of the proposed project has been analyzed. The annual cost of electric power generated by the project was compared with the annual cost of fuel required to generate an equal amount of power from an oil fired steam electric plant. The project was found to be an economically feasible source of energy. All energy produced at the project could be consumed in the Applicant's affiliated paper mill on site, or sold to a local utility.

License Term and Effective Date of Annual Charges

This license is issued for a term of 40 years. 6/ It shall be effective as of September 1, 1982. Annual charges will be based upon that effective date. Additionally, the Licensee will be required to pay an amount equivalent to the annual charges that would have been due if the project would have been licensed for the period between April 1, 1962, when the Androscoggin River was found navigable, and August 31, 1982. 7/

Ordering Paragraph (F) requires the filing of a statement under oath of the gross annual generation for each year beggining April 1, 1962. Article 30 specifies the effective dates and horsepower for assessment of annual charges.

6/ The application for initial license of the Pejepscot Project presents a factual basis similar to the relicensing of a project for which a moderate amount of redevelopment is proposed. Therefore a license term of 40 years is consistent with the Commission policy set forth in its Order Issuing License for FERC Project No. 2301. (Montana Power Company Mystic Lake Project No. 2301 issued October 5, 1976).

7/ See Idaho Power Company, Upper Salmon Project No. 2777, Order On Rehearing (Issued July 24, 1981).

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Fish Passage

The Town of Brunswick (Town) stipulated that an upstream fish passage facility be incorporated into the project during construction. The AWP stated that the position of the Town is contrary to the recommendations of the DMR, the Department of Inland Fisheries and Wildlife, the U.S. Department of the Interior, and the NMFS. These agencies recommended that the Applicant provide space only for an upstream fish passage facility. AWP has agreed in principle to construct a downstream fish passage facility during the construction of the proposed project and an upstream fish passage facility in the future, dependent on the success of fish passage efforts at the downstream Brunswick Topsham Project, FERC No. 2284.

Since present plans for fish restoration include trapping American shad and alewife at the Brunswick Topsham Project and trucking them to upstream waters, a downstream fish passage facility is necessary at this time. Article 34 requires AWP to consult with the appropriate agencies in designing the downstream passage facility. Standard Article 15 of the license provide for the installation of an upstream fish passage facility at the appropriate time.

Minimum Flows

The U.S. Environmental Protection Agency (EPA) recommended that AWP provide a minimum flow release equivalent to the 7Q10 flow (1,685 cfs) at the project site during periods of non-generation for protection of downstream water quality. AWP stated that the project would be a run-of-river facility with no headrace or tailrace diversions. AWP further stated that since project inflows are controlled by upstream releases and project reservoir storage capability is negligible, essentially all flows reaching the project would be released. Therefore, the AWP does not believe an instantaneous minimum flow requirement is appropriate for the proposed project.

Staff generally concurs with EPA that a minimum flow release may be required at the project during periods of non-generation. Staff also notes that AWP proposes to maintain the reservoir near elevation 64.5 feet msl by controlling the number of units operating and by varying the flow through the units. The old and new turbine/generator units can operate at reduced efficiency with a minimum flow of 200 and 370 cfs, respectively. Given the operating constraints of maintaining an optimum reservoir elevation near 64.5 feet msl and the minimum flow needed to run a unit, there exists the possibility that the generating facilities would

19820921-0245 FERC PDF (Unofficial) 09/16/1982

be shut down and that no flows would be released downstream during part of the day during the low-flow season. A no-flow condition could degrade local water quality and may have adverse impacts on downstream aquatic resources. Because of the planning efforts by Federal and State fishery agencies to reestablish anadromous fishes in the lower Androscoggin River, Staff believes that it is important to establish a minimum flow to maintain and enhance downstream fishery resources and habitat, and water quality.

Based on discussions with the Maine Department of Inland Fisheries and Wildlife, U.S. Fish and Wildlife Service, and a review of the application, it is concluded that the need for a minimum flow release at the project warrants further study. Therefore Article 37 requires AWP, in cooperation with appropriate fishery resource agencies, to determine the need for a minimum flow release from the project for protection and enhancement of downstream water quality and the fishery resources.

No threatened or endangered plant of animal species are known to exist in the project area. The shortnose sturgeon, a Federally-listed endangered fish species, is found below Brunswick Dam, FERC Project No. 2284. The NMFS by letter dated January 8, 1982, stated that the proposed project would not adversely affect this species.

Recreation

Interior recommended that the license include a condition requiring AWP to periodically review recreational needs on project lands and provide access as needed. Standard Articles 17 and 18 of the license would provide for future recreational needs at the project.

Historical and Archeological Resources

No archeological or historic sites on the National Register of Historic Places are known to exist in the project area. By letter dated September 30, 1981, the Maine State Historic Preservation Officer stated that the project would have no effect upon any structure or site of historical, architectural, or archeological significance. Article 29 of the license provide for cultural resource protection measures in the event of further construction at the project other than that proposed herein.

Environmental Impacts

During the construction period, increases in turbidity would occur due primarily to the construction and removal of cofferdams. AWP will however, maintain existing river flow during this period and will utilize appropriate measures to reduce soil erosion and

19820921-0245 FERC PDF (Unofficial) 09/16/1982

erosion and sedimentation. Any sanitary or industrial wastes arising from operation of the project will be treated at the existing treatment facility of the Pejepscot Paper Division Plant before release downstream fish passage facility and additional excavation to accommodate an upstream passage facility if required in the future. On the basis of the record, and Staff's independent analysis, it is concluded that issuance of license for the project will not constitute a major Federal action significantly affecting the quality of the human environment. 8/

It is ordered that:

(A) This license is issued to Androscoggin Water Power Company (Licensee) under Part I of the Federal Power Act (Act) for a period of 40 years effective September 1, 1982, for the construction, operation and maintenance of the Pejepscot Project No. 4784, located on the Androscoggin River, a navigable water of the United States. This license is subject to the terms and conditions of the Act, which is incorporated by reference as a part of this license, except as expressly waived below, and subject to the regulations the Commission issues under the provisions of the Act.

(B) The preliminary permit application filed by Worumbo Hydro, Incorporated for the Pejepscot Project No. 3631 is denied.

(C) The project consist of: (1) all lands constituting the project area and enclosed by the project boundary; to the extent of the Licensee's interests in those lands; the project boundary and area are shown and described by a certain exhibit which forms part of the application for license and which is designated and described as:

Exhibit	FERC No. 4784-	Showing
G Sheet 1	8	General Area Map
G Sheet 2	9	Project Detail Map
G Sheet 3	One typewritten page	Land and Rights owned

8/ The Applicant was issued water quality certification pursuant to Section 401 of the Federal Water Pollution Control Act Amendments of 1972, by letter dated May 27, 1982.

20020521-0243 FERC PDF (Unofficial) 09/16/1982

(1) Project works consisting of: (1) a rock, gravel and concrete filled timber crib dam, which is 430 feet long, has a maximum height of 40 feet and has a crest elevation, including flashboards, at 64.5 feet above mean sea level; (2) a reservoir with a normal surface area of about 203 acres at elevation 64.5 feet above mean sea level extending about 3 miles upstream from the dam; (3) a powerhouse, with associated headworks and intake structures, located on the left bank of the river adjacent to the dam, and containing seven turbine-generators with a total rated capacity of 10,025 kW; (4) downstream fish passage facilities and provisions for future upstream fish passage facilities; (5) the 900-foot-long, 12.5 kV bus connection; (6) the 50-foot-long 0.480 kV and 12.5 kV generator leads; and (7) appurtenant facilities.

The location, nature, and character of these project works are more specifically shown and described by the exhibit cites above and by certain other exhibits which also form part of the application for license and which are designated and described as:

Exhibit	FERC No. 4784-	Showing
F Sheet 1	1	Dam and Powerhouse
F Sheet 2	2	Powerhouse Plan - EL 36.00
F Sheet 3	3	Powerhouse Plan - EL 45.00 EL 55.17
F Sheet 4	4	Powerhouse Plan - EL 62.00
F Sheet 5	5	Powerhouse Plan - EL 78.00
F Sheet 6	6	Powerhouse - Roof Plan
F Sheet 7	7	Powerhouse - Section 1-1
F Sheet 8	8	Powerhouse - Section 2-2

(3) all of the structures, fixtures, equipment, or facilities used or useful in the maintenance and operation of the project and located in the project area, all portable property which may be employed in connection with the project, located on or off the project area, as approved by the Commission, and all riparian or other rights which are necessary or appropriate in the maintenance or operation of the project.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

(D) Exhibit A text describing the project (Sections A.3, A.4 and A.5) and the Exhibits F and G designated and described in ordering paragraph (B) above, are approved and made a part of this license.

(E) This license is also subject to Articles 1 through 28 which are set forth in Form L-4 revised (October 1975) entitled "Terms and Conditions of License for Unconstructed Major Project Affecting Navigable Waters of the United States", and attached to this license. In addition this license is subject to the following special conditions set forth as additional articles:

Article 29. Licensee shall, prior to the commencement of any construction or alteration of facilities at the project, consult with the State Historic Preservation Officer (SHPO) to determine the need for, and extent of, any archeological or historic resource surveys and any mitigative measures that may be necessary. The Licensee shall make available funds in a reasonable amount for any such work as required. If any previously unrecorded archeological or historical 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 SHPO to develop a mitigation plan for the protection of significant archeological or historical resources. If the Licensee and the SHPO cannot agree on the amount of money to be expended on archeological or historical 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. The Licensee shall pay the United States the following annual charges:

For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable amount as determined by the Commission in accordance with the provisions of the Commission's regulations, in effect from time to time. The authorized installed capacity for that purpose is:

(a) from April 1, 1962, until August 31, 1982, 3,330 horsepower.

(b) from September 1, 1982, and thereafter 13,370 horsepower.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Article 31. Pursuant to Section 10(d) of the Act, the first 20 years of operation of the project under license, a specified reasonable rate of return upon the net investment in the project shall be used 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 after the first 20 years of operation 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 at the end of each fiscal year. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year after the first 20 years of operation under the license, the amount of that deficiency shall be deducted from the amount of any surplus earnings subsequently accumulated, until absorbed. One-half of the remaining surplus earnings, if any, cumulatively computed, shall be set aside in the project amortization reserve account. The amounts 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 annual weighted costs of long-term debt, preferred stock, and common equity, as defined below. The annual weighted cost for each component of the reasonable rate of return is the product of its capital ratio and cost rate. The annual capital ratio for each component of the rate of return shall be calculated 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 long-term debt and preferred stock shall be their respective weighted average costs 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 32. Licensee shall consult and cooperate with the Maine Department of Marine Resources, Maine Department of Inland Fisheries and Wildlife, and the U.S. Fish and Wildlife Service in conducting studies to determine the minimum flow release needed at the Pejepscot Project to ensure protection and enhancement of fishery and wildlife resources. Further, Licensee shall, within 1 year from the date of issuance of this license, file a report of its findings and, for Commission approval, recommendations for a minimum flow release from the project.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Article 33. (a) In accordance with the provisions of this article, the Licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain other types of use and occupancy, without prior Commission approval. The Licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the Licensee shall also have continuing responsibility to supervise and control the uses and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the Licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the Licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, cancelling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The types of use and occupancy of project lands and waters for which the Licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the Licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The Licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the uses and occupancies for which it grants permission are maintained in good repair and comply with applicable State and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the Licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the Licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the Licensee's costs of administering the permit program. The Commission reserves the right to require the Licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

(c) The Licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges and roads for which all necessary State and Federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the Licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The Licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary State and Federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary Federal and State water quality certificates or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary Federal and State approvals have been obtained; (5) private or public marinas that can accommodate no more that 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal maximum surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 45 days before conveying any interest in project lands under this paragraph (d), the Licensee must file a letter to the Director, Office of Electric Power Regulation, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G or K map may be used), the nature of the proposed use, the identity of any Federal or State agency official consulted, and any Federal or State approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the Licensee to file an application for prior approval, the Licensee may convey the intended interest at the end of that period.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

(e) The following additional conditions apply to any intended conveyance under paragraphs (c) or (d) of this article:

(1) Before conveying the interest, the Licensee shall consult with Federal and State fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the Licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved Exhibit R or approved report on recreational resources of an Exhibit E; or, if the project does not have an approved Exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include covenants running with the land adequate to ensure that: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project.

(4) The Commission reserves the right to require the Licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G or K drawings would be filed for approval for other purposes.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Article 34. The Licensee shall, at least 60 days prior to commencement of construction of the downstream migrant fish passage facility, file for Commission approval functional design drawings of the proposed facility, prepared in consultation with the Maine Departments of Marine Resources and Inland Fisheries and Wildlife, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service. Letters from the agencies documenting consultation shall be attached to the filing. Further, Licensee shall file as-built drawings with the Commission within 6 months after completion of the passage facility.

Article 35. Licensee shall commence construction of the proposed project within two years of the date of issuance of the license and shall complete construction within three years from the start of construction.

Article 36. Licensee shall file with the Commission's Regional Engineer and the Director, Office of Electric Power Regulation, one copy each of the contract drawings and specifications for pertinent features of the project, such as water retention structures, powerhouses, and water conveyance structures, at least 60 days prior to start of construction. The Director, Office of Electric Power Regulation may require changes in the plans and specifications to assure a safe and adequate project.

Article 37. 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 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 38. The Licensee shall within 90 days of completion of construction file in accordance with Commission's Rules and Regulations revised Exhibit F and G drawings showing the project as-built.

(F) Within 6 months from the date of acceptance of this license, the Licensee shall file a statement under oath showing the gross amount of power generation for the project in kilowatt-hours for each calendar year commencing April 1, 1962, in accordance with the provisions of §11.20(a)(4) of the Commission's regulations.

Lawrence R. Anderson
Director, Office of Electric
Power Regulation

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Project No. 4784-000

IN TESTIMONY of its acknowledgment of acceptance of all of the terms and conditions of this Order, Androscoggin Water Power Company this _____ day _____, 19____, has caused its corporate name to be signed hereto by _____, its _____ President, and its corporate seal to be affixed hereto and attested by _____ its _____ Secretary, pursuant to a resolution of its Board of Directors duly adopted on the _____ day of _____ 19____, a certified copy of the record of which is attached hereto.

By _____
President

Attest:

_____
Secretary

(Executed in quadruplicate)

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Form L-4
(Revised October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR
UNCONSTRUCTED MAJOR PROJECT AFFECTING
NAVIGABLE WATERS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project works shall be constructed in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Upon the completion of the project, or at such other time as the Commission may direct, the Licensee shall submit to the Commission for approval revised exhibits insofar as necessary to show any divergence from or variations in the project area and project boundary as finally located or in the project works as actually constructed when compared with the area and boundary shown and the works described in the license or in the exhibits approved by the Commission, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variation in or divergence from the approved exhibits. Such revised exhibits shall, if and when approved by the Commission, be made a part of the license under the provisions of Article 2 hereof.

Article 4. The construction, operation, and maintenance of the project and any work incidental to additions or alterations shall be subject to the inspection and supervision of the Regional Engineer, Federal Power Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of the project and for any subsequent alterations to the project. Construction of the project works or any feature or alteration thereof shall not be initiated until the program of inspection for the project works or any such feature thereof has been approved by said representative. The Licensee shall also furnish to said representative such further information as he may require concerning the construction, operation, and maintenance of the project, and of any alteration thereof, and shall notify him of the date upon which work will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

19820921-0245 FERC PDF (Unofficial) 09/16/1982

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall consult with the appropriate State and Federal agencies and, within one year of the date of issuance of this license, shall submit for Commission approval a plan for clearing the reservoir area. Further, the Licensee shall clear and keep clear to an adequate width 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 results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. Upon approval of the clearing plan all clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner

19820921-0245 FERC PDF (Unofficial) 09/16/1982

as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

Article 22. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the project, the Licensee shall convey to the United States, free of cost, such of its lands and rights-of-way and such rights of passage through its dams or other structures, and shall permit such control of its pools, as may be required to complete and maintain such navigation facilities.

Article 23. The operation of any navigation facilities which may be constructed as a part of, or in connection with, any dam or diversion structure constituting a part of the project works shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army.

Article 24. The Licensee shall furnish power free of cost to the United States for the operation and maintenance of navigation facilities in the vicinity of the project at the voltage and frequency required by such facilities and at a point adjacent thereto, whether said facilities are constructed by the Licensee or by the United States.

Article 25. The Licensee shall construct, maintain, and operate at its own expense such lights and other signals for the protection of navigation as may be directed by the Secretary of the Department in which the Coast Guard is operating.

Article 26. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee

19820921-0245 FERC PDF (Unofficial) 09/16/1982

or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 27. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 28. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

This page intentionally left blank.

UNITED STATES OF AMERICA 65 FERC 62, 150
FEDERAL ENERGY REGULATORY COMMISSION

Topsham Hydro Partners, L.P. Project No. 4784-045
Chrysler Capitol Corporation Maine
and Utilco Group, Inc.

ORDER AMENDING LICENSE
(ISSUED NOVEMBER 18, 1993)

On October 6, 1993, and supplemented on November 9, 1993, Topsham Hydro Partners, licensee for the Pejepscot Project, FERC No. 4784, filed a revised exhibit A for an amendment of its license.1 The filing was made to correct discrepancies between the project description as stated in the license and the project's as-built conditions.

Background

The Pejepscot Project consists of the Pejepscot Dam and a powerhouse containing four generating units, for a total installed capacity of 13,880 kW. The units are: Unit 1 (new unit), with an installed capacity of 12,300 kW; Unit 2 (rehab unit 21), with an installed capacity of 490 kW; Unit 3 (rehab unit 22), with an installed capacity of 545 kW; and Unit 4 (rehab unit 23), with an installed capacity of 545 kW.

An Order Amending License, issued December 26, 1985,2 increased the project's gross head from 22 feet to 25 feet by raising the Pejepscot reservoir three feet. In the order, paragraph (B)(1) of the project description did not include an 80-foot-abutment wall on the right (west) bank of the river, which is, in fact, part of the dam depicted on exhibit F, Sheet 1.3 The dam length of 430 feet was the length of the main structure. The December 1984 application depicted the length of the rehabilitated dam to be 510 feet. Final design of the project resulted in a dam length of 560 feet, including space for the upstream fish passage facilities.4

1 20 FERC 62,483, Order Issuing License (Major), issued September 16, 1982.

2 33 FERC 62,441.

3 Order Approving As-Built Exhibits, 43 FERC 62,142, issued May 5, 1988.

4 36 FERC 62,097, issued July 29, 1986.

Project Works

The licensee states in its filing, that the new rehabilitated timber crib section of the dam is 82 feet wide and approximately 47.5 feet high, and includes five 3-foot-high hydraulic crest gates to raise the reservoir level to 67.5 msl. This as-built configuration was approved by the Commission Order Approving As-Built Exhibits, 43 FERC 62,142, issued May 5, 1988; however, the project description as contained in the license was never modified. The description will be changed herein to reflect the as-built configuration of the Pejepscot Project.

This order correcting minor discrepancies within the project description for the Pejepscot Project does not materially affect the Commission's determination that the Pejepscot Project is best adapted to a comprehensive plan for the waterway. This order does not authorize a change in the installed capacity and doesn't affect the annual charges for the Pejepscot Project.

The Director orders:

(A) The license for the Pejepscot Project, FERC No. 4784, is amended as provided by this order, effective the first day of the month in which this order is issued.

(B) The exhibit A filed on October 6, 1993, and supplemented on November 9, 1993, conforms to the Commission's rules and regulations and is approved and made a part of the license. The superseded exhibit A is eliminated from the license.

(C) The project description in Ordering Paragraph (C)(1) of the license is amended as follows:

(1) Project works consisting of: (1) a 560-foot-long dam, including a 430-foot-long concrete-filled timber

crib section and 130-foot-long concrete and rock section (including space for the upstream fish passage facility, crest gates, and piers), with a maximum height of 47.5 feet, including five 3-foot-high hydraulic crest gates; (2) a reservoir with a normal surface area of 225 acres at elevation 67.5 feet msl extending 3 miles upstream from the dam; (3) a powerhouse, with associated headworks and intake with two sectional bulkhead gates, located on the left bank of the river adjacent to the dam and containing four turbine-generators with a total rated capacity of 13,880 kW; (4) upstream and downstream fish passage facilities; (5) the 900-foot-long, 15 kV cable connections to the substations; and (6) appurtenant facilities.

(D) The licensee shall notify the Commission of any future changes within the project works.

(E) 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.

J. Mark Robinson
Director, Division of Project
Compliance and Administration

This page intentionally left blank.

APPENDIX D – INFORMATION AND DATA SOURCES CITED IN THE PAD

This page intentionally left blank.

References Cited in Section 1.0

None

References Cited in Section 2.0

Federal Energy Regulatory Commission (FERC). 2017. Integrated Licensing Process. [Online] URL: https://www.ferc.gov/industries/hydropower/gen-info/licensing/ilp.asp [Accessed February 15, 2017].

References Cited in Section 3.0

ENSR Corporation (ENSR). 2007. Historic Flooding in Major Drainage Basins, Maine. The Maine River Basin Report: Document No.:12092-003-B. October 2007

Environmental Protection Agency (EPA). 2016a. NPDES Permits in New England: Maine Final Individual Permits. Last Updated: 12/13/2016. https://www3.epa.gov/region1/npdes/permits_listing_me.html. Date Accessed: 12/16/16

Environmental Protection Agency (EPA). 2016b. NPDES Permits in New England: New Hampshire Final Individual Permits. Last Updated: 10/6/2016. https://www3.epa.gov/region1/npdes/permits_listing_nh.html. Date Accessed: 12/16/16

Federal Energy Regulatory Commission (FERC). 1996. Final Environmental Impact Statement: Lower Androscoggin River Basin Hydroelectric Projects Maine (FERC 2283-005, 11482-000). July 1996.

Federal Energy Regulatory Commission (FERC). 2017. Complete List of Active Hydropower Licenses. https://www.ferc.gov/industries/hydropower.asp. Date Accessed 4/4/2016

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K. 2015. Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. Photogrammetric Engineering and Remote Sensing, v. 81, no. 5, p. 345-354.

Maine Geographic Information Systems (MEGIS). 1987. Last updated 2004. The information provided in this coverage is a subset of spatial databases developed by NHDES.

Maine Department of Environmental Protection (MDEP). 2015. Volunteer River Monitoring Reports. 2015: Androscoggin River – Friends of Merrymeeting Bay. Online: http://www.maine.gov/dep/water/monitoring/rivers_and_streams/vrmp/reports.html. Date Accessed: 12/20/16

Maine Department of Environmental Protection (MDEP). 2016. Maine Combined Sewer Overflow 2015 Status Report. Document No. DEPLQ0972H-2016. May 2016. Available online: http://www.maine.gov/dep/water/cso/2015_status_report.pdf. Date Accessed: 12/20/2016

McFarlane, Wallace S. 2012. Environmental History, Defining a Nuisance: Pollution, Science and Environmental Politics on Maine's Androscoggin River, 8 March 2012; largest paper-producing companies in the world: Bethel Historical Society, A River's Journey: The Story of the Androscoggin. Online: www.bethelhistorical.org/A_River's_Journey.html, 11 September 2014. Date Accessed: 12/15/16

National Oceanic and Atmospheric Administration (NOAA). 2017. Climate Data Online. Data Tools: 1981-2010 Normals. Retrieved from: https://www.ncdc.noaa.gov/cdo-web/datatools/normals. Date Accessed: 4/4/17

NH GRANIT. 2014 GIS layer. Layers by data category: Utilities and Communication: National Pollutant Discharge Elimination System (NPDES). Retrieved from: http://www.granit.unh.edu/data/downloadfreedata/category/databycategory.html#. Date Accessed: 12/14/16

Turkel, Tux. 1977. "Something Else Important On Nov. 5 Ballot." Lewiston Evening Journal. Vol 117. November 8, 1977. Online: https://news.google.com/newspapers?nid=1913&dat=19771108&id=16VGAAAAIBAJ&sjid=fvMMAAAAIBAJ&pg=5242,1202559. Date Accessed: 12/14/16

U.S. Army Corp of Engineers (USACE). 1987. 1987 Dam Survey. Additional points were added by Maine Department of Environmental Protection (MDEP), Bureau of Land (BL) & Water Quality (WQ) staff for use with BL&WQ projects. Accessed online: http://www.maine.gov/megis/catalog/. Date accessed: 12/12/16

United States Census Bureau (USCB). 2016. Quick Facts: United States. Online: http://www.census.gov/quickfacts/. Date Accessed: 1/12/17

United States Geological Survey (USGS). 1999. Water-Quality Assessment of the New England Coastal Basins in Maine, Massachusetts, New Hampshire, and Rhode Island: Environmental Settings and Implications for water Quality and Aquatic Biota. Available online: https://pubs.usgs.gov/wri/wri984249/. Date Accessed: 12/15/16

United States Geological Survey (USGS). 1986. National Water Summary 1985 – Hydrologic Events and Surface-Water Resources. Water-Supply Paper 2300. United States Government Printing Office. p. 260. Available on Google Reads Online. Date Accessed: 12/19/16

United States Geological Survey (USGS). 2017. National Water Information System: Web Interface. Peak Streamflow for Maine; USGS Gage No. 01059000 Androscoggin River near Auburn, Maine.

https://nwis.waterdata.usgs.gov/me/nwis/peak?site_no=01059000&agency_cd=USGS&format=html. Date Accessed: 8/18/2017

References Cited in Section 4.0

None

References Cited in Section 5.1

Flanagan, S. M., Nielsen, M.G., Robinson, K.W., and Coles, J.F. 1999. Water-Quality Assessment of the New England Coastal Basin in Maine, Massachusetts, New Hampshire, and Rhode Island: Environmental Settings and Implications for Water Quality and Aquatic Biota. U.S. Geological Survey. 1999.

Maine Geological Survey (MGS). 1997. Surficial geology of the Lisbon Falls South Quadrangle, Maine. Open File Map 97-49: Lisbon-Falls-South. Online: https://www1.maine.gov/dacf/mgs/pubs/online/surficial/97-64-lisbon-falls-south-surficial.pdf. Date accessed: 12/12/16

Maine Geological Survey (MGS). 2000. A General Introduction to the Presumpscot Formation Maine's "Blue Clay." Geological Site of the Month. October 2000. Obtained online: https://www1.maine.gov/dacf/mgs/explore/surficial/facts/oct00.pdf. Date Accessed: 12/20/16

Natural Resources Conservation Service (NRCS). 2016. NRCS Official Soil Series Description: Search. Online: https://soilseries.sc.egov.usda.gov/osdname.aspx. Date Accessed: 12/21/16.

Natural Resources Conservation Service (NRCS). 2017. Web Soil Survey. [Online] URL: https://websoilsurvey.nrcs.usda.gov/app/ [Accessed February 15, 2017].

United States Department of Agriculture (USDA) in cooperation with Maine Agricultural Experiment Station. 1974. Soil Survey: Cumberland County, Maine. Issued August 1974. Online: https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/maine/cumberlandME1974/cumberland.pdf. Date Accessed: 12/21/16.

United States Geological Society (USGS). 2016. Mineral Resources On-Line Spatial Data: Silurian-Ordovician Vassalboro Formation. Online: https://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=MESOv%3B0. Date Accessed: 12/21/16

References Cited in Section 5.2

Dennis, Mary-Ellen (VRMP Program Coordinator of MDEP). Correspondence on 1/4/17. VRMP water quality data from 2010 to 2015 received via email.

Federal Energy Regulatory Commission (FERC). 1996. Final Environmental Impact Statement: Lower Androscoggin River Basin Hydroelectric Projects Maine (FERC 2283-005, 11482-000). July 1996.

Federal Energy Regulatory Commission (FERC). 2015. FERC Form 80: Licensed Hydropower Development Recreation Report (OMB No. 1902-0106). March 2015.

Federal Energy Regulatory Commission (FERC). 2016. Letter informing Topsham Hydro Partners L.P. that the minimum flow deviations that occurred on June 5-6 et al will not be considered violations of Article 32 re the Pejepscot Project under P-4784. September 22, 2016

Maine Department of Environmental Health (MDEH). 2008. Evaluation of the Health Implications of Levels of Polychlorinated Dibenzo-p-Dioxins (dioxins) and Polychlorinated Dibenzofurans (furans) in Fish from Maine Rivers: 2008 Update. January 2008. Online: https://www1.maine.gov/dhhs/mecdc/environmental-health/eohp/fish/documents/finaldraft-eval-of-pcdd.pdf. Date Accessed: 12/29/16

Maine Department of Environmental Health (MDEH). 2013. Freshwater Fish Safe Eating Guidelines. Online: http://www.maine.gov/dhhs/mecdc/environmental-health/eohp/fish/2kfca.htm. Date Accessed: 12/29/16

Maine Department of Environmental Protection (MDEP). 1990. State of Maine 1990 water quality assessment, a report to Congress pursuant to section 305(b) of the Federal Water Pollution Control Act as amended. Augusta, Maine. 103pp + appendices

Maine Department of Environmental Protection (MDEP). 2011. Lower Androscoggin River Basin Water Quality Study Modeling Report. Prepared by Peter Newkirk. March 2011. Online: http://www.maine.gov/dep/water/monitoring/rivers_and_streams/modelinganddatareports/androscoggin/2011/lowerandromodelreport_final_march_2011.pdf. Date Accessed: 12/28/16

Maine Department of Environmental Protection (MDEP). 2014. Draft State of Maine Department of Environmental Protection 2014 Integrated Water Quality Monitoring and Assessment Report. Online: http://www.maine.gov/dep/water/monitoring/305b/2014/draft-report.pdf

Maine Department of Environmental Protection (MDEP). 2016. GIS Maps and Other Data Files. Wastewater Facilities and Outfalls (MEPDES) (Data Under Development). 2016 Online: http://www.maine.gov/dep/gis/datamaps/. Date Accessed: 12/28/16

Maine Department of Environmental Protection (MDEP). 2016b. GIS Maps and Other Data Files. Biomonitoring Stream and Wetland Sampling Data GIS layer

(3/3/2016). Online: http://www.maine.gov/dep/gis/datamaps/. Date Accessed: 12/28/16

Maine Department of Environmental Protection (DEP). 2016c. Volunteer River Monitoring Report: 2015 Data Report. Online: http://www.maine.gov/dep/water/monitoring/rivers_and_streams/vrmp/reports.html. Date Accessed: 1/3/17

New Hampshire Department of Environmental Services (NHDES). 2008. New Hampshire Water Resources Primer. Online: http://www.des.nh.gov/organization/divisions/water/dwgb/wrpp/documents/primer_chapter2.pdf. Date Accessed: 1/13/16

National Marine Fisheries Service (NMFS). 2012. NMFS Endangered Species Act Biological Opinion for Emergency Spillway Repair and Proposed Amendment of the License for the Worumbo Project (FERC No. 2428).

The State of Maine (Maine). 2016a. Maine Revised Statutes. Title 38 Waters and Navigation, §467: Classification of major river basins. Online: http://legislature.maine.gov/statutes/38/title38sec467.html. Date Accessed: 11/1/16

The State of Maine (Maine). 2016b. Maine Revised Statutes. Title 38 Waters and Navigation, §465: Standards for classification of fresh surface waters. Online: http://legislature.maine.gov/statutes/38/title38sec465.html. Date Accessed: 12/28/16

United States Geological Survey (USGS). 2016. National Water Information System: Web Interface. USGS Surface-Water Daily Data for Maine; USGS Gage No. 01059000 Androscoggin River near Auburn, Maine. https://waterdata.usgs.gov/me/nwis/dv? Date Accessed: 12/27/2016.

References Cited in Section 5.3

Atlantic States Marine Fisheries Commission (ASMFC). 2016a. Maine ASMFC River Herring Sustainable Fishing Plan. September 2016. http://www.asmfc.org/files/Shad%20SFMPs/ME_RiverHerring_SFMP_Sept2016.pdf

Atlantic States Marine Fisheries Commission (ASMFC). 2016b. ASMFC Stock Status Overview. January 2016.

Atlantic States Marine Fisheries Commission (ASMFC). 2012. Stock Assessment Report No. 12-02: River Herring Benchmark Stock Assessment Volume I. Accepted for management use May 2012.

Atlantic States Marine Fisheries Commission (ASMFC). 2010. Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring (American Shad

Management). Prepared by ASMFC Shad and River Herring Plan Development Team.

Atlantic Salmon Recovery Project (ASRP). 2015. Draft SHRU Specific Recovery Implementation Strategy. http://kyoto.zentraal.com/atlantic-salmon-recovery-project/resources/documents/atlantic-salmon-recovery-plan-2015/recovery-plan-pages/shru-based-recovery/shru-specific-implementation-strategy-2015/index_html

Brautigam, F. and J. Pellerin. 2014. Upper Androscoggin Fishery Management Plan. Maine Department of Inland Fisheries and Wildlife. January 2014.

Brookfield White Pine Hydro (BWPH). 2016. 2015 Brunswick Project Fishway Report (FERC No. 2284) Article 30. Submitted to FERC on May 12, 2016.

Brookfield White Pine Hydro (BWPH) and Black Bear Hydro Partners (BBHP). 2016. Evaluation of Atlantic Salmon Passage, Spring 2015 – Weston, Shawmut, and Lockwood Projects, Kennebec River, and Pejepscot and Brunswick Projects, Androscoggin River. Prepared for Brookfield White Pine Hydro, LLC and Black Bear Hydro Partners, LLC by Normandeau Associates, Inc. March 2016.

Brown Bear II Hydro, Inc. (Brown Bear). 2016. Draft Biological Assessment for Gulf of Maine Distinct Population Segment of Atlantic Salmon. Prepared July 2016.

Brown, M.E., Maclaine, J., and L. Flagg. 2006. Annual Report: Anadromous Alosid Restoration in the Androscoggin River Watershed. State of Maine Department of Marine Resources, Augusta, ME. September 15, 2006.

Bruijs, M.C.M. and C.M.F. Durif. 2009. Silver eel migration and behaviour. Thillart, G., Dufour, S., and J. Rankin (eds.). Spawning Migration of the European Eel – Reproduction Index, a Useful Tool for Conservation Management. Springer, Netherlands. 477pp.

Charles Ritzi Associates. 1992. Pejepscot Hydroelectric Project, FERC Project No. 4784-ME – Evaluation of Upstream Fish Passage Facility. Report No. 2. Prepared for Topsham Hydro Partners.

Danie, D.S., Trial, J.G, and J.G. Stanley. 1984. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (North Atlantic) – Atlantic Salmon. U.S. Fish and Wildlife Service FWS/OBS-82/11.22. U.S. Army Corps of Engineers, TR EL-82-4. 19pp.

Downeast Salmon Federation (DSF). 2015. Atlantic Salmon Overview. https://mainesalmonrivers.org/atlantic-salmon-overview/ Accessed 12/16/2016.

Facey, D.E. and M.J. Van Den Avyle. 1987. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (North Atlantic)

– American Eel. U.S. Fish and Wildlife Service Biological Report 82(11.74). U.S. Army Corps of Engineers, TR EL-82-4. 28pp.

Fay, C.W., Neves, R.J., and G.B. Pardue. 1983a. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Mid-Atlantic)– Alewife and Blueback Herring. U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-82/11.9. U.S. Army Corps of Engineers, TR EL-82-4. 25pp.

Fay, C.W., Neves, R.J., and G.B. Pardue. 1983b. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Mid-Atlantic) – Striped Bass. U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-82/11.8. U.S. Army Corps of Engineers, TR EL-82-4. 36pp.

Fuller, P., Foster, A., and L.A. Somma. 2016. *Chelydra serpentina*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. https://nas.er.usgs.gov/queries/factsheet.aspx?speciesID=1225 Revision Date: 1/30/2015

Inskip, P.D. (1982). Habitat suitability index models: Northern pike. U.S. Dept. Int., Fish Wild. Serv. FWS/OBS-82/10.17. 40pp.

HDR Engineering (HDR). 2011. Little River Habitat Assessment Report. Prepared for Topsham Hydro. December 2011.

Kircheis, F.W. 2004. Sea Lamprey – *Petromyzon marinus*. Prepared by F.W. Kircheis L.L.C., Marmel, Maine.

Limburg, K.E., Hattala, K.A., and A. Kahnle. 2003. American Shad in its Native Range. Pages 125-140 in K.E. Limburg and J.R. Waldman, editors. Biodiversity, status, and conservation of the world's shads. American Fisheries Society, Symposium 35, Bethesda, MD.

Maine Damselfly and Dragonfly Survey. 2016. Maine Damselfly and Dragonfly Survey Data. http://mdds.umf.maine.edu/ Accessed 12/6/16.

Maine Department of Environmental Protection (MDEP). 2016a. Benthic Macroinvertebrates. Maine Department of Environmental Protection. http://www.maine.gov/dep/water/monitoring/biomonitoring/sampling/bugs/ Accessed 12/9/16

Maine Department of Environmental Protection (MDEP). 2016b. Biomonitoring Data and Maps. Google Earth Download. Biological Monitoring Program. http://www.maine.gov/dep/water/monitoring/biomonitoring/data.htm Accessed 12/9/16.

Maine Department of Inland Fisheries & Wildlife (MDIFW). 2015. Maine's State Wildlife Action Plan (SWAP)-2015. Maine Department of Inland Fisheries &

Wildlife. http://www.maine.gov/ifw/wildlife/reports/MWAP2015.html Accessed 12/6/16.

Maine Department of Inland Fisheries & Wildlife (MDIFW). 2013a. Species of Special Concern. Maine Department of Inland Fisheries & Wildlife 2011. http://www.maine.gov/ifw/wildlife/endangered/specialconcern.htm Accessed 12/5/16.

Maine Department of Inland Fisheries & Wildlife (MDIFW). 2013b. Snakes. Maine Department of Inland Fisheries & Wildlife. http://www.maine.gov/ifw/wildlife/human/lww_information/snakes.html Accessed 12/7/16.

Maine Department of Inland Fisheries and Wildlife (MDIFW). 2008. Northern Pike Assessment. Maine Department of Inland Fisheries and Wildlife. Prepared by F. Brautigam, November 2001, Updated by J. Lucas, January 2008.

Maine Department of Inland Fisheries and Wildlife (MDIFW). 1991. Spotted Turtle Assessment. Maine Department of Inland Fisheries and Wildlife, Wildlife Division, Wildlife Resource Assessment Section, Endangered and Threatened Species Group. https://www1.maine.gov/ifw/pdfs/species_planning/reptiles/spottedturtle/speciesassessment.pdf Accessed 12/8/16.

Maine Department of Marine Resources (MDMR). 2013. American Shad Habitat Plan. Submitted to the ASMFC. September 2013.

Maine Department of Marine Resources (MDMR). 2012. Androscoggin River Atlantic Salmon Tagging and Tracking Project 2011. Prepared by M. Pasterczyk, G. Wippelhauser, and M. Brown.

Maine Revised Statutes. 2009. Maine's Endangered and Threatened Species. http://www.maine.gov/ifw/wildlife/pdfs/Maine_ET_%20List_20090912.pdf. Accessed 12/9/16.

Miller Hydro Group (Miller Hydro). 2014. Worumbo Project (FERC No. 3428-ME) Annual Fish Passage Report. Submitted to FERC July 1, 2014.

Miller Hydro Group (Miller Hydro). 2013. Worumbo Project (FERC No. 3428-ME) Annual Fish Passage Report. Submitted to FERC July 29, 2013.

Milne, L. and M. Milne. 1980. *National Audubon Society Field Guide to Insects & Spiders*. Alfred A Knopf: New York, 1980. 31st printing October 2015. Pp. 363.

National Marine Fisheries Service (NMFS). 2009. Endangered and Threatened Species. Designation of critical habitat for Atlantic salmon (Salmo salar) Gulf of Maine Distinct Population Segment. Final rule. Federal Register, Vol. 74, No. 117. June 19, 2009.

National Marine Fisheries Service (NMFS). 2012a. NMFS Endangered Species Act Biological Opinion for the Proposed Amendment of License for the Pejepscot Project (FERC No. 4784).

National Marine Fisheries Service (NMFS). 2012b. NMFS Endangered Species Act Biological Opinion for Emergency Spillway Repair and Proposed Amendment of the License for the Worumbo Project (FERC No. 2428).

NatureServe Explorer. 2016. Comprehensive Report Species. NatureServe Explorer: An Online Encyclopedia of Life. Ver. 7.1. http://explorer.netureserve.org Accessed 12/6/16-12/9/16.

New England Fishery Management Council. 1998. Final Amendment for Essential Fish Habitat, Incorporating the Environmental Assessment. Saugus, MA: New England Fishery Management Council in Consultation with National Marine Fisheries Service.

North Atlantic Salmon Conservation Organization (NASCO). 2009. IP(09)07: Protection, Restoration, and Enhancement of Salmon Habitat Focus Area Report – USA. http://www.nasco.int/pdf/far_habitat/HabitatFAR_USA.pdf

Nedeau, E.J., McCollough, M.A., and B.I. Swartz. 2000. *The Freshwater Mussels of Maine*. Maine Department of Inland Fisheries and Wildlife: Augusta Maine, 2000.

Shepard, S.L. 2015. American Eel Biological Species Report. U.S. Fish and Wildlife Service, Hadley, Massachusetts. xii +120 pages.

Taylor, C.C. 1951. A Survey of Former Shad Streams in Maine. U.S. Department of the Interior. Special Scientific Report: Fisheries No. 66, August, 1951.

Topsham Hydro. 2012a. Investigation of Potential Additional Protection and Enhancement Measures for Listed Species. Attachment B in the Draft Biological Assessment for Gulf of Maine DPS of Atlantic Salmon. April, 2012.

Topsham Hydro. 2012b. Species Protection Plan – Topsham Project. Attachment A in the Draft Biological Assessment for Gulf of Maine DPS of Atlantic Salmon. April, 2012.

Topsham Hydro. 2014. Atlantic Salmon Passage Study Report – Topsham Hydroelectric Project. Prepared for Topsham Hydro Partners Limited Partnership by HDR Engineering, March 2014.

Topsham Hydro. 2015. 2014 Atlantic Salmon Passage Study Report – Pejepscot Project. Prepared for Topsham Hydro Partners Limited Partnership by HDR Engineering, March 2015.

U.S. Atlantic Salmon Assessment Committee (USASAC). 2015. Annual Report of the U.S. Atlantic Salmon Assessment Committee. Report No. 28 – 2015 Activities. Prepared for the U.S. Section to NASCO.

U.S. Fish and Wildlife Service (USFWS) and NOAA-Fisheries. 2016. Draft Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (*Salmo salar*). 61 pp.

U.S. Fish and Wildlife Service (USFWS). 2015. Press Release – American Eel Population Remains Stable – Does not Need ESA Protection. October 7, 2015.

Warner Nature Center. 2016. Painted Turtle. https://www.warnernaturecenter.org/animals/paintedturtle. Accessed 12/7/16.

Weiss-Glanz, L.S., J.G. Stanley, and J.R. Morning. 1986. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (North Atlantic) – American Shad. U.S. Fish and Wildlife Service Biological Report 82(11.59). U.S. Army Corps of Engineers, TR EL-82-4. 16pp.

Yoder, C.O., B.H. Kulik, J.M. Audet, and J.D. Bagley. 2006. The Spatial and Relative Abundance Characteristics of the Fish Assemblages in Three Maine Rivers. Technical Report MBI/12-05-1. September 1, 2006.

References Cited in Section 5.4

Bailey, Robert G. March 1995. *Ecoregions of the United States*. United States Department of Agriculture: Forest Service. Rocky Mountain Research Station. https://www.fs.fed.us/land/ecosysmgmt/colorimagemap/images/212.html Accessed. December 2016.

Ferree, C and M. G. Anderson. 2013. A Map of Terrestrial Habitats of the Northeastern United States: Methods and Approach. The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. Boston, MA. https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/habitatmap/Pages/default.asp

Maine Department of Agriculture, Conservation and Forestry. 2016. Natural Communities and Ecosystems. Maine Natural Areas Program. http://www.maine.gov/dacf/mnap/features/community.htm Accessed December 2016.

Maine Department of Agriculture, Conservation, and Forestry. 2016. Maine Invasive Plant Fact Sheets. Maine Natural Areas Program 2013. http://www.maine.gov/dacf/mnap/features/invasive_plants/invsheets.htm Accessed April 2017.

Maine Department of Inland Fisheries & Wildlife. 2016. *Wildlife*. http://www.state.me.us/ifw/wildlife/index.html Accessed December 2016.

Maine Department of Inland Fisheries & Wildlife. 2016. *Small Mammals*. http://www.maine.gov/ifw/wildlife/species/mammals/small.html Accessed January 2017.

Maine Invasive Species Network. 2017. *Maine Invasives Mapping and Other Data* https://extension.umaine.edu/invasivespecies/home/maps/ Accessed July 2017.

United States Fish & Wildlife Service. 2016. *IPaC Trust Resources Report*. https://ecos.fws.gov/ipac/ Accessed December 2016.

References Cited in Section 5.5

Maine Department of Environmental Protection. 2017. Wetland types. http://www.maine.gov/dep/water/wetlands/types.html

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

References Cited in Section 5.6

Maine Department of Agriculture, Conservation and Forestry. 2016. *Natural Communities and Ecosystems.* Maine Natural Areas Program. http://www.maine.gov/dacf/mnap/features/community.htm Accessed December 2016

Maine Department of Inland Fisheries & Wildlife. 2015. *Maine's State Wildlife Action Plan* (SWAP). http://www.state.me.us/ifw/wildlife/reports/wap.html Accessed January 2017.

Maine Department of Inland Fisheries & Wildlife. 2016. *Small Mammals.* http://www.maine.gov/ifw/wildlife/species/mammals/small.html Accessed April 2017.

United States Fish & Wildlife Service. 2016. *IPaC Trust Resources Report*. https://ecos.fws.gov/ipac/ Accessed December 2016.

References Cited in Section 5.7

Androscoggin River Watershed Council (ARWC). 2012. Androscoggin River Trail Access Sites: Lower Androscoggin – Riverlands. August 2012. [Online] URL: http://arwc.camp7.org/Resources/Documents/Lower%20Androscoggin_Riverlands.pdf. Accessed 12/14/2016.

Androscoggin River Watershed Council (ARWC). 2016a. Androscoggin Greenway-Riverlands. [Online] URL: http://arwc.camp7.org/greenway. Accessed 12/14/2016.

Androscoggin River Watershed Council (ARWC). 2016b. Androscoggin Greenway-Riverlands: Pejepscot Fishing Park. [Online] URL: http://arwc.camp7.org/resources/Pictures/Pejepscot%20Fishing%20Park.pdf. Accessed 12/14/2016.

Androscoggin River Watershed Council (ARWC). 2016c. Androscoggin Greenway-Riverlands: Topsham Hydro [Online] URL: http://arwc.camp7.org/resources/Pictures/Topsham%20Hydro.pdf. Accessed 12/14/2016.

Androscoggin Valley Council of Governments (AVCOG). 2009. Western Maine Regional Open Space Policy. [Online] URL: http://www.avcog.org/DocumentCenter/Home/View/42. Accessed on 8/18/2017.

Maine Department of Environmental Protection (MBEP). 2016. Mandatory Shoreland Zoning. [Online] URL: http://www.maine.gov/dep/land/slz/. Accessed on 12/16/2016.

Maine Bureau of Parks & Lands (BPL). 2009. Maine State Comprehensive Outdoor Recreation Plan 2009-2014. [Online] URL: http://www.maine.gov/doc/parks/programs/SCORP/index.html. Accessed 12/8/2016.

Maine Bureau of Parks and Lands (BPL). 2013. Boating Facilities Program Priorities. [Online] URL: http://www.maine.gov/dacf/parks/about/boating_facilities_program/strategic_plan/priorities.html. Accessed on 12/8/2016.

Maine Department of Agriculture, Conservation and Forestry (MDACF). 2013. Androscoggin Riverlands. [Online] URL: http://www.maine.gov/cgi-bin/online/doc/parksearch/index.pl?search_radio=1&state_park=98&historic_site=&public_reserved_land=&shared_use_trails=&town=&distance=&submit=Go+%BB. Accessed on 12/14/2016.

Maine Department of Conservation, Boating Facilities Division (MDOC). 1995. Boating Facilities Strategic Plan. [Online] URL: https://www1.maine.gov/dacf/parks/about/boating_facilities_program/strategic_plan/Strategic%20Plan.pdf. Accessed 12/8/2016.

Maine Department of Conservation, Bureau of Parks & Lands (MBPL). 2009. Maine State Comprehensive Outdoor Recreation Plan 2009-2014. [Online] URL: http://www.maine.gov/doc/parks/programs/SCORP/index.html. Accessed 12/8/2016.

Maine Office of GIS. 2016. Maine Office of GIS Data Catalog: Conserved Lands. July 18, 2016. [Online] URL: http://www.maine.gov/megis/catalog/. Accessed 12/16/2016.

Maine Office of Tourism (MOT). 2016. Interactive Map. [Online] URL: https://visitmaine.com/interactive-map/. Accessed 12/14/2016.

National Park Service (NPS). 2009. Nationwide Rivers Inventory: Maine Segments. [Online] URL: https://www.nps.gov/ncrc/programs/rtca/nri/states/me.html. Accessed 12/7/2016.

National Park Service (NPS). 2010. National Trails System Map. [Online] URL: https://www.nps.gov/nts/maps/National%20Trails%20map.pdf. Accessed 12/7/2016.

National Wild and Scenic Rivers System (NWSRS). 2016. Explore Designated Rivers/Maine. [Online] URL: https://www.rivers.gov/maine.php. Accessed 12/7/2016.

The University of Montana (UM). 2016. Wilderness.net. [Online] URL: http://www.wilderness.net/map.cfm. Accessed on 12/7/2016.

Topsham Hydro Partners. 1997. FERC Form 80 for Pejepscot Project for Reporting Year Ending 1996. March 24, 1997.

Topsham Hydro Partners. 2003. FERC Form 80 for Pejepscot Project for Reporting Year Ending 2002. March 31, 2003.

Topsham Hydro Partners. 2009. FERC Form 80 for Pejepscot Project for Reporting Year Ending 2008. March 31, 2009.

Topsham Hydro Partners LTD. 2015. FERC Form 80 for Pejepscot Project for Reporting Year Ending 2014. March 31, 2016.

Town of Brunswick. 2008. Comprehensive Plan Update. September 15, 2008. [Online] URL: http://www.brunswickme.org/wp-content/uploads/2013/06/Comp-Plan-Final-for-State-Review-091508rev.pdf. Accessed 8/18/2017.

Town of Brunswick. 2009. Zoning Map. August 19, 2009.

Town of Durham. 2002. Comprehensive Plan. [Online] URL: https://www.durhamme.com/sites/durhamme/files/uploads/durham_2002_compplan.pdf. Accessed August 8/18/2017.

Town of Durham. 2004. Zoning Map. March 2004.

Town of Lisbon. 2011. Comprehensive Plan Update. Amended April 19, 2011. [Online] URL: http://www.maine.gov/dacf/municipalplanning/comp_plans/Lisbon%202007%20(Amended%2011-04-19).pdf. Accessed 8/18/2017.

Town of Lisbon. 2012. Zoning Map. May 1, 2012.

Town of Topsham. 2005. Comprehensive Plan. May 19, 2005. [Online] URL: http://www.topshammaine.com/vertical/sites/%7B95A28B10-4485-4BEC-B8FC-5E8BF056A147%7D/uploads/%7BBA5D4C3D-82E3-45DA-9683-C9811D6C8253%7D.PDF. Accessed August 8/18/2017.

Town of Topsham. 2015. Zoning Map. May 20, 2015.

References Cited in Section 5.8

Federal Highway Administration (FHA). 2016. American Byways. [Online] URL: http://byways.org/explore/byways/11510. Accessed 1/13/2017.

Google Earth. 2016. Imagery Date: 5/9/16. Accessed 1/13/2017.

Maine Department of Transportation (MaineDOT). 2014. Maine State Rail Plan. July 2014. [Online] URL: http://maine.gov/mdot/ofbs/docs/Rail_Plan_7-9-2015.pdf. Accessed 1/13/2017.

Maine Trail Finder. 2017. Interactive Map. [Online] URL: http://www.mainetrailfinder.com/trails. Accessed 1/13/17.

Town of Topsham. 2016a. A Guide to Paddling Topsham's Waterways: Androscoggin River. [Online] URL: http://www.topshammaine.com/index.asp?Type=B_BASIC&SEC={0C9ED500-3153-44A1-B370-02AD7F3100F0}. Accessed 1/12/2017.

Town of Topsham. 2016b. A Guide to Topsham's Trails. [Online] URL: http://www.topshammaine.com/index.asp?SEC=110F5165-62BE-4EA4-BA45-2FD9CDBB42D2&Type=B_BASIC. Accessed 1/12/2017.

References Cited in Section 5.9

Bourque, Bruce J. 1995. Diversity and Complex Society in Prehistoric Maritime Societies: A Gulf of Maine Perspective. Plenum Press, New York.

1976 The Turner Farm Site: A Preliminary Report. *Man in the Northeast* 22:21–30.

2001 *Twelve Thousand Years: American Indians in Maine*. University of Nebraska Press. Lincoln, NB.

Cox, Belinda and James Petersen. 1997. The Varney Farm (ME 36-57): A Late Paleoindian Encampment in Western Maine. Bulletin of the Maine Archaeological Society 37(2):25- 48.

Curran, M.L. 1987. *The Spatial Organization of Paleoindian Populations in the Late Pleistocene of the Northeast*. Ph.D. dissertation, Department of Anthropology, University of Massachusetts, Amherst.

Curran, M.L., and D.F. Dincauze. 1977 Paleo-Indians and Paleo-Lakes: New Data from the Connecticut Drainage. *Annals of the New York Academy of Sciences* 288:333–348.

Davis, R., and G. Jacobsen, Jr. 1985. Late Glacial and Early Holocene Landscapes in Northern New England and Adjacent Areas of Canada. *Quaternary Research* 23:341–368.

Dincauze, Dena F. 1974. An Introduction to Archaeology in the Greater Boston Area. *Archaeology of Eastern North America* 2:39–67.

1975 The Late Archaic Period in Southern New England. *Arctic Anthropology* 12(2):23–34.

Dincauze, Dena F., and M.L. Curran. 1984. Paleoindians as Flexible Generalists: An Ecological Perspective. Paper presented at the 24th Annual Meeting of the Eastern States Archaeological Federation, Hartford, Connecticut.

Doyle, Richard, Jr., Nathan Hamilton, James Petersen, and David Sanger 1985 Late Paleo-Indian Remains from Maine and their Correlations in Northeastern Prehistory. Archaeology of Eastern North America 13:1-34.

Gramly, R. Michael 1982. *The Vail Site: A Palaeo-Indian Encampment in Maine.* Buffalo Museum of Science.

Gaudreau, D. 1986. Late-Quaternary Vegetational History of the Northeast: Paleoecological Implications of Topographic Patterns in Pollen Distributions. Ph.D. dissertation, Yale University. University Microfilms, Ann Arbor.

Haynes, C.V. 1980 The Clovis Culture. *Canadian Journal of Anthropology* 1:115–121

Jacobsen, G., T. Webb and E. Grimm. 1987. Patterns and Rates of Vegetation Change During the Deglaciation of Eastern North America. In *North America and Adjacent Oceans During the Last Deglaciation*, pp. 277–288. Edited by W. Ruddiman and H. E. Wright, Jr. The Geology of North America, V. K-3, Geological Society of America

Maine Historic Preservation Commission. 2007 Pejepscot Village School National Register Nomination

Maine History Online. 2017. 1500-1667 Contact and Conflict. [Online] URL: https://www.mainememory.net/sitebuilder/site/895/page/1306/display [Accessed August, 2017].

Petersen, J. and D. Putnam. 1986. Archaeological Phase II Testing in the Williams Hydroelectric Dam Increased Pool Project, Somerset County, Maine. Report on file with the Maine Historic Preservation Commission, Augusta.

Proud Pejepscot Village, MHPC vertical files 2017

Ritchie, William. 1971. The Archaic in New York. New York State Archaeological Association Bulletin 52:2–12.

Robinson, Brian S. 1992. Early and Middle Archaic Occupation in the Gulf of Maine Region: Mortuary and Technological Patterning. In Early Holocene Occupation in Northern New England, edited By B. S. Robins, J. B. Petersen, and A. K. Robinson. Occasional Publications in Maine Archaeology, no. 9. The Maine Historic Preservation Commission, Augusta.

Sanger, David. 1979. The Ceramic Period in Maine. In Discovering Maine's Archaeological Heritage, edited by D. Sanger. Maine Historic Preservation Commission, Augusta.

Spiess, Arthur. 1990. Maine's Unwritten Past: State Plan for Prehistoric Archaeological. Second Draft. Maine Historic Preservation Commission Augusta.

1994. CRM Archaeology and Hydro Relicensing in Maine. 1994. In Cultural Resource Management: Archaeological Research, Preservation Planning, and Public Education in the Northeastern United States, pp 155-190. Edited by Jordan E. Kerber. Bergin & Garvey, Westport, CN.

Spiess, Arthur, D. Wilson, J. Bradley. 1998. Peleoindian Occupation in the New England-Maritimes Region: Beyond Cultural Ecology. In Archaeology of Eastern North America 26:41-54.

Weeks, Lyman Horace

1916 *A History of Paper-Manufacturing in the United States, 1690-1916*. The Lockwood Trade Journal Company, New York.

Will, Richard, and Edward Moore. 2002. Recent Late Paleoindian Finds in Maine. Maine Archaeological Society Bulletin 42:1:1-14.

References Cited in Section 5.10

Maine Department of Labor (MaineDOL). 2016. Top 25 Private Employers in Maine by Average Monthly Employment by County (1st Quarter 2016). [Online] URL: https://www1.maine.gov/labor/cwri/publications/pdf/MaineCountyTop25Employers.pdf. Accessed 1/16/2017.

State of Maine Office of Policy and Management (OPM). 2016. Maine Demographic Projections. [Online] URL: http://maine.gov/economist/projections/index.shtml. Accessed 1/17/2017.

United States Census Bureau (Census). 2000a. Profile of General Demographic Characteristics: 2000. [Online] URL:

https://factfinder.census.gov/bkmk/table/1.0/en/DEC/00_SF1/DP1/0400000US23. Accessed 1/16/2017.

United States Census Bureau (Census). 2000b. Urban and Rural - 2000 Census Summary File 2. [Online] URL: https://factfinder.census.gov/bkmk/table/1.0/en/DEC/00_SF2/HCT001/0400000US23. Accessed 1/16/2017.

United States Census Bureau (Census). 2010. Population, Housing Units, Area, and Density: 2010 - State -- Place and (in selected states) County Subdivision. [Online] URL: https://factfinder.census.gov/bkmk/table/1.0/en/DEC/10_SF1/GCTPH1.CY07/0500000US23001|0500000US23005|0500000US23023. Accessed 1/16/2017.

United States Census Bureau (Census). 2015a. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2015. [Online] URL: https://factfinder.census.gov/bkmk/table/1.0/en/PEP/2015/PEPANNRES/0500000US23001. Accessed 1/16/2017.

United States Census Bureau (Census). 2015b. Selected Economic Characteristics: 2011-2015 American Community Survey 5-Year Estimates. [Online] URL: https://factfinder.census.gov/bkmk/table/1.0/en/ACS/15_5YR/DP03/0100000US|0400000US23|0500000US23001|0500000US23005|0500000US23023|0600000US2300119105|0600000US2300140035|0600000US2300508430|0600000US2302376960. Accessed 1/16/2017.

References Cited in Section 5.11

None

References Cited in Section 6

Federal Energy Regulatory Commission (FERC). 2016. List of Comprehensive Plans. FERC Office of Energy Projects. December 2016.