PRE-APPLICATION DOCUMENT

UPPER BARKER HYDROELECTRIC PROJECT

FERC NO. 3562

VOLUME I

Prepared for:

KEI (Maine) Power Management (III) LLC
Gardiner, Maine

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtUSA.com

July 2018

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GARDINER, MAINE

PRE-APPLICATION DOCUMENT
VOLUME I

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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
af	Acre-foot, the amount of water needed to cover one acre to a depth of one foot
ALT	Androscoggin Land Trust
APE	Area of Potential Effect as pertaining to Section 106 of the National Historic Preservation Act as amended
Applicant	KEI (Maine) Power Management (III) LLC
AVCOG	Androscoggin Valley Council of Governments
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CADD	Computer Aided Drafting and Design
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CWA	Clean Water Act
DLA	Draft License Application
DO	dissolved oxygen
DOE	U.S. Department of Energy
DOI	U.S. Department of Interior
DOT FHA	Department of Transportation Federal Highway Administration
DSSMP	Dam Safety Surveillance and Monitoring Program and Report
EA	Environmental Assessment
EAP	Emergency Action Plan
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EL	Elevation
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FOIA	Freedom of Information Act
FPA	Federal Power Act
FWCA	Fish and Wildlife Coordination Act
GIS	Geographic Information Systems
GWh	Gigawatt-hour (equals one million kilowatt-hours)
Hp	Horsepower

Hz	hertz (cycles per second)
HPMP	Historic Properties Management Plan
ILP	Integrated Licensing Process
Installed Capacity	The nameplate MW rating of a generator or group of generators
Interested Parties	The broad group of individuals and entities that have an interest in a proceeding
kV	Kilovolts
KVA	Kilovolt amps
kW	kilowatt
kWh	kilowatt-hour
License Application	Application for New License submitted to FERC no less than two years in advance of expiration of an existing license. See DLA
Licensee	KEI (Maine) Power Management (III) LLC
MBF	Maine Bureau of Forestry
MBLWQ	Maine Bureau of Land and Water Quality
MBPL	Maine Department of Agriculture, Conservation and Forestry; Bureau of Parks and Lands
MBPL	Maine Bureau of Parks and Lands
MDACF	Maine Department of Agriculture, Conservation, and Forestry
MDEP	Maine Department of Environmental Protection
MDIFW	Maine Department of Inland Fisheries & Wildlife
MDMR	Maine Department of Marine Resources
MGS	Maine Geological Survey
MHPC	Maine Historic Preservation Commission
MLMTC	Maine Lakes and Mountains Tourism Council
MLUPC	Maine Land Use Planning Commission
MNAP	Maine Natural Areas Program
MOT	Maine Office of Tourism
MSCORP	Maine State Comprehensive Outdoor Recreation Plan
MW	megawatt
MWh	megawatt-hour
NEPA	National Environmental Policy Act
NGO	Non-governmental organization
NMFS	National Marine Fisheries Services, same as NOAA Fisheries
NOAA Fisheries	NOAA National Marine Fisheries Service, same as NMFS
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service

NOI	Notice of Intent
Normal Operating Capacity	The maximum MW output of a generator or group of generators under normal maximum head and flow conditions
NRCM	Natural Resource Council of Maine
NWI	National Wetlands Inventory
PAD	Pre-Application Document
Peaking	Operation of generating facilities to meet maximum instantaneous electrical demands
Penstock	An inclined pressurized pipe through which water flows from a forebay or tunnel to the powerhouse turbine
PDF	Portable Document Format
PFMA	Probably Failure Mode Analysis
PLP	Preliminary Licensing Proposal
PM&E	Protection, Mitigation and Enhancement Measures
PMF	Probable Maximum Flood
Project	FERC Project No. 3562, Upper Barker Project
Project Area	The area within the FERC Project Boundary
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 Upper Barker Hydroelectric Project, the project boundary encompasses the impoundment up to approximately 1.7 miles upstream and extends just below the dam. The project boundary includes the dam and the powerhouse.
Project Impoundment	The 120-acre-foot impoundment on the Little Androscoggin River, impounded by Upper Barker Dam.
Project Vicinity	The general geographic area in which the Project is located; for this PAD, Androscoggin, Maine
QC	quality control
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 proceeding
Resource Affected Area	The geographic area in which a specific resource is potentially affected by the Project
RM	River mile
Run-of-river	A hydroelectric Project that uses the flow of a stream with little or no reservoir capacity for storing water
SD	Scoping Document

Service List	A list maintained by FERC of parties who have formally intervened in a proceeding. In relicensing, there is no Service List 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
SHPO	State Historic Preservation Officer
STID	Supporting Technical Information Documents
Tailrace	Channel through which water is discharged from the powerhouse turbines
T&E Species	Threatened and 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 identified as occurring within Androscoggin County by the MDIFW; (3) all federal wildlife species listed as threatened or endangered for Androscoggin County identified by the USFWS and NMFS and (4) species identified during other surveys or through consultation with the resource agencies. Special status species includes the federally protected bald eagle *(Haliaeetus leucocephalus)* and Osprey (*Pandion haliaetus*).
TLP	Traditional Licensing Process
TU	Trout Unlimited
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQC	Water Quality Certificate

UPPER BARKER HYDROELECTRIC PROJECT
FERC PROJECT NO. 3562

KEI (MAINE) POWER MANAGEMENT (III) LLC
GARDINER, MAINE

PRE-APPLICATION DOCUMENT
VOLUME I

1.0 INTRODUCTION

KEI (USA) Power Management Inc. on behalf of KEI (Maine) Power Management (III) LLC [KEI (USA) or Applicant] is filing with the Federal Energy Regulatory Commission (FERC or Commission) its notification of intent (NOI) to relicense and the required Pre-Application Document (PAD) for the 950 kW Barker's Mills Upper Hydroelectric Project (FERC No. 3562) (Upper Barker Project or Project). The Project is located on the Little Androscoggin River in Androscoggin County, Maine. The Project is located approximately 1.3 miles upstream from the confluence of the Little Androscoggin River with the Androscoggin River in the city of Auburn, Maine.

KEI (USA) provides this PAD as required by Title 18 § 5.6 and §16.8 of the U.S. Code of Federal Regulations (CFR). This PAD accompanies KEI (USA)'s Notice of Intent (NOI) to seek a new license for the Project. KEI (USA) distributed this PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others interested in the relicensing proceeding. Appendix A provides the distribution list for the NOI and PAD. As specified in 18 CFR § 5.6 (c) and (d) the PAD provides FERC and the entities listed above with summaries of existing, relevant, and reasonably available information related to the Project that is in the Licensee's possession or was obtained through due diligence.

KEI (USA) has spent the past five years conducting the relicensing process for the Lower Barker Project immediately downstream. As such, existing information available from agency consultation efforts, field studies, and license application documents were used to inform development of the PAD for the Upper Barker Project.

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 KEI (USA)'s Application for New License (License Application) that will be filed with FERC on or before July 31, 2023. The PAD is also a precursor to the environmental analysis section of the License Application and to FERC's Scoping Documents and Environmental Impact Statement (EIS) or Environmental Assessment (EA) under the National Environmental Policy Act (NEPA). Filing the PAD concurrently with the NOI enables those who plan to participate in the relicensing to familiarize themselves with the Project at the start of the proceeding.

FIGURE 1-1 UPPER BARKER PROJECT WATERSHED MAP

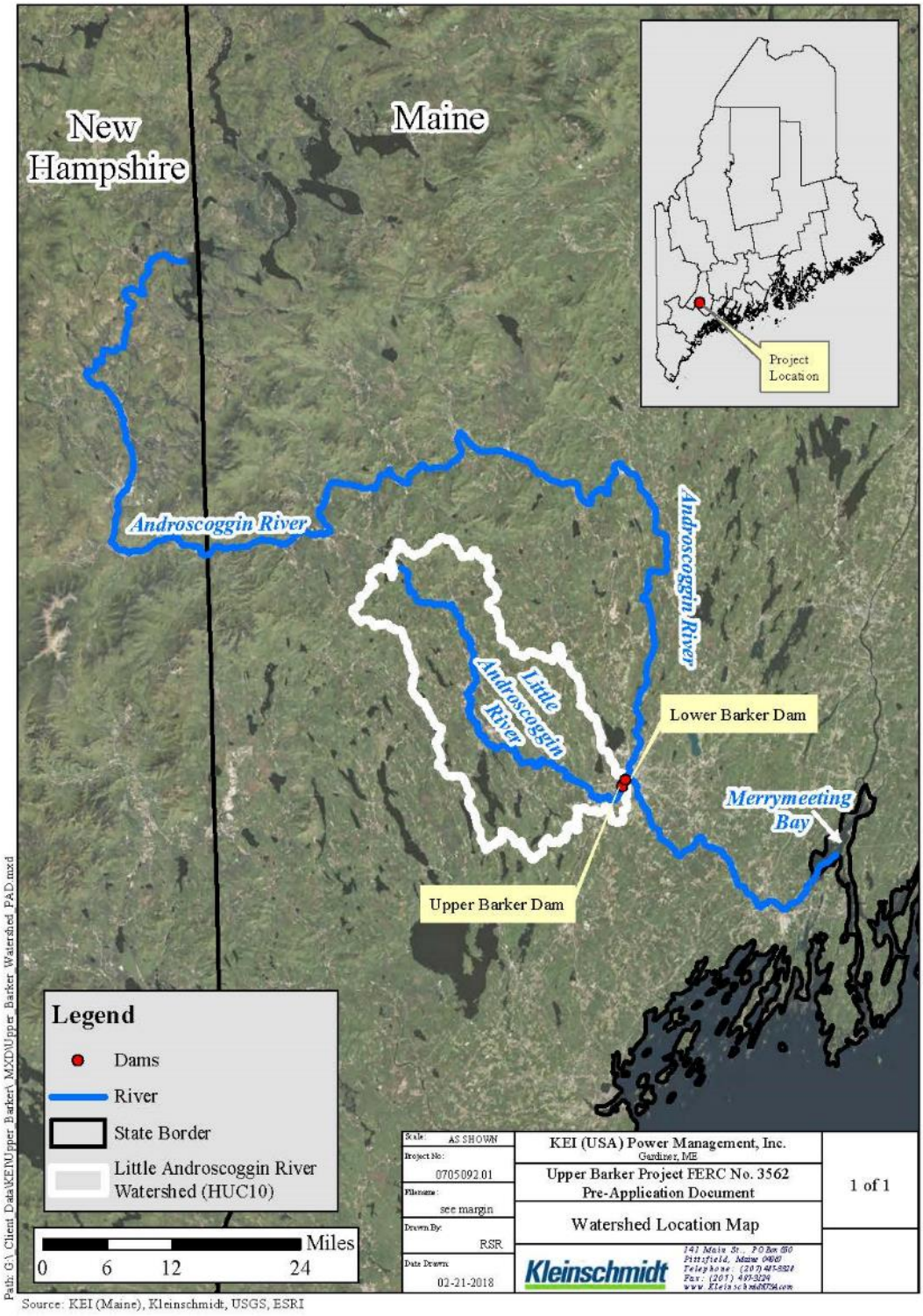
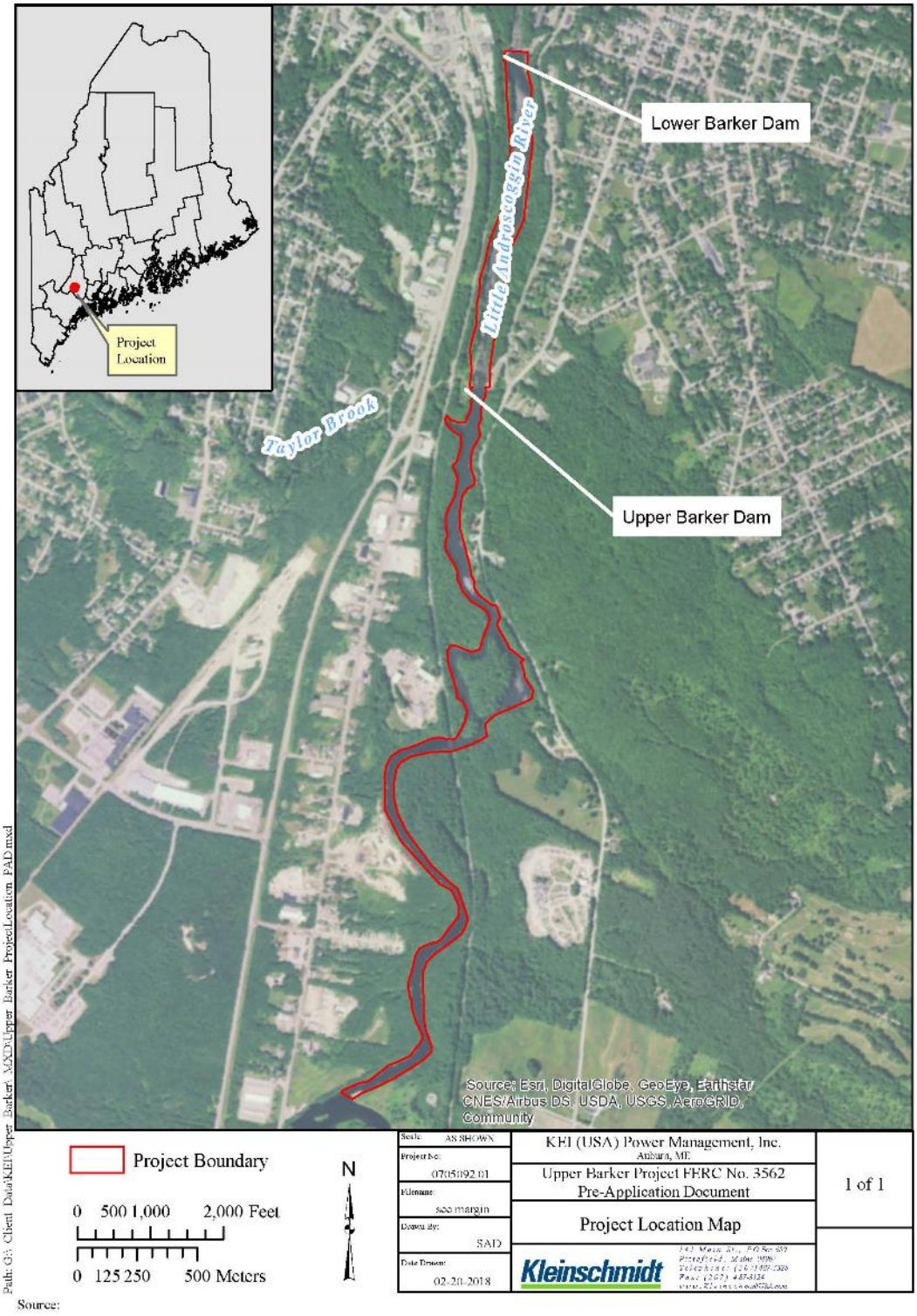


FIGURE 1-2 UPPER BARKER PROJECT LOCATION MAP



1.1 AGENTS FOR KEI (MAINE) POWER MANAGEMENT (III) LLC

The following persons are authorized to act as agent for the applicant pursuant to 18 CFR § 5.6(d)(2)(i):

Lewis C. Loon, General Manager
Operations and Maintenance–USA/QC
KEI (USA) Power Management Inc.
423 Brunswick Avenue
Gardiner, ME 04345
Phone: (207) 203-3025
Fax: (207) 582-0094
Email: LewisC.Loon@kruger.com

1.2 PAD CONTENT

This PAD follows the content and form requirements of 18 CFR § 5.6 (c) and (d), with minor changes in form for enhanced readability. This PAD is organized into two volumes. Volume 1 contains all of the information required by 18 CFR § 5.6 (c) and (d) for distribution to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others likely to be interested in the relicensing proceeding. Volume 2 contains drawings of Project works that meet the definition of Critical Energy Infrastructure Information (CEII) pursuant to FERC's June 23, 2003 Order No. 630-A. Consistent with that order, KEI (USA) is distributing Volume 2 only to FERC.

Volume 1 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 1.0 – Introduction and Background Information.
- Section 2.0 – Process Plan and Schedule, Communications Protocol, and TLP Flow Chart, per 18 CFR § 5.6(d)(1).
- Section 3.0 – General Description of the Little Androscoggin River basin, per 18 CFR § 5.6(d)(3)(xiii).
- Section 4.0 – Description of Project Location, Facilities, and Operation, per 18 CFR § 5.6(d)(2).
- Section 5.0 – Description of the Existing Environment by Resource Area, per 18 CFR § 5.6(d)(3)(ii)-(xii).

- Section 6.0 – Description of Impacts, Issues, Study and Information Needs, Resource Measures, and Existing Plans, per 18 CFR § 5.6(d)(3) and (4).
- Appendices:
  - Appendix A – Process Plan and Schedule, per 18 CFR § 5.6(d)(1)
  - Appendix B – Current License Requirements
  - Appendix C – Flow Duration Curves
  - Appendix D – List of Wildlife Species Common to the Region

1.3 REFERENCES

Federal Energy Regulatory Commission (FERC). 1983. Order Issuing License for Barker's Mill Upper Hydroelectric Project (FERC No. 3562). 24 FERC ¶62,209. Issued August 22. 1983.

2.0 PLANS, SCHEDULE, AND PROTOCOLS

18 CFR 5.6(d)(1) requires "The pre-application document must include a plan and schedule for all pre-application activity that incorporates the time frames for pre-filing consultation, information gathering, and studies set forth in this part. The plan and schedule must include a proposed location and date for the scoping meeting and site visit required by §5.8(b)(3)(viii)."

In its NOI, KEI (USA) requests FERC's approval to use the Traditional Licensing Process (TLP) for the Project. The TLP has three stages (18 CFR 4.38). The first stage involves coordination between the Applicant, resource agencies, affected Indian tribes, and the public and includes the sharing of project information, notification of interested parties, and study planning and implementation using the PAD. The second stage involves study implementation and additional data gathering as well as development of a Draft License Application (DLA) and review of the draft License Application by resource agencies and optionally, FERC. The third stage commences with the filing the Final License Application (FLA), whereby FERC initiates its own review and public comment process, ultimately issuing a license for the Project. Figure 2-1 depicts the regulatory milestones of the TLP.

2.1 PROCESS PLAN AND SCHEDULE THROUGH FILLING OF LICENSE APPLICATION

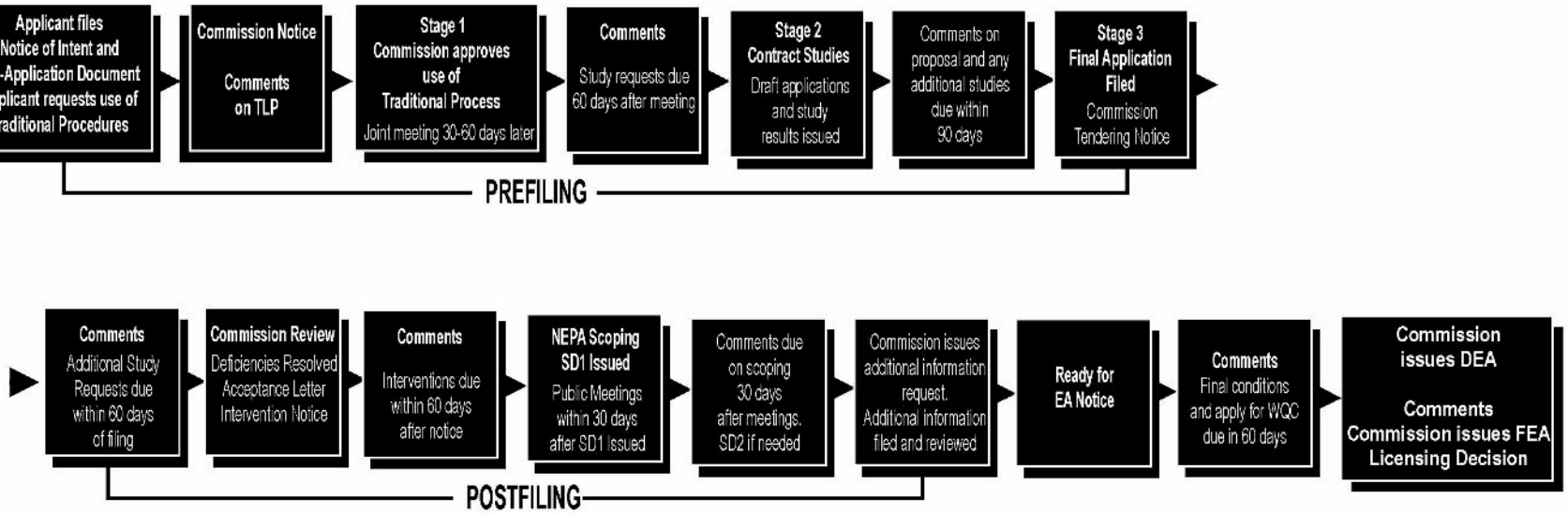
The Process Plan and Schedule outlines actions by FERC, KEI (USA), and other participants in the relicensing process through filing of the FLA. Appendix B provides a Process Plan and Schedule for the TLP and is based upon the License Application filing deadline of July 31, 2023 for the Upper Barker Project and all subsequent dates given derive from this date. The final License Application must be filed no later than two years before license expiration, but could be filed earlier. The following diagram prepared by FERC and provided as Figure 2-1 illustrates the TLP pursuant to 18 CFR 4.38.

The Process Plan and Schedule includes an anticipated Joint Agency Meeting and site visit in the October/November 2018 timeframe, to be held at KEI (USA)'s offices at 423 Brunswick Avenue, Gardner, ME 04345 or at a location determined to be mutually convenient for the stakeholders.

FIGURE 2-1 TLP PROCESS FLOW CHART

TRADITIONAL LICENSING PROCESS

Figure 2. Traditional Licensing Process



Source: FERC, 2004

KEI (USA) has collaborated early with agencies, non-governmental organizations (NGOs) and interested members of the public on the relicensing process for the other ongoing relicensings and the following protocol outlines how KEI (USA) has and intends to communicate, document and distribute information related to the licensing process among Interested Parties in the pre-filing consultation process.

2.2 PROPOSED COMMUNICATIONS PROTOCOLS

Effective communication is essential for a timely, cost-effective relicensing. KEI (USA) anticipates that the primary means of communication will be meetings, documents, email, and telephone.

2.2.1 PARTIES TO THE RELICENSING

Under FERC proceedings, participating individuals typically are identified as one of two groups: a) Interested Parties, which is the broad group of individuals and entities that may have an interest in a proceeding, including Native American tribes, agencies, groups and individuals that may wish to participate in the licensing process and are sometimes referred to as "stakeholders" and b) Relicensing Participants, which is a subset of Interested Parties and consists of individuals and entities that are actively participating in a proceeding, such as by participating on committees. Relicensing Participants may receive additional communications relative to the specific activity or function. Any Interested Party may elect to be a Relicensing Participant by request to KEI (USA).

FERC also maintains a mailing list of Interested Parties, on which the applicant's mailing list is typically based. FERC generally integrates the licensee's Interested Parties mailing list with their own once the relicensing process has started. Once the FLA is filed with the FERC, FERC will establish an official Service List for parties who formally intervene in the proceeding. Typically, this is comprised of the Relicensing Participants who have been recognized by FERC as official parties.

2.2.2 GENERAL COMMUNICATIONS

Communications include written correspondence, emails, and notes from individual and conference telephone calls. KEI (USA)'s goal is to keep the lines of communication open during

the relicensing process and make it easy for Interested Parties, Relicensing Participants and the public to get information related to the relicensing and the interests of other stakeholders.

2.2.2.1 TELEPHONE

KEI (USA) anticipates that telephone calls among Interested Parties and Licensing Participants will be treated informally, with no specific documentation unless specifically agreed upon in the discussion or as part of formal agency consultation proceedings.

KEI (USA) anticipates that FERC will distribute to the FERC Project No. 3562 Mailing List summaries of any informal decisional telephone calls in which it participates prior to acceptance of the FLA.

2.2.2.2 ELECTRONIC COMMUNICATIONS

KEI (USA) anticipates distribution of relevant documents and submittal of comments, correspondence, and study requests from agencies 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. KEI (USA) 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 http://www.ferc.gov/docsfilings/elibrary.asp (Docket P-3562). 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 Upper Barker Project is provided on FERC's website at http://www.ferc.gov/docs-filing/esubscription.asp.

2.2.2.3 MEETINGS

KEI (USA) will work with all Interested Parties to develop meeting schedules that include practical locations and times to accommodate the majority of participants. In general, KEI (USA)

will schedule meetings between the hours of 9:00 a.m. and 4:00 p.m. KEI (USA) will make every effort to begin and end meetings on time.

KEI (USA) will notify all Interested Parties at least two weeks in advance of the next planned public meeting. At that time, KEI (USA) will provide a meeting agenda via mail and by email. KEI (USA) will also distribute any documents or other information that will be the subject of meeting discussions.

2.2.3 DOCUMENTS

KEI (USA) will maintain copies of all mailing lists, announcements, notices, communications, and other documents related to the relicensing of the Project at the KEI (USA) corporate office in Brunswick, Maine. KEI (USA) will regularly update the public files to ensure the public has the latest information related to the relicensing process available to them and that all public documents are available. Anyone may obtain documents by contacting:

Sherri Loon
Coordinator Operations - USA
KEI (USA) Power Management Inc.
423 Brunswick Avenue
Gardiner, ME 04345
(207) 203-3026 Direct Line
Sherri.Loon@kruger.com

As discussed above, documents submitted to and issued by the FERC for the Project are available through eLibrary under Docket P-3562 (http://www.ferc.gov/docsfilings/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, DC:

Federal Energy Regulatory Commission
Public Reference Room, Room 2-A
Attn: Secretary
888 First Street, N.E.
Washington, D.C. 20426

2.2.3.1 PUBLIC REFERENCE FILE

The public reference file is a listing of important materials pertaining to the relicensing. This includes background reference material as well as the consultation record, all relevant studies and data collected during the development of the PAD, meeting summaries, notices, reports as well as Project documents such as the current FERC license.

KEI (USA) will maintain public reference files on the Upper Barker Project at the KEI (USA) corporate office at 423 Brunswick Avenue, Gardiner, ME 04345.

For a nominal copying fee, hard copies of all documents are available upon request. Documents are available for inspection and reproduction during regular office business hours. Appointments are appreciated.

All communications added to the public reference file will be available to the public consistent with the public records procedures set forth in the Freedom of Information Act (FOIA).

2.2.3.2 RESTRICTED DOCUMENTS

Certain Project-related documents are restricted from public viewing in accordance with FERC regulations. CEII (18 CFR 388.113) related to the design and safety of dams and appurtenant facilities, and that is necessary to protect national security and public safety are restricted. Anyone seeking CEII information from FERC must file a CEII request. FERC's website at www.ferc.gov/help/how-to/file-ceii.asp contains additional details related to CEII.

Information related to protecting sensitive archaeological or other culturally important information is also restricted under Section 106 of the National Historic Preservation Act (NHPA)[1] as amended and its implementing regulations (36 CFR 800). In addition, information related to threatened and endangered species are protected under Section 7 of the Endangered Species Act (ESA). Anyone seeking this information from FERC must file a FOIA request. Instructions for FOIA are available on FERC's website at www.ferc.gov/legal/ceii-foia/foia.asp.

[1] Section 106 of the NHPA of 1966, as amended, 54 U.S.C. § 306108, Pub. L. No. 113-287, 128 Stat. 3188 (2014). The NHPA was recodified in Title 54 in December 2014.

2.2.3.3 MAILING LISTS

KEI (USA) will maintain a Relicensing Mailing List of all Interested Parties including Relicensing Participants (Appendix A). The list will include both standard U.S. Post Office addresses and available email addresses for distributing notices and documents for public review (Table 2-1).

FERC also maintains a mailing list of Interested Parties for the Project (Appendix A). KEI (USA) anticipates that once the relicensing proceeding begins, KEI (USA)'s Relicensing Mailing List and FERC's Mailing List will be consolidated into one common list. After KEI (USA) files the FLA, FERC will establish an official Service List (Table 2-1) for parties who formally intervene in the proceeding. Once FERC establishes a Service List, any written documents filed with FERC must also be sent to the Service List. A Certificate of Service must be included with the document filed with FERC.

TABLE 2-1 MAILING LISTS FOR THE UPPER BARKER RELICENSING FERC PROJECT NO. 3562

ENTITY	TYPE	DESCRIPTION
KEI (USA)	Project No. 3562 Interested Parties Relicensing Mailing List	A list of Interested Parties prepared by Licensee in anticipation of the Project relicensing proceeding.
FERC	Project No. 3562 Mailing List	A mailing list of Interested Parties prepared and maintained by FERC throughout the Project relicensing proceeding.
FERC	Project No. 3562 Service List	A mailing list of parties that have formally intervened in the relicensing proceeding, prepared and maintained by FERC after it accepts the License Application.

2.2.3.4 DOCUMENT DISTRIBUTION

KEI (USA) will distribute, whenever possible, all documents electronically in standard MS Word format or PDF, either via email or on CD. KEI (USA) may distribute hard copies of some documents for convenience or by request. Distribution of information will follow the guidelines presented below (Table 2-2).

TABLE 2-2 DOCUMENT DISTRIBUTION FOR THE UPPER BARKER RELICENSING FERC PROJECT NO. 3562

DOCUMENT	METHOD	DISTRIBUTION
Public Meeting Notices	U.S. Mail, Email and Newspapers.	Public and all Potential Interested Parties
Meeting Agendas	Email or US Mail*	Interested Parties
Meeting Summaries	Email or US Mail*	On Request
Process Plan & Schedule	Email or US Mail*	On Request
Major Documents: Proposed Study Plans, Study Reports, Draft License Application, Final License Application, etc.	Email or US Mail	Notice of availability by US Mail or Email to Interested Parties; Major documents on CD to Relicensing Participants
PAD support documents	KEI (USA) corporate office	On Request
Written Communications	Email or US Mail*	On Request

*US Mail service by special request.

2.2.4 STUDY REQUESTS

In the development of the PAD, KEI (USA) has used previous knowledge from its downstream dam (Lower Barker FERC No. 2808) for which a FLA was developed in 2017, to identify areas where there is little or no information relevant to issues of potential concern for Project effects to the human and natural environments. However, stakeholders may identify additional studies for consideration. As specified by CFR 18, § 5.9(b), any 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.

Email or mail completed study requests in MS Word or PDF format to:

Sherri Loon
Coordinator Operations - USA
KEI (USA) Power Management Inc.
423 Brunswick Avenue
Gardiner, ME 04345
(207) 203-3026 (Office)
Sherri.Loon@kruger.com

2.3 REFERENCES

Federal Energy Regulatory Commission (FERC). 2004. Handbook for Hydroelectric Project Licensing and 5 MW Exemptions from Licensing. [Online] URL: http://www.ferc.gov/industries/hydropower/gen-info/handbooks/licensing_handbook.pdf. Accessed January 22, 2018.

3.0 GENERAL DESCRIPTION OF RIVER BASIN

18 CFR 5.6(d)(3)(xiii) requires "A general description of the river basin or sub-basin, as appropriate, in which the proposed project is located, including information on: (A) the area of the river basin or sub-basin and length of stream reaches therein; (B) Major land and water uses in the project area; (C) all dams and diversion structures in the basin or sub-basin, regardless of function; and (D) Tributary rivers and streams, the resources of which are or may be affected by project operations."

3.1 OVERVIEW

The Androscoggin River watershed extends from northeastern New Hampshire to the coast of Maine where it joins the Kennebec River to form Merrymeeting Bay. The watershed has a total drainage of 3,530 square miles (sq mi) (FERC 1996). At 164 miles long, the Androscoggin River is the third largest river in Maine. The Androscoggin River basin contains over 100 dams, 16 of which are used for hydropower generation (ENSR, 2007). Among the major streams and rivers in the basin are the Kennebago River, Rangeley River, Sabattus River, Sunday River, and the Little Androscoggin River (Maine Rivers, 2018).

The Little Androscoggin River basin, where the Project is located, is a sub-basin of the Androscoggin River watershed. The Little Androscoggin River basin, originates in Bryant Pond in Woodstock, Maine approximately 29 miles northwest of the project area (Google Earth, 2013a). The Little Androscoggin River has a total drainage area of approximately 360 sq mi covering two counties (Androscoggin and Oxford) (USGS 2018a and 2018b). The river is approximately 52-miles-long from its headwaters to its confluence with the Androscoggin River (USGS, 2018c). Among the major lakes and tributaries in the basin are Bryant Pond, Thompson Lake, Andrews Brook, Black Brook, Cushman Stream, Meadow Brook, and Bog Brook (Maine Legislature, 1989). The Project is located approximately 2,000 feet upstream from the confluence of the Little Androscoggin River with the Androscoggin River in Androscoggin County in Auburn, Maine.

Androscoggin County is located in southwestern Maine. The County encompasses 14 cities and towns including the second and fourth largest cities in the state, Lewiston and Auburn respectively. The Lewiston-Auburn metro area is a center for retail trade, services and manufacturing. The major topographic feature of Androscoggin County is the Androscoggin

River which divides the "twin cities" of Lewiston and Auburn. The remainder of the topography is generally moderate, varying from forested hills to flat farmlands (AVCOG, 2011).

River flow data for the Upper Barker Project was generated from USGS gage No. 01057000 (Little Androscoggin River near South Paris, Maine) for the period January 1985 to December 2015; the USGS gage is approximately 40 river miles upstream of the Upper Barker Project. River flow data provided in the Lower Barker Project Final License Application (FERC No. 2808; filed with FERC on January 30, 2017) was assumed to be representative of flow data at the Upper Barker Project because of the proximity of the two hydroelectric projects (i.e., 0.6 river miles). Data from the South Paris gage were pro-rated by a factor of 4.9 to account for the additional drainage area at the Upper Barker Hydroelectric Project.

The mean, median, minimum, and maximum annual river flows of the Little Androscoggin River at the Upper Barker Project are estimated to be 694 cfs, 350 cfs, 3 cfs, and 32,871 cfs, respectively (Table 3-1). The maximum monthly average flow typically occurs in April, and the minimum monthly average flow is typically in September. Annual and monthly flow duration curves for the Upper Barker Project are presented in Appendix C .

3.2 MAJOR LAND USES

Until the late 19th century, agriculture was the primary land use of the Little Androscoggin River basin. The amount of lands used for agricultural purposes peaked in 1880 before steadily declining through the end of the 20th century. Following the decline in agriculture many lands reverted to their original, forested state. Today, the majority of the basin remains forested (Irland, 1998).

The Project lies wholly within Androscoggin County, Maine, which has a land area of approximately 468 square miles (U.S. Census, 2017a). The project vicinity is dominated by forestland, approximately 61% of the total land cover, followed by agriculture at approximately 13% of the land cover. Overall, only a small percentage of the project vicinity is developed (6.4%) (NOAA C-CAP, 2010). As such, the major land uses in Androscoggin County are forestry, agriculture and urban development, contained within 14 cities and towns, the largest of which is the Lewiston-Auburn metropolitan area where the Project is located (FERC, 1996).

The Upper Barker Project is located wholly within the city of Auburn, which is comprised of a mix of urban development and forested areas. Auburn was incorporated as a town in 1842. In the mid-1850s Auburn emerged as a "powerful and well-organized city" (Men, 1889), noted for its multitude of mills and factories (FERC, 1996). Today, many of the mills and factories are defunct and the areas of Auburn closest to the Project are zoned as general business; multi-family urban and suburban; and rural residential (Auburn, 2011).

The shoreline of the project impoundment is predominantly wooded. Project operations and maintenance are the primary activities that occur on project lands. There are no formal public recreation facilities at the Project and access to the dam is blocked to unauthorized vehicles or pedestrians.

3.3 MAJOR WATER USES

The Little Androscoggin River was historically home to many industrial sites that took advantage of the river as an energy source and water supply. The main types of industry developed on the Little Androscoggin River were textile and paper mills. As time progressed, large-scale factories began to leave the area and, as of today, only light industrial development and small businesses remain along the Little Androscoggin River (FERC, 1996).

There are 8 dams currently located on the Little Androscoggin River, listed in Table 3-1 in ascending order. The historical use of the river as an energy source is evident as a majority of the dams were constructed prior to 1945. Six of the dams are currently used for hydroelectric generation. Five of the dams are privately owned while the remaining three are owned by local municipalities (Table 3-1) (USACE 2016). The Little Androscoggin River is also utilized for recreational purposes; the majority of which are fishing and boating (FERC, 1996).

TABLE 3-1 LITTLE ANDROSCOGGIN RIVER HYDRO PROJECTS

PROJECT	OWNER	RESERVOIR AREA (AC)	HEIGHT OF DAM (FT)	GENERATION CAPACITY (KW)[1]
Lower Barker	KEI (Maine) Power Management (III) LLC.	150	30	1,200
Upper Barker	KEI (Maine) Power Management (III) LLC.	255	24	1,000

PROJECT	OWNER	RESERVOIR AREA (AC)	HEIGHT OF DAM (FT)	GENERATION CAPACITY (KW)[1]
Hackett Mills	Hackett Mills Hydro Associates	480	8	470
Mechanic Falls/ Marcal Dam	KEI (Maine) Power Management (IV) LLC	103	15.4	1,310
Welchville	Town of Oxford	5232	16	NA
Biscoe Falls	John Crouch Jr. & Sons	126	15	50
Hicks Pond	Town of Greenwood	538	12	NA
Lake Christopher/ Bryant Pond	Town of Woodstock	8560	7	NA

Source: USACE 2016; FERC, 1996

3.4 PROJECT RESERVOIR AND STORAGE

The project reservoir is approximately 41 acres with a maximum usable storage capacity of approximately 255 acre-feet at elevation 192 feet msl (FERC 1983). However, the Project operates in a run-of-river mode with no useable storage capacity.

3.5 PROJECT DRAINAGE BASINS' TRIBUTARY STREAMS

The Little Androscoggin River is the largest tributary of the Androscoggin River. The Little Androscoggin River itself has several tributaries that feed into it including: Bryant Pond, Thompson Lake, Andrews Brook, Black Brook, Cushman Stream, Meadow Brook, and Bog Brook (Maine Legislature, 1989).

3.6 CLIMATE

The project region experiences moderately cool summers and cold winters with moderate to heavy snowfall (FERC 1996). The National Weather Service monitoring station (USC00174566) located in Lewiston, Maine shows the shows the July air temperatures ranging from an average maximum high of just over 79°F to an average minimum low of 60°F. Overall average temperatures in July are approximately 70°F. The average maximum air temperature for January is 27°F while the average minimum air temperature for January is 8°F. Overall, average temperatures in January are approximately 18°F. The average total snowfall is 65.6 inches. The average annual total precipitation including the water equivalent of snow is 45.07 inches (NOAA, 2018).

3.7 REFERENCES

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4.0 PROJECT LOCATION, FACILITIES, AND OPERATIONS

4.1 EXISTING PROJECT FACILITIES

18 CFR 5.6(d)(2) requires "detailed description of all existing and proposed project facilities and components; Physical composition, dimensions, general configuration of any dams, spillways, penstocks, canals, powerhouses, tailraces and other structures proposed to be included as part of the project or connected directly to it; normal maximum water surface area and normal maximum water surface elevation (msl), gross storage capacity of any impoundments."

PROJECT STRUCTURES

The Project consists of a masonry-gravity dam with flashboards, spillway, two slide gates, non-overflow stoplog and gate sections; a powerhouse containing one turbine, a downstream fish passage facility, a transformer, and appurtenant facilities.

Source: Google Earth 2018

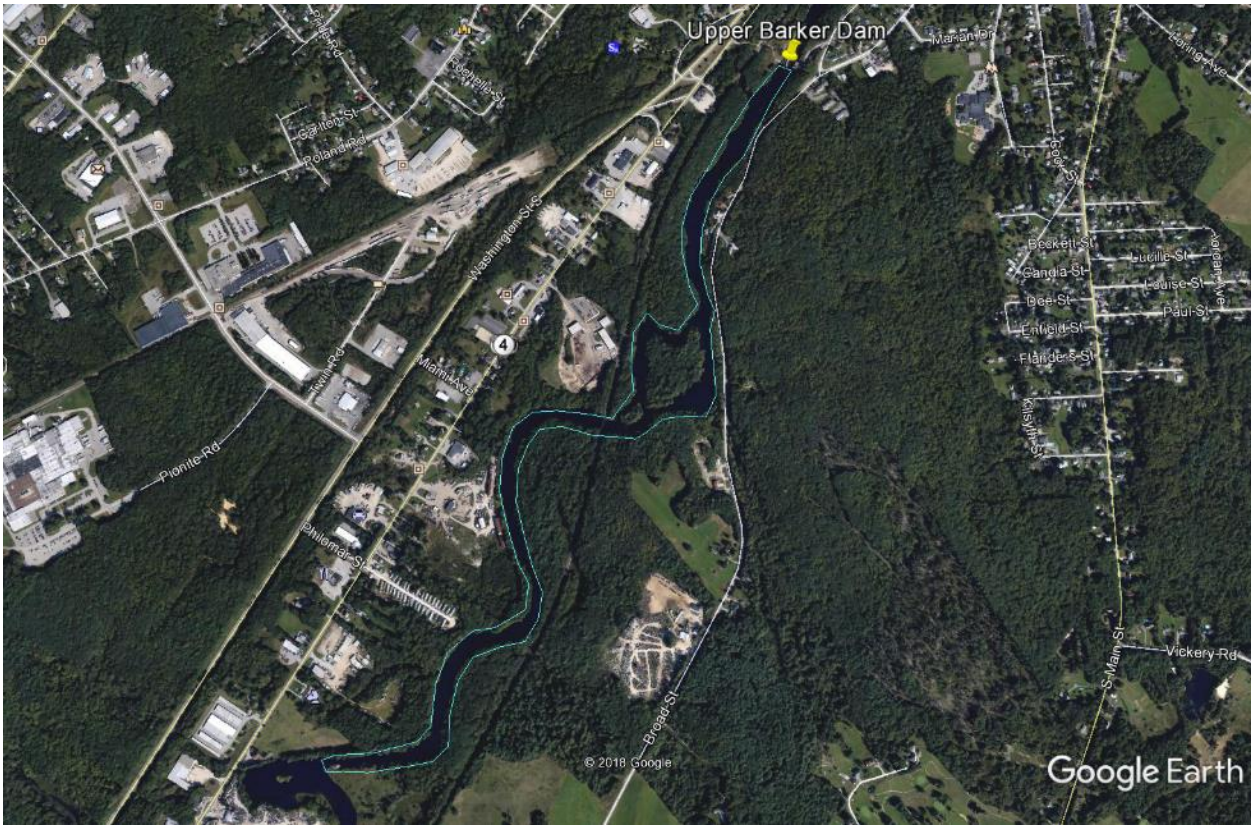
PHOTO 4-1 UPPER BARKER PROJECT

TABLE 4-1 PROJECT DESCRIPTION TABLE

RESERVOIR	
Water Body	Little Androscoggin River
Normal Maximum Surface Area (ac)	41
Reservoir Elevation	
Normal Maximum	192
Minimum	189
Reservoir Storage (acre-feet)	
Maximum	255
Useable	0
DAM	
Dam Type	Masonry Gravity
Year Dam was completed	1987
Dam length (ft)	230
Dam Height (ft)	24
Dam Crest Elevation (ft)	189
Elevation of Top of Flashboards (ft)	192
Uncontrolled Spillway Width (ft)	78
Uncontrolled Spillway Crest Elevation (ft)	189
Gated Spillway elevation (ft)	175.8
Gated Spillway (ft)	21' (L) by 15'-0 (w)
Non-gated spillway (ft)	92'-0"
Tainter gates (elevation) (ft)	193
Piers/Training Walls (ft)	9'-0" (3 at 3'-0)
GENERATION	
Authorized Generation Capacity	950 kW
FLOOD INFORMATION	
Hydrologic Data	
Hundred-year flood	14,400
Flood of Record (cfs)	16,500
Date of Flood of Record	3/27/1953
SAFETY INFORMATION	
Hazard Potential	Low
Part 12D Report Required	No
Emergency Action Plan Status	Not Applicable
Boat Restraining Barrier Required	Yes
Date in (typ.)	May 31
Date out (typ.)	October 15

PROJECT RESERVOIR

The project reservoir is approximately 41 acres (FERC 1983) with a maximum dam storage of 255 acre-feet (Photo 4-2). Normal pond elevation for the Project is 192 feet NAVD88. Because the Project is run-of-river, there is no useable storage behind the dam.



Source: Google Earth 2018

PHOTO 4-2 UPPER BARKER IMPOUNDMENT

PHOTO 4-3 HEADPOND VIEWED FROM THE LEFT TAINTER GATE DECK LOOKING UPSTREAM, BOAT BARRIER SYSTEM IN PLACE.

DAM

The project dam is a stone masonry uncontrolled spillway with a resurfaced concrete overlay about 24-foot-high by 230-foot-long at permanent crest elevation 189.0 feet, a spillway with 3-foot high wooden flashboards across the length of the spillway that is tripped automatically by hydrostatic pressure about two feet above the top of the flashboards; an integral concrete powerhouse intake structure housing one turbine-generator unit; and a Tainter gate section housing two motorized Tainter gates (Photo 4-6).

POWERHOUSE

There are two motorized 21-foot high by 15.0-foot wide steel Tainter gates to the left of the spillway abutment. Both Tainter gates can be operated locally from the powerhouse or at the gate deck area.

FISH PASSAGE

The downstream fish passage facility consists of: two submerged intake boxes at the right and left side of the powerhouse intake deck grating and two 18-inch pipes along the sides of the powerhouse walls (Photo 4-7 and Photo 4-8). A Commission Order Approving Minimum Flow Requirement dated June 7, 1990 amended Article 21 to reflect a continuous minimum flow of 82 cfs or inflow, whichever is less, must be discharged to protect fishery resources (FERC 2009). The dual purpose downstream fish passage and minimum flow pipe operates whether the unit is generating or not, depending on operating conditions to maintain the project headpond elevation. The intakes for the fish passage are located on both ends of the powerhouse.

PHOTO 4-4 POWERHOUSE PARKING AREA AND BELOW-GRADE CONCRETE POWERHOUSE

PHOTO 4-5 VIEW OF THE SPILLWAY WITH A FAILED FLASHBOARD DUE TO A SNAGGED FLOATING TREE BRANCH

PHOTO 4-6 VIEW OF THE SPILLWAY AND TAINTER GATE SECTION

PHOTO 4-7 VIEW OF FISH PIPES DISCHARGING IN THE POWERHOUSE TAILRACE (ARROW)

PHOTO 4-8 ONE OF TWO DOWNSTREAM FISH PASSAGE PIPES (ARROW) AT THE POWERHOUSE INTAKE.

PHOTO 4-9 VIEW OF DOWNSTREAM BYPASSED REACH FROM THE LEFT TAINTER GATE DECK

Volume 2 contains the Exhibit F drawings for the Upper Barker Project. The figures depict the dam, powerhouse, and the mechanical and electrical equipment contained within it. Volume 2 is considered to be CEII[2] and is not available to the public.

TRANSMISSION FACILITIES

The Project has 50-foot-long, 4. 16 kV generator leads; a 4. 16/12.47 kV 1.0 MVA three-phase step-up transformer; and a 50-foot-long 12.47-kV transmission line (FERC 1983). The single line diagram for the Project considered CEII and is provided in Volume 2.

[2] The public may file a CEII request under FERC Regulation 18 C.F.R. 388.113. The public also may file a Freedom of Information Act (FOIA) request under 18 C.F.R. 388.108.

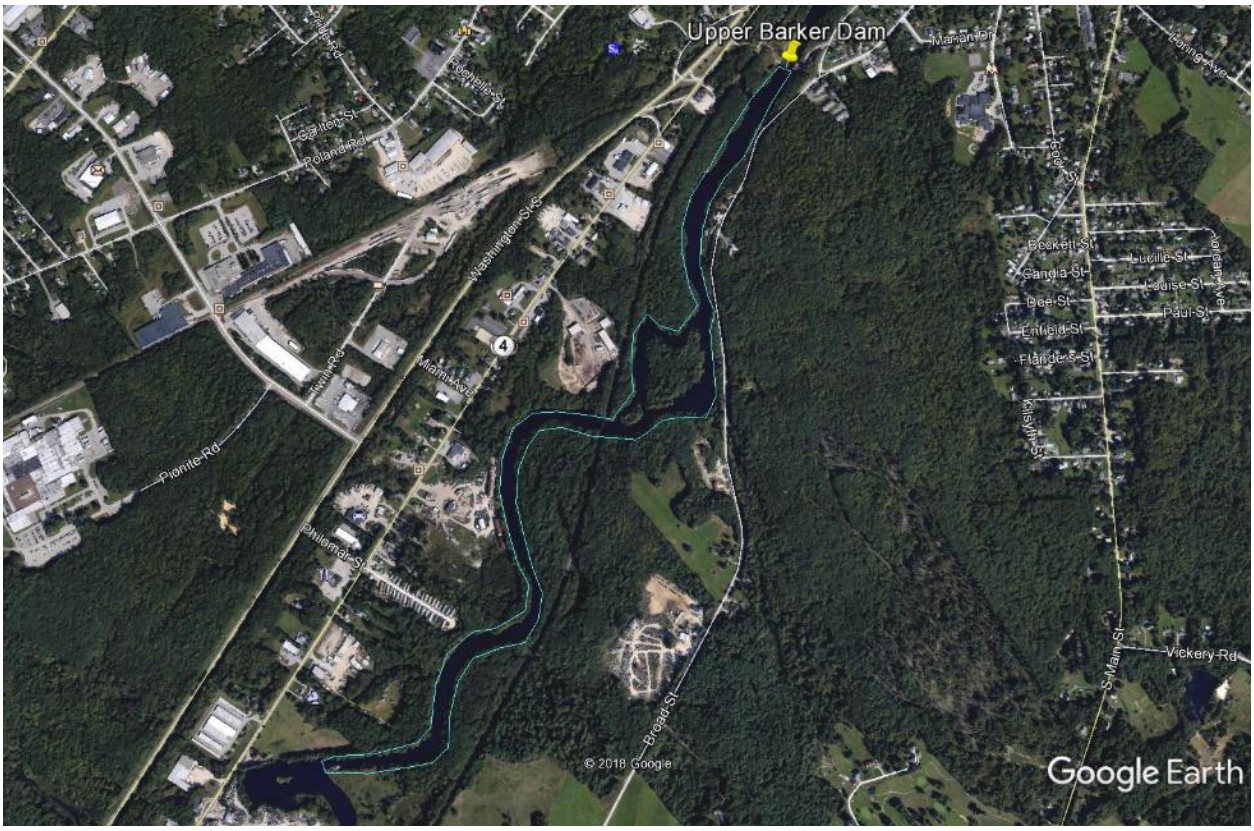
4.2 PROPOSED PROJECT FACILITIES

There are no changes to existing facilities proposed for the Upper Barker Project. However, in association with the Lower Barker Project relicensing, discussion of future upstream fish passage facilities is ongoing with agencies. It is anticipated that additional detail on any fish passage proposal will be included in the license application.

4.3 PROJECT BOUNDARY

The project boundary encompasses the impoundment up to approximately 1.7 miles upstream of the Upper Barker Project. The project boundary also encloses the dam and powerhouse and extends approximately 100 feet downstream of the dam.

There are no proposed changes to the project boundary for the Upper Barker Project.



Source: Google Earth 2018

PHOTO 4-10 UPPER BARKER PROJECT BOUNDARY

4.4 EXISTING PROJECT OPERATIONS

The Project is operated in run-of-river mode with a maximum hydraulic capacity of 960 cfs. Flows that pass through the project turbines are discharged directly into the Little Androscoggin River. Minimum bypass reach flows are required by the license as discussed in greater detail below.

There is no dam monitoring instrumentation installed at the Project. The Licensee has filed a self-assessment evaluation survey of its resources for implementation of an owner's dam safety surveillance and monitoring program (DSSMP). The project underwent a Supervisory Control and Data Acquisition (SCADA) upgrade in 2008 to allow for self-starting of the unit by wire in addition to automatic shutoff when adverse operating parameters are encountered. The SCADA also minimizes fluctuations of the reservoir and allows the Project to be remotely started or shutoff, though plant operators visit the site daily. In conjunction with the instrumentation that monitors project operation, a telephone paging system notifies project personnel of operational problems via cellular telephones; the paging system is equipped with a battery backup.

4.4.1 NORMAL OPERATIONS

The Project has a maximum hydraulic capacity of 960 cfs and a minimum hydraulic capacity of 125 cfs. In accordance to the revised Article 21 (issued June 23, 2014), KEI (USA) operates the project in run-of-river mode whereby outflow equals inflow to the project reservoir, whichever is less, for the protection of water quality, fishery, wildlife, and visual resources. This flow may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement among the licensee, the Maine Department of Inland Fisheries and Wildlife, and the Maine Department of Marine Resources.

A summary of pro-rated daily average flows at the Project by month from January 1985 to December 2013 is presented in Table 4-2. Inflows to the Project exceed the maximum capacity (plus minimum flow requirements) approximately 35 percent of the time, on average.

TABLE 4-2 PRO-RATED DAILY AVERAGE MINIMUM, MAXIMUM, AND MONTHLY MEAN INFLOWS FOR THE UPPER BARKER PROJECT (JANUARY 1985 TO DECEMBER 2015)[3]

MONTH	MEAN FLOW (CFS)	MEDIAN FLOW (CFS)	MINIMUM FLOW (CFS)	MAXIMUM FLOW (CFS)
January	489	306	88	15,269
February	379	282	88	3,978
March	998	574	97	15,512
April	2,034	1,364	209	32,871
May	916	676	73	16,144
June	634	343	36	15,803
July	327	141	15	6,467
August	281	92	4	7,051
September	196	83	3	8,801
October	528	248	15	9,482
November	786	535	63	10,406
December	762	467	92	12,254
Annual	**694**	**350**	**3**	**32,871**

4.4.2 LOW WATER OPERATIONS

The Project operates in a run-of-river mode wherein the impounded water elevation is limited to between 192 feet and 191 feet when the flashboards are in place and between elevations 189 feet and 188 feet when the flashboards are not in place, during normal operation.

HIGH WATER OPERATIONS

During high water operations, the flashboards are designed to fail after flows reach an elevation of 194.33 (NAVD88), or 2 feet and 4 inches above the flashboard height. In addition to the flashboards, the dam is equipped with two Tainter gates which are located on the left side of the dam and are used, if needed, to pass additional flow.

[3] The Auburn flow gage (USGS Gage 01058500) located near the Lower Barker Dam was discontinued in 1982. The coincident period of record for both the Auburn and South Paris (USGS Gage 01057000) gages 10-5-1972 to 10-5-1982 was selected and compared. The FDC of each set of raw data was developed, and then a proration factor of (DA Auburn Gage/DA South Paris Gage) was calculated to multiply the South Paris FDC to match the Auburn FDC; where n is some number less than 1 used to adjust the factor and was adjusted in order to match the prorated flow to Auburn as best as possible. The Auburn gage drainage area is smaller than the Lower Barker Dam's, so the prorated South Paris data was further prorated by (DA Lower Barker Dam/DA Auburn Gage)0.8. Annual and monthly FDCs were developed from this final prorated data.

4.5 PROPOSED PROJECT OPERATIONS

The Licensee is not proposing any changes to current operations.

4.6 OTHER PROJECT INFORMATION

4.6.1 CURRENT LICENSE REQUIREMENTS

FERC issued a license for the Upper Barker Project by order on August 22, 1983. The Project was an unconstructed minor project at the time the order was issued. The Project was completed in 1987.

The license was for a period effective August 1, 1983 to July 31, 2023. Articles 1-18 are "standard articles" contained in FERC's Form L-15 included as part of the Order Issuing License. Articles 19 to 30 were also included in the Order Issuing License (FERC 1983). In 2014 FERC amended the License with revisions to the project description and Article 21. The following is a summary of Articles 19-30 (see Appendix B):

- Article 19 outlines consultation for the potential need for recreational facilities at the project. Requiring within one years from the date of the issuance of the licensee to submit to the FERC the results of the consultation.
- Article 20 requires the Licensee to file with the FERC functional design drawings of the proposed downstream migrant fish passage facility, 60 days prior to commencement of project construction.
- Article 21 requires the Licensee to release an interim continuous minimum flow at the Project of 20 cfs or inflow to the project reservoir, whichever is less.
- Revised Article 21 requires the Licensee to operate the project in run-of-river mode whereby outflow equals inflow to the project reservoir for the protection of water quality, fishery, wildlife, and visual resources. This flow may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement among the licensee, the Maine Department of Inland Fisheries and Wildlife, and the Maine Department of Marine Resources. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.
- Article 22 requires the Licensee to file with the Commission's Regional Engineer and the Director, Office of Electric Power Regulation, contract drawings and specifications of pertinent features of the project, 60 days prior to the start of construction.
- Article 23 requires the Licensee to file for approval revised Exhibits A, F, and G as-built drawings, within 90 days of the completion of construction.
- Article 24 requires the Licensee to commence the construction of the project within two years of the date of issuance of the license.

- Article 25 requires the Licensee at least 30 days prior to start of construction of the cofferdam the Licensee shall file with the Commission's Regional Engineer and Director, Office of Electric Power Regulation, one copy of the approved cofferdam construction drawings and specifications and a copy of the letter(s) of approval.
- Article 26 consult with the State Historic Preservation Officer (SHPO) if any historical or archeological sites are discovered during construction.
- Article 27 requires the Licensee to oversee land and water use at the Project.
- Article 28 outlines annual charges for the Project.
- Article 29 prepare a study analyzing the impact of restoration of the Upper Barker Mill Dam on upstream flood risks.
- Article 30 The Licensee shall continue to consult and cooperate with the appropriate Federal, State and other natural resources agencies for the protection and development of the environmental resources and values of the project area.

4.6.2 COMPLIANCE HISTORY OF THE PROJECT

KEI (USA) has reviewed the compliance history for the Project and found no instances of recurring non-compliance.

FERC's Regional Office conducts an environmental inspection every four to five years. The most recent environmental inspection at the Upper Barker Project was conducted on September 15, 2009 (FERC 2009).

4.6.3 SAFETY PROCEDURES

The Upper Barker Project is remotely monitored and operated 24 hours a day, 7 days a week. In addition, plant staff visit the site daily. A telephone paging system notifies project personnel of operational problems via cellular telephones. Plant staff are generally within 30 minutes of the Project at all times. Upper Barker is classified as a low hazard dam. Due to the low hazard classification of this dam, no Potential Failure Mode Analysis has been conducted at this site and therefore no Potential Failure Modes have been identified. The Dam Safety Surveillance and Monitoring Program and Report (DSSMP) defines the appropriate monitoring for the water retaining project works. The DSSMP for the Project was filed with the FERC on March 23, 2018, which was acknowledged by FERC on May 2, 2018.

In addition, Section 10(c) of the Federal Power Act (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.

A public safety plan for the Project, which depicts the public safety devices installed at the Project and their location was submitted to FERC on July 31, 1995. Since the original plan a revised Public Safety Plan was submitted to FERC on November 10, 2017. FERC acknowledged filing of the plan on November 14, 2017. KEI (USA) maintains fences, handrails, a locked entrance gate, and warning signs to protect the public from the hazards of project operations (Photo 4-11 through Photo 4-13). The licensee seasonally installs and removes (before May 31 and after October 12, respectively) a boat restraining barrier to warn boaters of the dam ahead (Photo 4-14). The Public Safety Plan, filed November 14, 2017, depicts the public safety devices installed at the project and their location.

PHOTO 4-11 VIEW OF THE "DANGER DAM AHEAD" WARNING SIGN ON THE DECK OF THE INTAKE STRUCTURE ON THE RIGHT SIDE OF THE DAM

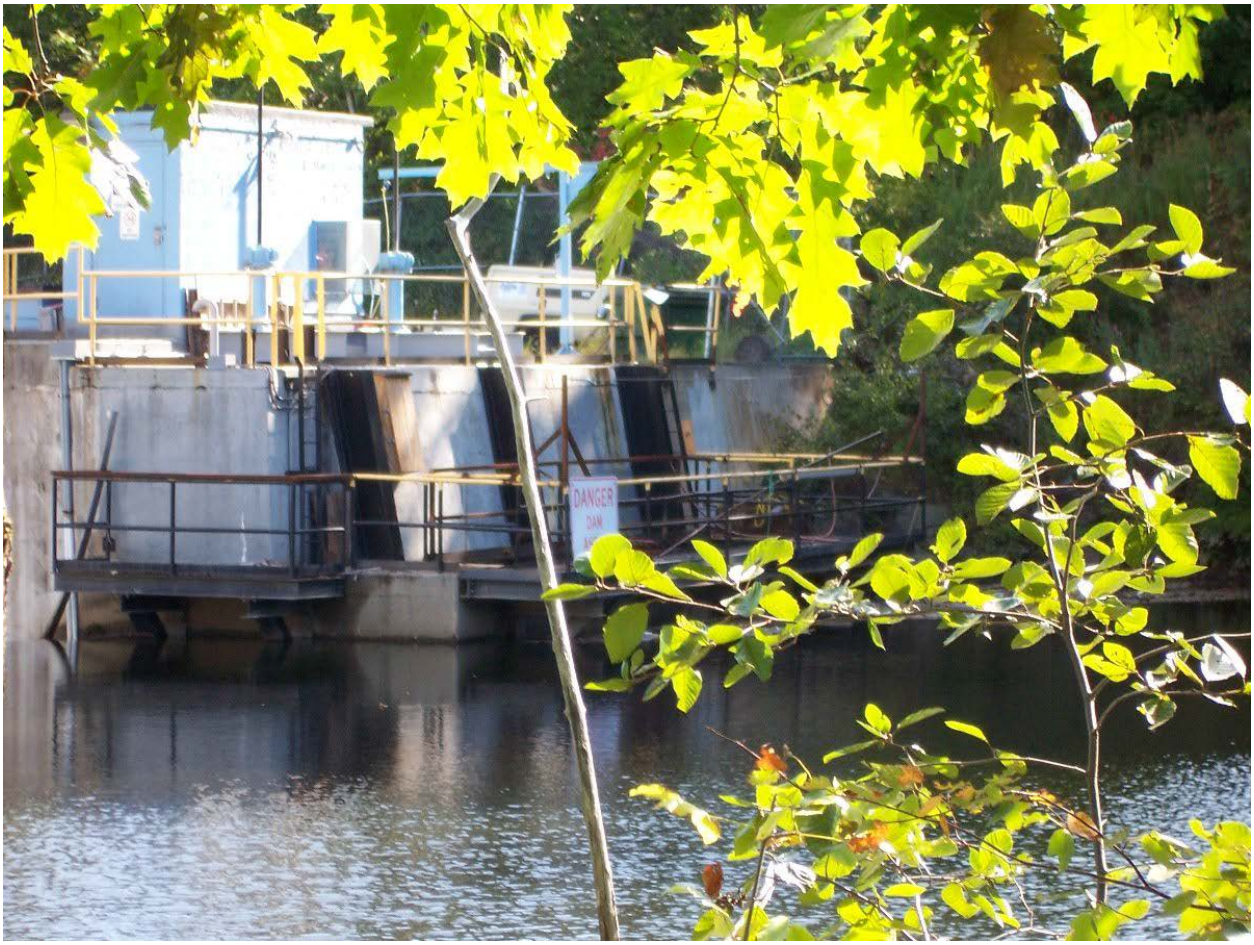


PHOTO 4-12 VIEW OF THE "DANGER DAM AHEAD" WARNING SIGN ON THE DECK OF THE FLOOD GATES ON THE LEFT SIDE OF THE DAM

PHOTO 4-13 VIEW OF SIGN WARNING OF SUDDEN RISE OF WATERS DUE TO PROJECT OPERATIONS ON THE DOWNSTREAM SIDE OF THE FLOOD GATE STRUCTURE

PHOTO 4-14 VIEW OF THE BOAT RESTRAINING BARRIER UPSTREAM OF THE DAM

4.6.4 SUMMARY OF PROJECT GENERATION

The Project generated an average annual energy output of 5,420,000 kWh between 2011 and 2017 (Table 4-3) at a plant factor of 65 percent, calculated as follows:

(5,420,000 kWH/year) / (950 kW x 8736 hours/year) = 65%

Dependable capacity refers to the power the Project is guaranteed to produce during future hours of peak demand under adverse flow conditions. The Project operates over a flow range of from 125 cfs, the minimum operating flow or design flow to 960cfs, the maximum operating flow. At the design flow, the project has a generating capacity of 950 KW.

Dependable capacity of the Project has been assumed to be the generating capacity the site would provide at the minimum average annual flow experienced during the period of record. During this period, flows for extended periods were below the minimum operating flow. As such, the project does not have a dependable capacity based on the definition noted above.

TABLE 4-3 HISTORICAL MONTHLY GENERATION TOTALS AT THE UPPER BARKER PROJECT (MWH)

MONTH	2011	2012	2013	2014	2015	2016	2017	MEAN
January	491	644	576	742	0	568	470	499
February	275	391	475	382	31	627	426	372
March	844	837	787	438	428	813	738	698
April	965	515	958	844	800	660	827	796
May	829	898	602	875	310	436	701	664
June	438	820	641	601	457	141	454	507
July	152	262	851	398	222	27	290	315
August	25	142	565	585	2	0	5	189
September	321	156	707	39	3	0	108	191
October	712	341	157	177	372	107	162	290
November	666	518	296	174	393	286	399	390
December	921	593	605	0	635	437	383	511
TOTAL ANNUAL	6639	6117	7220	5255	3653	4102	4963	5421

4.6.5 DELIVERY OF WATER FOR NON-POWER USES

There are no permitted withdrawals of water directly from the project impoundment for purposes other than hydropower generation.

4.6.6 CURRENT NET INVESTMENT

The current (2018) net investment for the Project is approximately$682,990.

4.6.7 AVERAGE ANNUAL ENERGY AND DEPENDABLE CAPACITY

4.7 REFERENCES

Google Earth. 2018. Upper Barker Project. Latitude 44 4’43.27”, Longitude 70 14’5.51”.

Federal Energy Regulatory Commission (FERC). 1983. Order Issuing License for Barker's Mill Upper Hydroelectric Project (FERC No. 3562). 24 FERC ¶62,209. Issued August 22. 1983.

Federal Energy Regulatory Commission (FERC). 2009. Dam Safety Inspection Report – Barker Mill Upper Station (FERC No. 3562). Inspected July 30, 3009.

Federal Energy Regulatory Commission (FERC). 2011. Environmental Inspection Report for Barker's Mill Hydroelectric Project (FERC No. 2808). Accession No.: 20110408-5042. Filed April 7, 2011.

5.0 DESCRIPTION OF EXISTING ENVIRONMENT

5.1 GEOLOGY AND SOILS

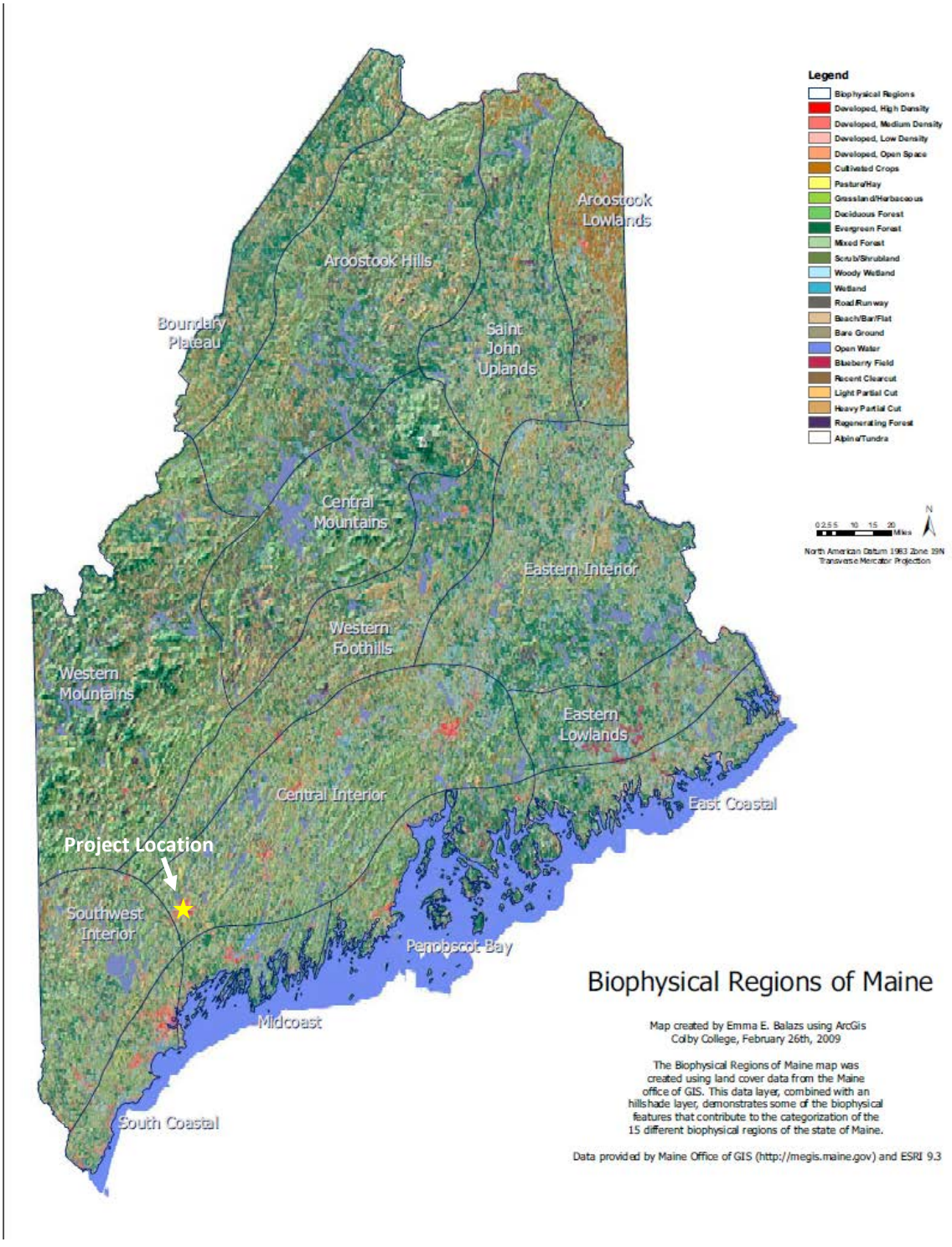
18 CFR 5.6(d)(3)(ii) requires "Descriptions and maps showing the existing geology, topography, and soils of the proposed project and surrounding area. Components of the description must include: (A) A description of geological features, including bedrock lithology, stratigraphy, structural features, glacial features, unconsolidated deposits, and mineral resources at the project site; (B) A description of the soils, including the types, occurrence, physical and chemical characteristics, erodability and potential for mass soil movement; (C) A description of reservoir shorelines and streambanks, including: (1) Steepness, composition (bedrock and unconsolidated deposits), and vegetative cover; and (2) Existing erosion, mass soil movement, slumping, or other forms of instability, including identification of project facilities or operations that are known to or may cause these conditions."

5.1.1 EXISTING GEOLOGICAL FEATURES

Historically, Maine has been divided into two or three ecoregions, however more recently, the state has been delineated into 15 biophysical regions, which are based on climate variables, topography and soil characteristics (MDIFW, 2015) (Figure 5-1). The Project is located in the Central Interior biophysical region of Maine. This area is identified by its flat to gently low rolling hills and heavily forested land. While most of the region is underlain by sedimentary and metamorphic bedrock, a sizeable granitic pluton does exist southwest of Androscoggin Lake. The northwest border of the region roughly follows the inland extent of the glacial submergence that occurred in the state, and therefore the lowlands of the lower Androscoggin valley is filled with glaciomarine clays and silts (MDIFW, 2015).

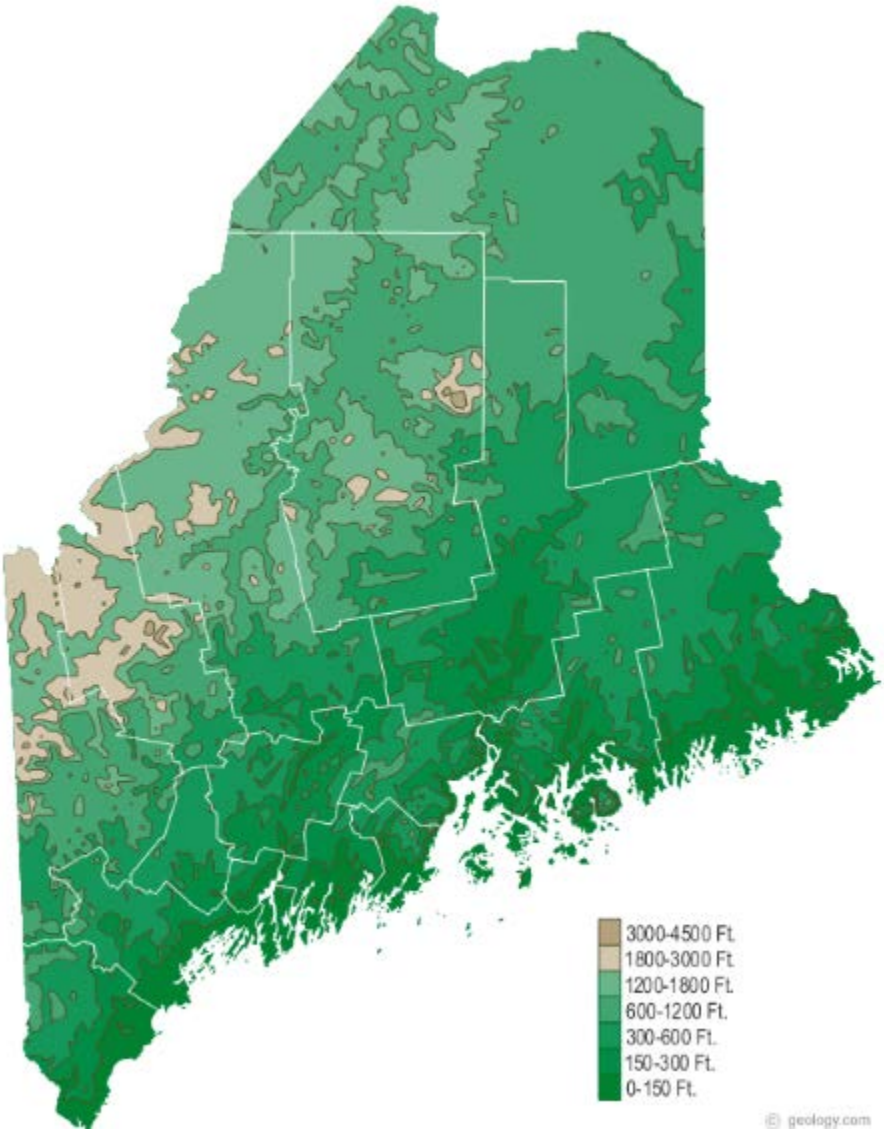
The general topography of the state is presented in Figure 5-1. The highest mountains in Maine are Mount Katahdin, at an elevation of 5,267 feet, followed by Sugarloaf Mountain, at 4,237 feet (MDACF, 2018). The topography of the project vicinity, Androscoggin County, is heavily forested with low, rolling hills. Androscoggin County contains 860 lakes and ponds as well as approximately 750 miles of rivers and streams (USGS, 2007). The tallest peak in Androscoggin County is Shackley Hill in town of Livermore. Shackley Hill is 11,222 feet high and is located approximately 22 miles north of the Project (Peakbagger, 2018).

FIGURE 5-1 GEOGRAPHICAL PROVINCES OF MAINE



Source: Balazs, 2009 modified

FIGURE 5-2 GENERAL TOPOGRAPHY OF MAINE

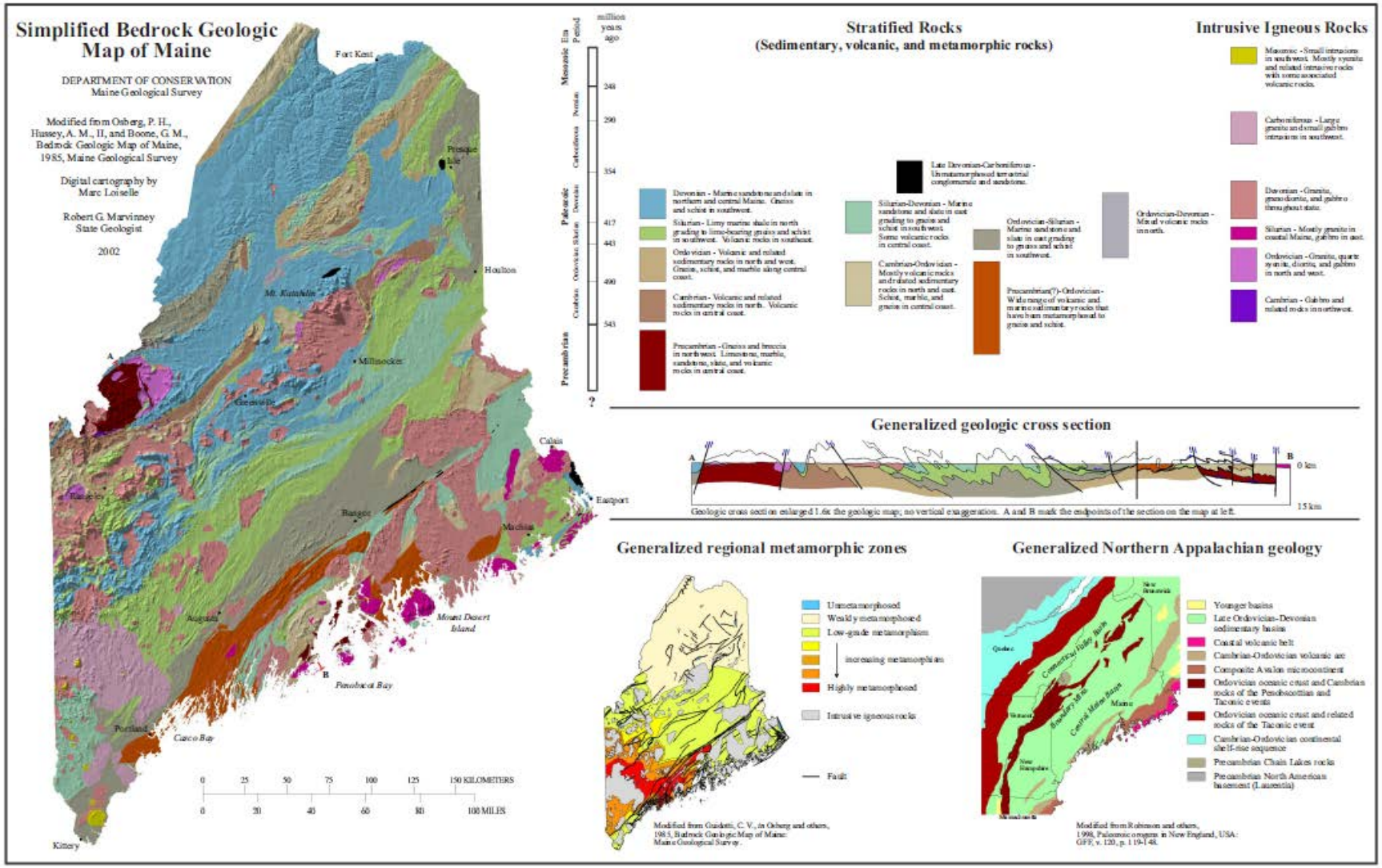


Source: Geology.com 2018

5.1.2 BEDROCK GEOLOGY

Bedrock near the Project is composed primarily of stratified sedimentary, volcanic and metamorphic rocks as well as intrusive igneous rocks. Specifically, the bedrock in the vicinity of the Project includes gneiss, schist, granite, granodiorite and gabbro (MDACF, 2018) (Figure 5-3 and Figure 5-4).

FIGURE 5-3 BEDROCK GEOLOGY OF MAINE



Source: MDACF 2018

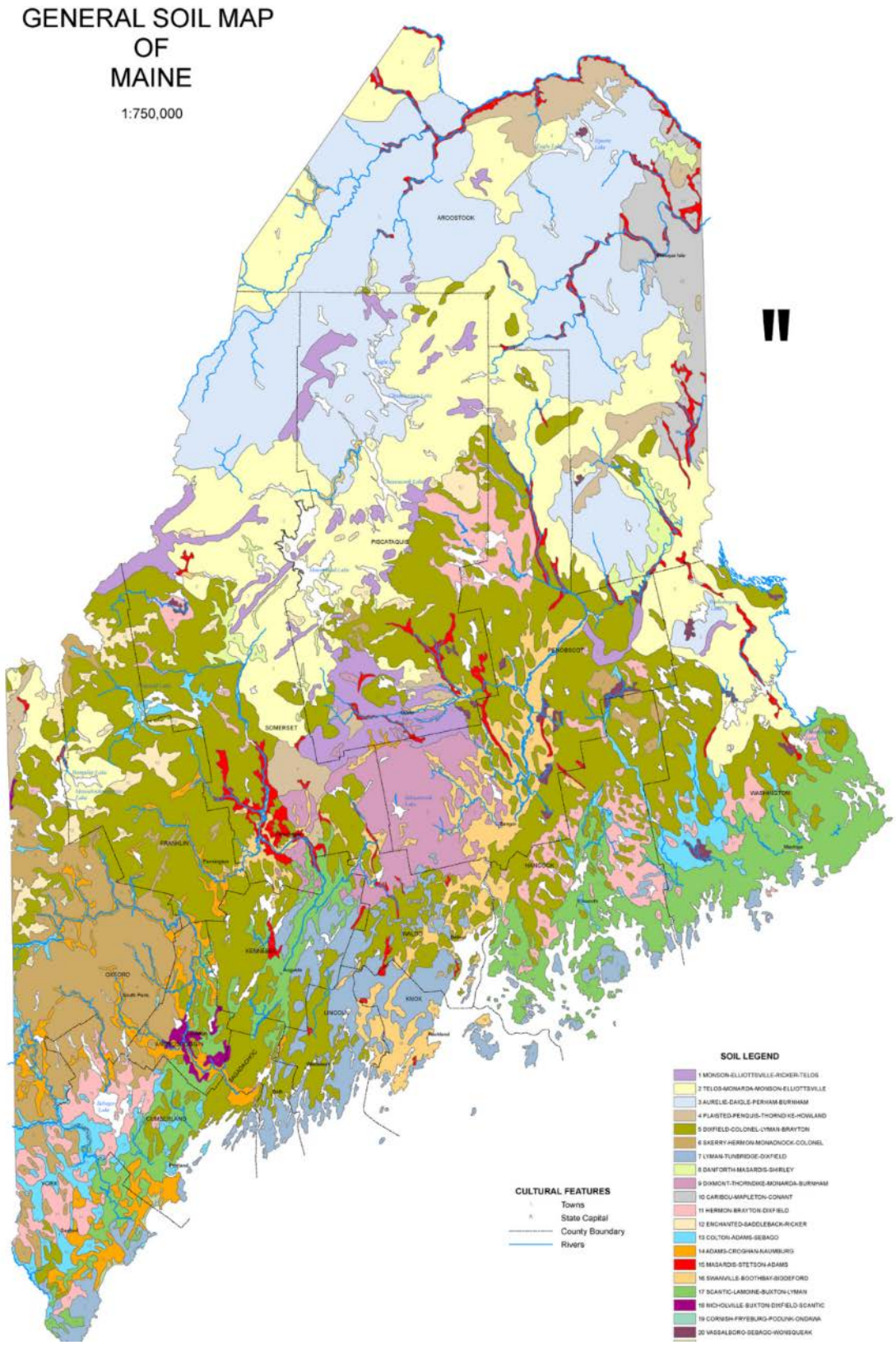
5.1.3 SOILS

Maine soils were formed when the last glacier in Maine melted approximately 12,500 years ago and moved across the state in a northwest to southeasterly direction. Rock fragments and soil material were deposited as till, or as water-sorted sediments in streams, rivers, lake and the ocean (Figure 5-4). Land, depressed by the glacier, rebounded slowly, creating a complex pattern of soils derived from till, sediments, sands, and gravel (Ferwerda et. al, 1997).

Androscoggin County is composed of mainly loamy and sandy soils, formed mostly from granite, gneiss, metasandstone, schist. Additionally, some areas of Androscoggin County contain soils more clayey and loamy in nature. These soils are labeled as Skerry-Hermon-Monadnock-Colonel; Adams-Croghan-Naumburg; and Scantic-Lamoine-Buxton-Lyman (Ferwerda et. al, 1997).

Specifically, within the project area and immediate vicinity, there is a wide array of soil types, as depicted in Figure 5-4 and Table 5-1.

FIGURE 5-4 SOILS MAP OF THE STATE OF MAINE



Source: Ferwerda et al. 1997

FIGURE 5-5 SOILS SURROUNDING THE PROJECT

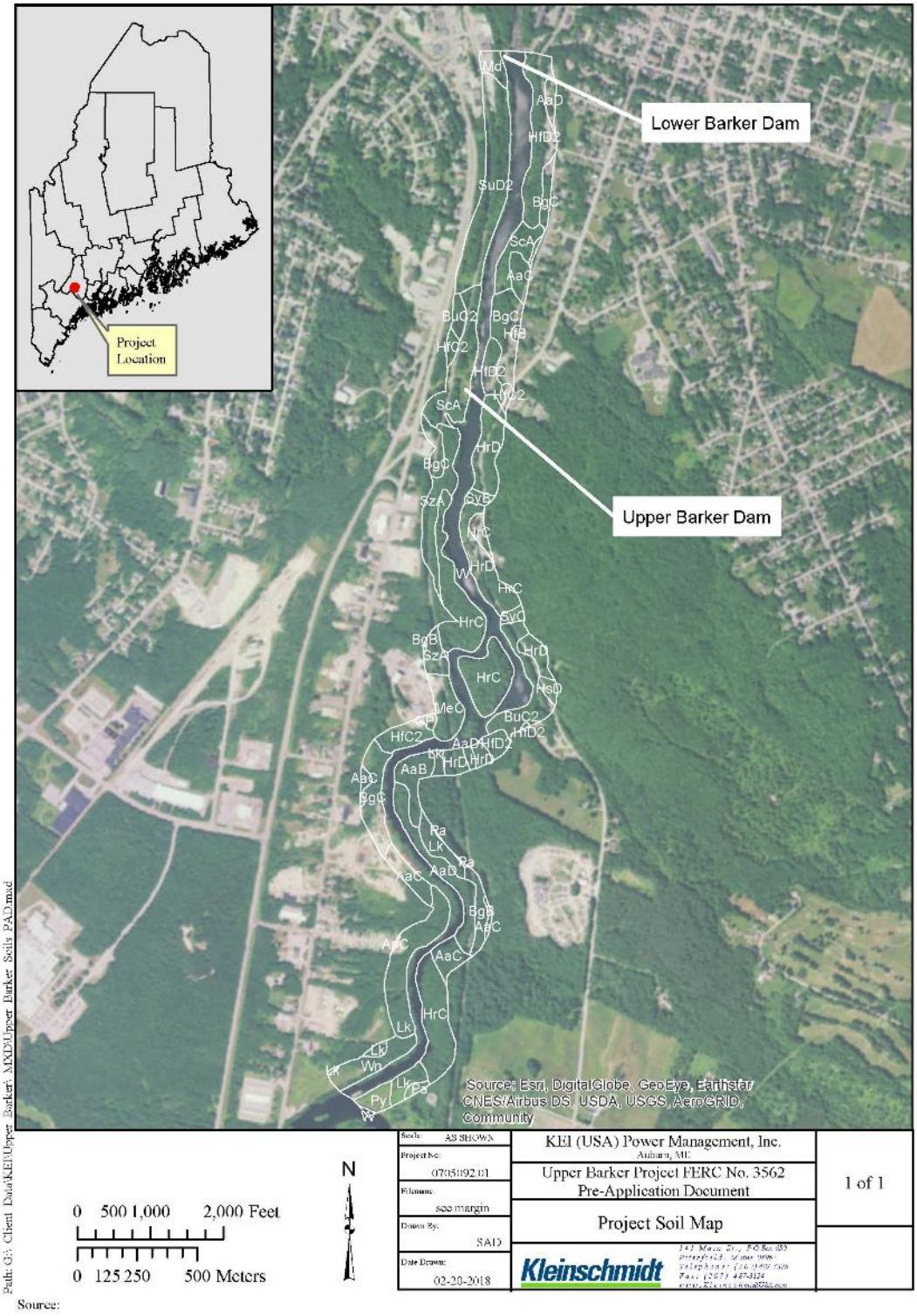


TABLE 5-1 LIST OF SOILS BY TYPE, SIZE (ACRES), AND PERCENT IN THE VICINITY OF THE PROJECT

		PROJECT BOUNDARY		PROJECT VICINITY	
MAP UNIT SYMBOL	MAP UNIT NAME	ACRES	%	ACRES	%
AaB	Adams loamy sand, 0 to 8 percent slopes	0.1	0.21	3.2	1.7
AaC	Adams loamy sand, 8 to 15 percent slopes	0.3	0.63	6.7	3.6
AaD	Adams loamy sand, 15 to 30 percent slopes	0.7	1.47	6.9	3.8
BgB	Belgrade very fine sandy loam, 2 to 8 percent slopes	0	0.00	2	1.1
BgC	Belgrade very fine sandy loam, 8 to 15 percent slopes	0.6	1.26	12.1	6.6
BuC2	Buxton silt loam, 8 to 15 percent slopes	0	0.00	6.3	3.4
GP	Sand and gravel pits	0	0.00	0.5	0.3
HfB	Hartland very fine sandy loam, 2 to 8 percent slopes	0	0.00	0.2	0.1
HfC2	Hartland very fine sandy loam, 8 to 15 percent slopes, eroded	0	0.00	3.6	2.0
HfD2	Hartland very fine sandy loam, 15 to 25 percent slopes, eroded	1.4	2.94	10.8	5.9
HrC	Lyman-Tunbridge complex, 8 to 15 percent slopes, rocky	6.9	14.47	21.2	11.5
HrD	Lyman-Tunbridge complex, 15 to 35 percent slopes, rocky	0.2	0.42	13.7	7.5
HsD	Lyman-Abram complex, 15 to 35 percent slopes, very rocky	0	0.00	0.7	0.4
Lk	Charles silt loam, 0 to 2 percent slopes, occasionally flooded	0.1	0.21	12.5	6.8
Md	Made land, loamy materials	0	0.00	1.4	0.8
MeC	Melrose fine sandy loam, 8 to 20 percent slopes	0.1	0.21	3.5	1.9
Pa	Peat and Muck	0	0.00	0.6	0.3
Py	Podunk fine sandy loam, 0 to 3 percent slopes, occasionally flooded	0	0.00	1.5	0.8
ScA	Scantic silt loam, 0 to 3 percent slopes	1.8	3.77	10.1	5.5
SuD2	Suffield silt loam, 15 to 30 percent slopes, eroded	0.3	0.63	11.7	6.4
SyB	Sutton very stony loam, 0 to 8 percent slopes	0	0.00	0.7	0.4
SyC	Sutton very stony loam, 8 to 15 percent slopes	0	0.00	0.7	0.4
SzA	Swanton fine sandy loam, 0 to 3 percent slopes	0.1	0.21	7	3.8
W	Water	35.1	73.58	42.3	23.0
Wn	Winooski silt loam	0	0.00	3.8	2.1
	Total	47.7	100	183.7	100.0

Generally, the soils surrounding the dam are fine sandy loams, with some silty loams (USDA, 2013). The most common type of soil near the Project is characterized by the USDA as Made Land, which is a very gravelly sandy loam, moderately well drained, with a slope of 0 to 35 percent. The Project is also surrounded by Hartland, Scantic, Belgrade, Suffield, and Adams soils. Hartland soils are characterized as well-drained, very fine sandy loams, with slopes ranging from 0 to 25 percent. Parent material for Hartland type soils is course-silty glaciolacustrine deposits. Scantic soils are characterized as silt loam, with slopes ranging from 0 to 3 percent. Parent material for Scantic soils is fine glaciolacustrine deposits and/or fine-silty marine deposits. Belgrade soils are characterized as very fine sandy loam, with slopes ranging from 8 to 15 percent. Parent material for Belgrade soils is coarse-silty glaciolacustrine deposits. Suffield soils are characterized as silt loam, with slopes ranging from 15 to 30 percent. Parent material for Suffield soils is fine glaciolacustrine deposits. Adams soils are characterized as somewhat excessively drained, loamy sands, with slopes ranging from 0 to 30 percent. Parent material for Adams soils is sandy glaciofluvial deposits derived from crystalline rock. (USDA, 2013).

5.1.4 RESERVOIR SHORELINE AND STREAMBANK CONDITIONS

As discussed above, soils immediately surrounding the Project are primarily composed of moderately well drained, very gravelly sandy loam (USDA, 2013). Slopes range from 0 to 35 percent. Just upstream of the dam, soils along the shoreline are composed of Hartland very fine sandy loam, with 15 to 25 percent slopes. These soils are well drained and are typically found in lakebeds. Suffield silt loam soils are also found upstream of the dam, and are characterized as moderately well drained with slopes of 15 to 30 percent (USDA, 2013). Downstream of the dam, soils are predominantly "Made Land".

Shorelines immediately surrounding the project impoundment are heavily forested, with some localized commercial and residential areas. Slopes are generally gentle along the impoundment. Downstream of the dam, the streambank and riverbed is primarily composed of rock and sand. Shorelines are very steep in the immediate vicinity of the dam and continue to be steep along the bypass reach to the confluence of the Little Androscoggin River with the Androscoggin River.

5.1.5 EROSION

According to the 2010 State Hazard Mitigation Plan, all areas in Maine are susceptible to erosion, due to farming and crop cultivation throughout the state. Erosion can also occur in the area because of hurricanes, flooding, and wildfires, among other reasons (MDDVEM, 2010).

The Natural Resources Conservation Survey has assessed the susceptibility of the soils surrounding the Project to erosion caused by water including rainfall and stormwater run-off. Factor K estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity with values ranging from 0.02 to 0.69; the larger value indicating greater susceptibility to sheet and rill erosion by water. The Factor K values for the soils surrounding the Project range from 0.17 (Adams soils) to 0.49 (Belgrade and Hartland soils), indicating a moderate susceptibility to erosion from water. However, the majority of these soils are along the impoundment, which has relatively stable elevations from run-of-river operations. Downstream of the dam, the majority of soils are "Made Lands" and the bypass reach is armored with bedrock (USDA, 2013). The shoreline surrounding the Project is also heavily forested, which aids in stabilizing the banks.

5.1.6 REFERENCES

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5.2 WATER RESOURCES

18 CFR 5.6(d)(3)(iii) requires "A description of the water resources of the proposed project and surrounding area. This must address the quantity and quality (chemical/physical parameters) of all waters affected by the project, including but not limited to the project reservoir(s) and tributaries thereto, bypassed reach, and tailrace. Components of the description must include:(A) Drainage area; (B) The monthly minimum, mean, and maximum recorded flows in cubic feet per second of the stream or other body of water at the powerplant intake or point of diversion, specifying any adjustments made for evaporation, leakage, minimum flow releases, or other reductions in available flow; (C) A monthly flow duration curve indicating the period of record and the location of gauging station(s), including identification number(s), used in deriving the curve; and a specification of the critical streamflow used to determine the project's dependable capacity;(D) Existing and proposed uses of project waters for irrigation, domestic water supply, industrial and other purposes, including any upstream or downstream requirements or constraints to accommodate those purposes; (E) Existing instream flow uses of streams in the project area that would be affected by project construction and operation; information on existing water rights and water rights applications potentially affecting or affected by the project; (F) Any federally-approved water quality standards applicable to project waters; (G) Seasonal variation of existing water quality data for any stream, lake, or reservoir that would be affected by the proposed project, including information on: (1) Water temperature and dissolved oxygen, including seasonal vertical profiles in the reservoir; (2) Other physical and chemical parameters to include, as appropriate for the project; total dissolved gas, pH, total hardness, specific conductance, chlorophyll a, suspended sediment concentrations, total nitrogen (mg/L as N), total phosphorus (mg/L as P), and fecal coliform (E. Coli) concentrations; (H) The following data with respect to any existing or proposed lake or reservoir associated with the proposed project; surface area, volume, maximum depth, mean depth, flushing rate, shoreline length, substrate composition; and (I) Gradient for downstream reaches directly affected by the proposed project."

5.2.1 DRAINAGE AREA

The Little Androscoggin River joins the Androscoggin River in Auburn, Maine, approximately 30 river miles upstream of where the Androscoggin River converges with the Kennebec River to form Merrymeeting Bay (Figure 1-1). The Upper Barker Project is approximately 1.3 river miles upstream of the confluence of the Little Androscoggin River with the Androscoggin River and 0.6 river miles upstream of the Lower Barker Project, which is owned and operated by KEI (USA). The drainage area of the 52-mile-long Little Androscoggin River is approximately 360 square miles; the drainage area at the Upper Barker Project is approximately 353 square miles (USGS StreamStats 2018). Lakes and ponds in the Little Androscoggin River drainage area include Upper Range Pond, Middle Range Pond, Lower Range Pond, Taylor Pond, Whitney Pond, Marshall Pond, Hogan Pond, Tripp Pond, Worthley Pond, Thompson Lake, Pennesseewassee Lake, and Little Pennesseewassee Lake (MDMR 2017).

5.2.2 STREAMFLOW, GAGE DATA, AND FLOW STATISTICS

River flow data for the Upper Barker Project was generated from USGS gage No. 01057000 (Little Androscoggin River near South Paris, Maine) for the period January 1985 to December 2015; the USGS gage is approximately 40 river miles upstream of the Upper Barker Project. River flow data provided in the Lower Barker Project final license application (FERC No. 2808; filed with FERC on January 30, 2017) was assumed to be representative of flow data at the Upper Barker Project because of the proximity of the two hydroelectric projects (i.e., 0.6 river miles). Data from the South Paris gage were pro-rated by a factor of 4.9 to account for the additional drainage area at the Upper Barker Hydroelectric Project.

The mean, median, minimum, and maximum annual river flows of the Little Androscoggin River at the Upper Barker Project are estimated to be 694 cfs, 350 cfs, 3 cfs, and 32,871 cfs, respectively (Table 5-2). The maximum monthly average flow typically occurs in April, and the minimum monthly average flow is typically in September. Annual and monthly flow duration curves for the Upper Barker Project are presented in Appendix C.

TABLE 5-2 MEAN, MEDIAN, MINIMUM, AND MAXIMUM RIVER FLOWS BY MONTH FOR THE UPPER BARKER PROJECT (JANUARY 1985 TO DECEMBER 2015).

MONTH	MEAN FLOW (CFS)	MEDIAN FLOW (CFS)	MINIMUM FLOW (CFS)	MAXIMUM FLOW (CFS)
January	489	306	88	15,269
February	379	282	88	3,978
March	998	574	97	15,512
April	2,034	1,364	209	32,871
May	916	676	73	16,144
June	634	343	36	15,803
July	327	141	15	6,467
August	281	92	4	7,051
September	196	83	3	8,801
October	528	248	15	9,482
November	786	535	63	10,406
December	762	467	92	12,254
Annual	**694**	**350**	**3**	**32,871**

5.2.3 EXISTING AND PROPOSED USES OF WATER

The Little Androscoggin River is used for hydroelectric power generation, wastewater assimilation, and recreation. There are eight dams on the Little Androscoggin River (Table 3-1). Six dams are upstream of the Upper Barker Project; three of those dams (Hackett Mills, Mechanic Falls, and Biscoe Falls) are used for hydroelectric power generation (USACE 2018).

Currently, there is minor development and small business activity along the Little Androscoggin River; however, the Upper Barker Project area is generally devoid of shoreline development. There are no current or proposed water withdrawals or consumptive uses of water at the Upper Barker Project.

5.2.4 EXISTING INSTREAM FLOW USES

In 2014, the Upper Barker Project license was amended to state (FERC 2014):

> *"...the applicant shall operate the Upper Barker (Barker's Mill) Hydroelectric facility in run-of- river mode wherein the impounded water elevation is limited to between 192 feet and 191 feet when the flashboard are in place and between elevations 189 feet and 188 feet when the flashboards are not in place, during normal operation."*

Run-of-river operations minimize water level fluctuations in the impoundment; protect water quality, fishery, wildlife, and visual resources; and provide stable river flows downstream. There is no minimum flow requirement for the Upper Barker Project because it is operated in run-of-river mode (FERC 2014). KEI (USA) provides a flow of 20 cfs, or inflow, whichever is less, through a downstream fishway from June 1 to November 30.

5.2.5 EXISTING WATER RIGHTS

KEI (USA) holds all the flowage easements necessary to operate the Project. There is no development within the project boundary and no private property is affected by operations. Taylor Brook is the only impoundment tributary but is unlikely to be affected by run-or-river operations.

5.2.6 RESERVOIR BATHYMETRY

The Upper Barker Project has a 41-acre reservoir and extends upstream approximately 1.7 river miles. According to FEMA flood maps, the depth of the impoundment near the dam varies from 20 to 25 feet (FEMA 2012).

5.2.7 GRADIENT OF DOWNSTREAM REACHES

The elevation of the Little Androscoggin River at the base of the Upper Barker dam is approximately 164 feet, and the stream bed elevation immediately upstream of the Lower Barker dam is estimated to be 155 feet based on FEMA (2012). The Lower Barker Project impoundment extends almost all the way to the Upper Barker Project. Therefore, the Little Androscoggin River is relatively flat between the two dams; the elevation drops approximately 9 feet over the 0.6 miles between the two dams.

5.2.8 FEDERALLY-APPROVED WATER QUALITY STANDARDS

Maine statute 38 MRSA §464-470 establishes the state of Maine's classification system for surface waters. The lower section of the Little Androscoggin River from South Paris, Maine, to the confluence with the Androscoggin River is a Class C waterway (Maine Legislature 1989). The quality of Class C waters must support the designated uses of drinking water supply after treatment, fishing, agriculture, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation, and habitat for fish and other aquatic life. Discharges in Class C waterways are permitted to cause some changes to aquatic life, provided that the receiving waters remain of sufficient quality to support all species of fish indigenous to the receiving waters and to maintain the structure and function of the resident biological community (Maine Legislature 1989). The state of Maine has established Class C water quality standards for dissolved oxygen (DO), iron, chloride, and aluminum, and has developed draft criteria for total phosphorus, chlorophyll-a, pH, and water transparency (i.e., Secchi disk depth) (Table 5-3).

TABLE 5-3 ESTABLISHED AND PROPOSED MAINE WATER QUALITY STANDARDS FOR SELECT PARAMETERS[A]

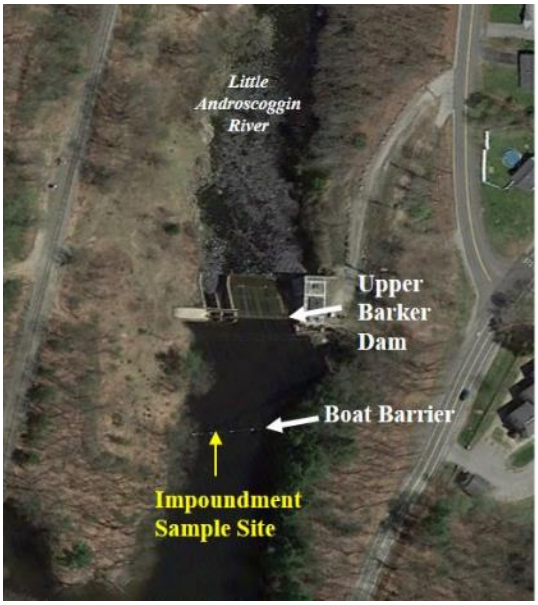
PARAMETER	CRITERIA	WATER CLASSIFICATION
Dissolved Oxygen	>5 mg/l or 60% saturation; 30-day average of 6.5 mg/l in salmonid spawning areas	Class C
Iron[b]	1000 µg/l or 1 mg/l	Statewide
Chloride[b]	230,000 µg/l or 230 mg/l	Statewide
Aluminum[b]	87 µg/l or 0.087 mg/l	Statewide
Total Phosphorus[c]	≤ 33 µg/l (0.033 mg/l)	Class C
Water Column Chlorophyll-a[c]	≤ 8 µg/l (0.008 mg/l)	Class C
Secchi Disk Depth[c]	≥ 2.0 m	Class C
pH[c]	6.0 – 8.5	Class C

[a]Maine Legislature 1989
[b]MDEP 2012a values refer to the criterion continuous concentration which is an estimate of the highest concentration of the substance in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect.
[c]MDEP 2012b

5.2.9 BASELINE WATER QUALITY MONITORING

In preparation for the Upper Barker relicensing, KEI (USA) performed lake trophic sampling in the Upper Barker impoundment concurrently with a baseline water quality study at the Lower Barker Project in 2015; sampling was conducted in accordance with MDEP protocols (MDEP 2014a). Prior to sampling, KEI (USA) used a sounding weight to find the deepest, safely accessible spot in the impoundment to establish a sampling station. For safety reasons, the sampling location was established upstream of the boat barrier. The monitoring site was approximately 150 feet upstream of the dam in approximately 22.0 feet (6 meters) of water (Figure 5-6); MDEP was notified of the proposed sampling site via e-mail on June 8, 2015. Maximum impoundment depth is reported as 25 feet (FEMA 2012); therefore, the depth at the sampling location adequately reflects deeper waters in the impoundment that have the potential to become anoxic (i.e., areas of depleted DO).

FIGURE 5-6 (LEFT) LAKE TROPHIC SAMPLE SITE IN THE UPPER BARKER IMPOUNDMENT AND (RIGHT) VIEW TOWARDS THE UPPER BARKER DAM FROM THE LAKE TROPHIC SAMPLE SITE DIRECTLY UPSTREAM OF THE BOAT BARRIER.



Sampling occurred twice a month from June through October 2015, using an epilimnetic core[4] to collect measurements of total alkalinity, color, pH, chlorophyll-a, and total phosphorus. All samples were collected in the afternoon between 13:10 and 17:15. The water samples were stored on ice and delivered within 24 hours to the state of Maine's Health and Environmental Testing Laboratory (HETL) in Augusta. On August 13, 2015, and in accordance with MDEP protocols, KEI (USA) collected and submitted additional late summer water samples to HETL for analysis of nitrate, dissolved organic carbon (DOC), iron, dissolved aluminum, calcium, magnesium, sodium, potassium, silica, conductivity, chloride, and sulfate. Furthermore, during each sampling event, KEI (USA) collected Secchi disk transparency measurements and water temperature and DO profiles at 1-meter intervals with a YSI-550A.

The main findings of the water quality monitoring in the Upper Barker impoundment demonstrate that (Table 5-4 to Table 5-8):

[4] Small-diameter hosing used to take a sample of the entire water column.

- Total phosphorus ranged from 0.013 to 0.033 mg/L with an average 0.021 mg/L (Table 5-3). These levels are equal to or below the proposed criteria upper limit of 0.033 mg/L for Class C waters.
- Color ranged from 23 to 45 PCU with an average of 33.3 PCU. These values are typical of lakes in Maine (long-term average = 28; VLMP 2018)
- Chlorophyll-a ranged from 0.0022 to 0.0042 mg/L with an average of 0.0031 mg/L which is less than the proposed state standard upper limit of 0.008 mg/L.
- Total alkalinity ranged from 11 to 23 mg/L with an average of 17.7 mg/L indicating that the water had adequate buffering capacity. These values are typical of lakes in Maine (long-term average = 11.9; VLMP 2018) and are similar to previous readings made in the Little Androscoggin River (Section 5.2.10).
- pH ranged from 6.3 to 7.0 with an average of 6.7. All pH values were within the recommended range of 6.0 to 8.5 for Class C waters.
- The Secchi disk transparency ranged from 1.3 to 3.4 meters with an average of 2.4 meters.
- The concentrations of iron (0.7 mg/L), chloride (24 mg/L), and aluminum (<0.2 mg/L) were less than the established and proposed standards (Table 5-3).
- The average temperature throughout the water column at the beginning (June) and end (October) of the monitoring period were 17.4°C and 9.4°C (63.3°F and 48.9°F), respectively (Table 5-6). The highest water temperatures were observed in late July through early September (instantaneous readings ranged from 21.6°C (70.9°F) at 6 meters on August 13, to 25.3°C (77.5°F) approximately 3 inches below the surface on September 9. The highest average water temperature throughout the water column was recorded on September 9 (23.6°C or 74.5°F).
- The DO concentration was highest at the beginning and end of the monitoring period with average values throughout the water column of 9 mg/L on June 9 and June 24, and average values of 11.0 mg/L on October 6 and October 22 (Table 5-7). DO was lower in July, August, and September, ranging from 6.5 mg/L at a depth of 5 meters on August 26 to 8.8 mg/L approximately 3 inches below the surface on July 23. The lowest mean DO throughout the water column was observed on August 26 (6.9 mg/L). All values attained MDEP's standard for Class C waters (i.e., > 5.0 mg/L).
- The DO percent saturation ranged from approximately 77 percent to 104 percent throughout the monitoring period (Table 5-7). All values attained MDEP's standard for Class C waters (i.e., > 60% saturation).
- Water temperature and DO exhibited little to no variation throughout the water column during each profile; a thermocline or lake stratification were not observed.

TABLE 5-4 LAKE TROPHIC SAMPLE RESULTS FOR THE UPPER BARKER IMPOUNDMENT – JUNE TO OCTOBER 2015.

SAMPLE DATE	SAMPLE TIME	TOTAL PHOSPHORUS (MG/L)	CHLOROPHYLL-A (MG/L)	TOTAL ALKALINITY (MG/L)	COLOR (PCU)	PH	SECCHI DISK (M)
6/9	17:00	0.023	0.0029	15	37	6.8	2.5
6/24	16:45	0.033	0.0022	15	42	6.6	1.3
7/7	17:15	0.021	0.0032	15	44	6.6	2.3
7/23	17:00	0.025	0.0030	20	30	7	2.4
8/13	15:10	0.026	0.0034	23	25	6.9	1.4
8/26	14:30	0.013	0.0037	22	25	6.3	3.0
9/9	14:50	0.014	0.0035	20	25	6.7	3.4
9/22	14:30	0.013	0.0042	22	23	6.8	3.4
10/6	13:30	0.022	0.0025	11	45	6.5	2.6
10/22	14:30	0.020	0.0026	14	37	6.5	2.0
Average		0.021	0.0031	17.7	33.3	6.7	2.4
Minimum		0.013	0.0022	11	23	6.3	1.3
Maximum		0.033	0.0042	23	45	7	3.4

TABLE 5-5 CONCENTRATIONS OF DISSOLVED METALS AND NUTRIENTS IN THE UPPER BARKER IMPOUNDMENT, AUGUST 13, 2015

PARAMETER	CONCENTRATION
Conductivity	138 µS/cm
Chloride	24 mg/L
Nitrate	0.08 mg/L
Sulfate	4 mg/L
Calcium	9.1 mg/L
Iron	0.7 mg/L
Magnesium	1.8 mg/L
Potassium	1.5 mg/L
Silica	2.0 mg/L
Sodium	13 mg/L
Aluminum	<0.2 mg/L
DOC	1.8 mg/L

TABLE 5-6 WATER TEMPERATURE (°C) PROFILES IN THE UPPER BARKER IMPOUNDMENT- JUNE TO OCTOBER 2015.

Depth (m)	June 9 16:40	June 24 16:30	July 7 17:00	July 23 17:00	Aug. 13 15:10	Aug 26 14:30	Sept. 9 14:50	Sept. 22 14:05	Oct. 6 13:10	Oct. 22 14:25
0	18.1	19.8	23.7	23.9	24.3	23.9	25.3	20.4	13.0	9.8
1	17.6	19.6	22.7	23.7	22.4	23.6	24.9	20.2	12.9	9.6
2	17.5	19.6	21.9	23.3	22.2	23.4	23.3	20.0	12.8	9.4
3	17.3	19.5	21.7	22.3	21.9	23.3	22.8	20.0	12.7	9.3
4	17.2	19.5	21.7	23.1	21.8	23.3	22.6	20.0	12.7	9.2
5	17.2	19.5	21.6	23.0	21.7	23.2	22.4	19.9	12.7	9.2
6	17.2	19.5	21.6	22.8	21.6	23.1	-	-	12.7	9.2
Avg	**17.4**	**19.6**	**22.1**	**23.2**	**22.3**	**23.4**	**23.6**	**20.1**	**12.8**	**9.4**
Min	**17.2**	**19.5**	**21.6**	**22.3**	**21.6**	**23.1**	**22.4**	**19.9**	**12.7**	**9.2**
Max	**18.1**	**19.8**	**23.7**	**23.9**	**24.3**	**23.9**	**25.3**	**20.4**	**13.0**	**9.8**

*Measurements were not collected at 6 m on September 9 and September 22 because the water quality meter probe was at the bottom of the impoundment.

TABLE 5-7 DISSOLVED OXYGEN CONCENTRATION (MG/L) PROFILES IN THE UPPER BARKER IMPOUNDMENT- JUNE TO OCTOBER 2015.

Depth (m)	June 9 16:40	June 24 16:30	July 7 17:00	July 23 17:00	Aug. 13 15:10	Aug 26 14:30	Sept. 9 14:50	Sept. 22 14:05	Oct. 6 13:10	Oct. 22 14:25
0	9.04	8.98	8.10	8.76	7.87	7.32	8.41	7.89	11.13	11.07
1	9.01	8.96	8.25	8.42	8.01	7.17	8.47	7.55	11.07	10.95
2	8.98	8.98	8.26	8.09	8.02	7.02	8.03	7.36	11.07	10.94
3	8.94	8.96	8.18	8.03	7.73	6.81	7.70	7.34	11.03	10.94
4	8.95	8.97	8.19	7.97	7.57	6.68	7.34	7.27	10.97	10.96
5	8.93	8.98	8.14	7.78	7.34	6.50	7.42	7.21	10.97	10.93
6	8.91	8.97	8.08	7.32	7.42	6.59	-	-	10.99	10.87
Avg	**9.0**	**9.0**	**8.2**	**8.1**	**7.7**	**6.9**	**7.9**	**7.4**	**11.0**	**11.0**
Min	**8.9**	**9.0**	**8.1**	**7.3**	**7.3**	**6.5**	**7.3**	**7.2**	**11.0**	**10.9**
Max	**9.0**	**9.0**	**8.3**	**8.8**	**8.0**	**7.3**	**8.5**	**7.9**	**11.1**	**11.1**

TABLE 5-8 DISSOLVED OXYGEN PERCENT SATURATION PROFILES IN THE UPPER BARKER IMPOUNDMENT- JUNE TO OCTOBER 2015.

Depth (m)	June 9 16:40	June 24 16:30	July 7 17:00	July 23 17:00	Aug. 13 15:10	Aug 26 14:30	Sept. 9 14:50	Sept. 22 14:05	Oct. 6 13:10	Oct. 22 14:25
0	95.4	98.3	95.6	104.2	93.9	86.4	102.5	87.9	105.1	97.3
1	94.5	97.8	95.7	99.8	92.4	84.6	102.3	83.2	105.0	96.0
2	93.9	97.9	94.1	94.7	92.2	82.0	94.5	81.2	104.2	95.7
3	93.1	97.6	92.9	94.0	88.5	80.1	89.2	80.7	104.1	95.6
4	92.9	97.6	93.1	93.0	86.5	78.0	84.5	79.9	103.7	95.4
5	92.8	97.7	92.5	90.7	83.5	76.6	85.4	79.3	103.5	94.8
6	92.5	97.6	91.6	84.8	84.3	76.8	-	-	103.5	94.7
Avg	**93.6**	**97.8**	**93.6**	**94.5**	**88.8**	**80.6**	**93.1**	**82.0**	**104.2**	**95.6**
Min	**92.5**	**97.6**	**91.6**	**84.8**	**83.5**	**76.6**	**84.5**	**79.3**	**103.5**	**94.7**
Max	**95.4**	**98.3**	**95.7**	**104.2**	**93.9**	**86.4**	**102.5**	**87.9**	**105.1**	**97.3**

Total phosphorus, chlorophyll-a, and Secchi disk transparency are often used as indicators of trophic state, or the biological productivity in a water body, particularly a lake (MDEP 2014b). An oligotrophic lake has low productivity, a mesotrophic lake has medium productivity, and a eutrophic lake is highly productive. The Maine Trophic State Index (TSI) for a water body with color greater than 30 PCU can be calculated as (MDEP 1996):

$$TSI = 70*\log (\text{mean chlorophyll-a} + 0.7)$$

Using the mean chlorophyll-a concentration in the Upper Barker Impoundment (0.0031 mg/L or 3.1 µg/L), the TSI is 41, which is characterized as mesotrophic.

5.2.10 ADDITIONAL WATER QUALITY MONITORING

As part of the Lower Barker Project relicensing, KEI (USA) completed lake trophic and riverine monitoring at the Lower Barker Project from June to October 2015. The lake trophic sampling site was approximately 3,200 feet downstream of the Upper Barker dam. Continuous DO and water temperature data were collected in the Lower Barker bypassed reach and tailwater. Complete details and results of the water quality study are presented in the Final Study Report and Exhibit E of the Final License Application for the Lower Barker Project (KEI (USA) 2017). MDEP concluded that the Little Androscoggin River immediately upstream and downstream of

the Lower Barker dam attains Class C water quality standards and provides for the designated uses of the waterway (i.e., recreation in and on the water and habitat for fish and aquatic life).

MDEP collected water quality data at the confluence of the Little Androscoggin River and the Androscoggin River during the summer of 2010 (MDEP 2011). The concentrations of chlorophyll-a (0.0025 to 0.0036 mg/L) and total phosphorus (0.018 to 0.022 mg/L) were within the range observed in the Upper Barker and Lower Barker impoundments in 2015 and below the proposed state criteria.

The MDEP Biological Monitoring Program (BMP) monitors benthic macroinvertebrate communities at multiple stations throughout the state to evaluate attainment with aquatic life standards. Several water quality parameters are measured at the time of installation and retrieval of the macroinvertebrate samplers. The BMP has monitored sites in the Little Androscoggin River near the Upper Barker Project: Site 1033 is approximately 7.7 river miles upstream of the Upper Barker dam; Site 1104 is approximately 8.3 river miles upstream; and Site 696 is approximately 0.3 river miles upstream of the confluence of Taylor Brook with the Little Androscoggin River (MDEP 2008, 2014b, 2015, 2016) (Table 5-9). The results from site S-1033 in 2014 and 2015, demonstrated that waters upstream of the Upper Barker Project meet the Class C standard for DO and attain draft criteria for pH and total phosphorus; results were consistent with water quality data collected in the Upper Barker impoundment in 2015. Site S-1104 also attained the DO standard in 2016 (Table 5-9).

The confluence of Taylor Brook with the Little Androscoggin River is approximately 370 feet upstream of the Upper Barker dam; Taylor Brook is classified as Class B. Based on the macroinvertebrate sampling conducted in 2008, MDEP concluded that the site met Class C aquatic life standards. The total phosphorus measurement from S-696 was slightly above the proposed criteria.

TABLE 5-9 MDEP WATER QUALITY MONITORING RESULTS FROM UPSTREAM OF THE UPPER BARKER PROJECT

SITE	DATE	TEMPERATURE (°C)	DO (MG/L)	PH	TOTAL PHOSPHORUS (MG/L)	TOTAL ALKALINITY (MG/L)	CONDUCTIVITY (µS/CM)
S-1033	7/14/2014	25.0	7.9	7.14	–	–	83
S-1033	7/22/2014	22.2	7.4	6.06	0.020	15	97
S-1033	8/12/2014	22.3	8.4	6.9	0.017	–	84
S-1033	7/15/2015	23.6	7.8	7.13	0.019	17	98.5
S-1104	7/27/2016	24.5	7.1	–	–	–	–
S-1104	8/23/2016	21.9	7.8	–	–	–	–
S-696	7/22/2008	23.3	7.3	6.8	0.039	29	135

Source: MDEP Biomonitoring Unit; http://www.maine.gov/dep/water/monitoring/biomonitoring/data.htm

5.2.11 BENTHIC MACROINVERTEBRATES

Benthic macroinvertebrates include aquatic insects (e.g., mayflies, stoneflies), annelids (e.g., worms), arthropods (e.g., crayfish), and mollusks (e.g., freshwater mussels, snails) (MDEP 2017). These organisms provide a link between a system's primary productivity and its aquatic consumers through the conversion of plant biomass to consumable energy. The abundance of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT) is a useful indicator of water quality because these species have a low tolerance to pollution; EPT richness values greater than 10 are indicative of excellent water quality. Furthermore, EPT are high-quality forage for freshwater fish species, including trout and salmon. The Hilsenhoff Biotic Index (HBI) is another indicator of the level of pollution-sensitive macroinvertebrates in a surface water body; the HBI ranges from 0 to 10 with lower values indicating a higher abundance of pollution sensitive macroinvertebrates (Hilsenhoff 1987).

MDEP sampled the macroinvertebrate communities at Sites S-1033 in 2014 and S-1104 in 2016 (7.7 and 8.3 river miles upstream of the Upper Barker Project; see Section 5.2.10). MDEP concluded that the macroinvertebrate communities at S-1033 and S-1104 met Class B aquatic life standards which is one statutory class higher than the designated class (Class C) for this reach of the Little Androscoggin River (MDEP 2014b, 2015, 2016). Furthermore, four of the top five most abundant species at both sites were mayflies and caddisflies.

KEI (USA) conducted benthic macroinvertebrate monitoring in the bypassed reach and tailwater of the Lower Barker Project in 2015 to assess whether waters meet Class C aquatic life standards and to evaluate the benthic community structure and function. Complete results of the benthic macroinvertebrate study are presented in the Final Study Report and Exhibit E of the Final License Application for the Lower Barker Project (KEI (Maine) 2017). The monitoring results demonstrated that the benthic macroinvertebrate communities downstream of the Lower Barker Dam were abundant, diverse, and rich in taxa. The community structure and function indicates that there has been little, if any, change in the resident biological community. EPT species represented a sizable proportion of the communities; the EPT richness at both the bypassed reach and tailwater sites was 22. Furthermore, the HBI was 3.4 in the bypassed reach and 3.5 in the tailrace. Thus, both the EPT richness and HBI were indicative of very good to excellent water quality.

MDEP concluded that the macroinvertebrate community downstream of the Lower Barker Dam on the Little Androscoggin River attains Class C aquatic life standards and maintains the structure and function of the resident benthic macroinvertebrate community. In fact, MDEP determined that the benthic macroinvertebrate community at both monitoring sites, which are less than 1.2 river miles downstream of the Upper Barker dam, were representative of Class A aquatic life standards.

Overall, recent water quality and benthic macroinvertebrate studies completed by KEI (USA) and MDEP in the Upper Barker Project area, the Lower Barker Project area, and in nearby reaches of the Little Androscoggin River, have demonstrated that water quality standards, aquatic life standards, and designated uses are being met.

5.2.12 REFERENCES

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5.3 FISH AND AQUATIC RESOURCES

18 CFR 5.6(d)(3)(iv) requires "A description of the fish and other aquatic resources, including invasive species, in the project vicinity. This section must discuss the existing fish and macroinvertebrate communities, including the presence or absence of anadromous, catadromous, or migratory fish, and any known or potential upstream or downstream impacts of the project on the aquatic community. Components of the description must include: (A) Identification of existing fish and aquatic communities; (B) Identification of any essential fish habitat as defined under the Magnuson- Stevens Fishery Conservation and Management Act and established by the National Marine Fisheries Service; and (C) Temporal and spatial distribution of fish and aquatic communities and any associated trends with respect to: (1) Species and life stage composition; (2) Standing crop; (3) Age and growth data; (4) Spawning run timing; and (5) The extent and location of spawning, rearing, feeding, and wintering habitat."

5.3.1 FISH SPECIES AND HABITATS

DIADROMOUS FISH SPECIES

Diadromous fish species within the Little Androscoggin River include American eel and sea-run alewives. The run of alewives in the Little Androscoggin River is heavily dependent on active trap and truck management program undertaken by the MDMR. MDMR stocks river herring into eight lakes and ponds in the Little Androscoggin River watershed at a target rate of 14.8 fish per hectare (i.e., 6 fish per acre) (MDMR 2017). Three of the stocked ponds are upstream of the Upper Barker Dam (i.e., Lower Range Pond, Marshall Pond, and Taylor Pond) (MDMR 2010; MDMR 2017). During recent years (i.e., 2007-2017), these habitats have typically attained or exceeded their target stocking density of 14.8 fish per hectare (Table 5-10). Other lakes and ponds historically stocked by MDMR in the Little Androscoggin River include Thompson Lake, Tripp Lake, Hogan Pond, and Whitney Pond (MDMR 2010). Hogan Pond, Whitney Pond, and Thompson Pond are no longer stocked with herring because of legislative restrictions or current fisheries management objectives do not support the effort.

None of the 8 dams on the Little Androscoggin River have upstream passage facilities; downstream passage measures are in place at some of the dams, including the Upper Barker Project, Lower Barker Project, and Marcal Project, all of which are operated by KEI (USA). The provision of downstream passage by KEI (USA) allows for adult alewives that are stocked by MDMR and juvenile alewives to pass downstream in the summer and fall.

TABLE 5-10 ANNUAL RIVER HERRING STOCKING RECORDS FOR THE LITTLE ANDROSCOGGIN RIVER

YEAR	STOCKING LOCATION			
	LOWER RANGE POND	MARSHALL POND	TAYLOR POND	TOTAL RELEASE
1983	0	312	2,126	2,438
1984	217	499	2,626	3,342
1985	1,505	504	2,502	4,511
1986	1,364	514	3,846	5,724
1987	0	633	3,907	4,540
1988	1,768	522	3,672	5,962
1989^	1,821	1,308	3,807	6,936
1990	2,085	595	2,261	4,941
1991	1,720	650	3,770	6,140
1992	1,718	600	3,207	5,525
1993	911	617	1,625	3,153
1994	1,745	593	4,068	6,406
1995^	1,669	1,592	3,593	6,854
1996	1,793	689	3,779	6,261
1997	1,723	711	2,810	5,244
1998^	1,852	930	4,336	7,118
1999	0	0	2,489	2,489
2000	1,748	612	3,801	6,161
2001^	1,889	612	4,225	6,726
2002	1,595	609	1,477	3,681
2003	1,033	0	3,835	4,868
2004	1,654	612	3,731	5,997
2005	0	0	0	0
2006^	3,999	1,629	3,875	9,503
2007^	3,699	1,497	7,996	13,192
2008^	2,499	1,499	4,500	8,498
2009^	1,968	1,148	4,517	7,633
2010	1,327	1,272	3,232	5,831
2011^	1,493	1,527	4,317	7,337
2012^	1,616	1,453	4,318	7,387
2013	1,552	0	0	1,552
2014^	1,506	1,117	4,080	6,703
2015^	2,186	1,496	4,555	8,237
2016^	2,481	1,499	4,496	8,476
Total	**54,136**	**27,851**	**117,379**	**199,366**

^ total attains or exceeds stocking goal of 14.8 fish/ha (i.e., 6 fish/acre) for the Little Androscoggin River.
Source: personal communication, Gail Wippelhauser and Mike Brown, MDMR.

AMERICAN EEL

In general, few American eels have been documented recently in the Androscoggin River (MBI 2006; MDMR 2016b; Miller Hydro Group 2013, 2014). Since 2011, the Licensee of the Worumbo Project has installed an upstream eel ladder annually to pass juvenile American eels. In 2012 and 2013, 17 and 131 eels were captured in the eel ladder at the Worumbo Project, respectively (Miller Hydro Group 2013, 2014); 403 75 mm to 175 mm (3-inch to 7-inch) eels were caught between June 16 and September 1, 2015 (ECRE 2017). Data for 2016 and 2017 could not be obtained at the time of publication of this document. There are no other upstream eel passage systems on the Androscoggin River or on any of the Little Androscoggin River dams (MDMR 2017).

KEI (USA) performed 11 nighttime surveys between June 9 to August 5, 2015, to assess the need and potential location for an upstream eelway at the Lower Barker Project. KEI (USA) searched for juvenile eels along the downstream face of the dam and spillway, the spill gates, and the bedrock outcrops downstream of the dam. KEI (USA) observed a total of 44 eels within pools and along the bedrock falls on river right[5]. Most eels were approximately 75 mm to 150 mm (3-inch to 6-inch) in length; one eel was 300 mm (12 inches); and one eel was approximately 600 mm (24 inches). KEI (USA) is planning to install an upstream eel passage system as part of the new license implementation for the Lower Barker Project.

5.3.2 EXISTING FISH PASSAGE MEASURES

KEI (USA) maintains and operates a downstream fish bypass at the Upper Barker Project to facilitate the passage of juvenile and post-spawned river herring and adult American eel. The bypass consists of two intakes in the headpond and two 18-inch diameter pipes that discharge into a plunge pool at the base of the dam. KEI (USA) provides a flow of 20 cfs or inflow, from June 1 to November 30, through the downstream fish bypass.

5.3.3 RESIDENT FISH

Recreational fisheries for coldwater and warmwater fish species exists in the Little Androscoggin River watershed. MDIFW annually stocks approximately 4,000 brown trout and rainbow trout (7

[5]All references to river right and river left are from the perspective of an observer looking downstream.

to 11 inches) between the Welchville dam in Mechanic Falls and the Upper Barker dam (MDIFW 2018a) (Table 5-11). Furthermore, approximately 3,500 to 4,500 brown trout, brook trout, and rainbow trout are annually stocked in the main stem Little Androscoggin River upstream of Mechanic Falls. Those same three trout species, as well as landlocked salmon, are also stocked in Lower Range Pond, Middle Range Pond, Upper Range Pond, Thompson Lake, Tripp Pond, Worthley Pond, Pennesseewassee Lake, and Little Pennesseewassee Lake.

TABLE 5-11 STOCKING RECORDS FOR THE LITTLE ANDROSCOGGIN RIVER BETWEEN THE UPPER BARKER DAM AND MECHANIC FALLS, 2013 – 2017.

YEAR	RAINBOW TROUT	BROWN TROUT	TOTAL
2013	2,050	2,050	4,100
2014	2,050	2,050	4,100
2015	2,050	2,050	4,100
2016	1,804	2,250	4,054
2017	1,740	2,050	3,790

Source: MDIFW 2018a.

Within stocking areas, MDIFW manages the Little Androscoggin River as a put-grow-take trout fishery (personal communication, Francis Brautigam, MDIFW). MDIFW's fishery management goal for the Little Androscoggin River is to develop a trout fishery that persists April 1 – October 31 (Lower Barker MDIFW study request letter to the Commission, June 17, 2014). Anglers can access the Little Androscoggin River downstream the Upper Barker Project area from the Barker Mill Trail which runs parallel to the Little Androscoggin River beginning next to the Lower Barker Dam and continuing upstream approximately 0.6 miles to the Upper Barker Dam.

The Midwest Biodiversity Institute (MBI) sampled the main stem of the Androscoggin River in 2003 near Lewiston-Auburn, 0.8 miles from the confluence with the Little Androscoggin River (MBI 2006). The sampling was part of a large river Index of Biotic Integrity study completed in Maine. MBI collected nine species via electrofishing in a 0.6-mile reach. The assemblage was dominated by smallmouth bass (Table 5-12). All species were typical of the lower reaches of Maine's large warmwater river systems. Given the proximity to the Upper Barker Project, KEI (USA) expects a similar resident fish species assemblage to occur.

TABLE 5-12 SUMMARY OF MBI 2003 ELECTROFISHING RESULTS, ANDROSCOGGIN RIVER NEAR LEWISTON-AUBURN.

SPECIES	NO. COLLECTED	RELATIVE PERCENTAGE
Smallmouth bass	78	67.2%
White sucker	17	14.7%
Redbreast sunfish	6	5.2%
American eel	4	3.4%
Pumpkinseed sunfish	4	3.4%
Rainbow trout	2	1.7%
Spottail shiner	2	1.7%
Yellow perch	2	1.7%
Fallfish	1	0.9%
Total Catch[1]	**116**	**-**

[1] MBI also collected a single largemouth bass from the main stem at the next downstream most station in the Lewiston-Auburn area.
Source: MBI 2006.

In 2011, MDMR completed a radio-telemetry study evaluating Atlantic salmon habitat use and main stem fish passage in the lower Androscoggin River. MDMR documented one adult Atlantic salmon and some spawning habitat in the bypassed reach below the Lower Barker Dam (MDMR 2011).

5.3.4 AQUATIC HABITAT

The Upper Barker Project impoundment extends upstream approximately 1.7 river miles and ranges in width from approximately 100 to 200 feet with a maximum depth of approximately 20 to 25 feet near the dam (FEMA 2012). KEI (USA) operates the Upper Barker Project in a run-of-river mode to minimize the effects of operational flow fluctuations on downstream aquatic resources and shoreline aquatic habitats. The impoundment is generally lacustrine in character (i.e., narrow and slow-moving channel) (Photo 5-1). Taylor Brook enters the Little Androscoggin River approximately 370 feet upstream of the Upper Barker dam. The Lower Barker Project impoundment extends to just below the Upper Barker dam. The Lower Barker impoundment is generally riverine in character (i.e., shallow and narrow) with a width ranging from approximately 50 to 185 feet. A small riffle occurs just downstream of the Upper Barker dam (Photo 5-2).

PHOTO 5-1 VIEW LOOKING UPSTREAM IN THE UPPER BARKER PROJECT IMPOUNDMENT.

PHOTO 5-2 VIEW OF SMALL RIFFLE DOWNSTREAM OF THE UPPER BARKER PROJECT TAILRACE.

CRITICAL HABITAT

Atlantic salmon are a federally endangered species protected under the ESA (NMFS 2009b). Critical habitat includes areas occupied by ESA-listed species, areas that may require special management considerations or protection, or areas that have been determined to be essential for the conservation of the species. As described in Section 5.6.2, Atlantic salmon in the Androscoggin River are part of the Merrymeeting Bay Salmon Habitat Recovery Unit (SHRU); however, the Little Androscoggin River is not classified as critical habitat (i.e., critical to the recovery of the species) (NMFS 2009b).

ESSENTIAL FISH HABITAT

NMFS identifies essential fish habitat (EFH) for fish species that are commercially-managed under the Magnuson-Stevens Fishery Conservation and Management Act. EFH is defined as the "habitat necessary for managed fish species to complete their life cycle such that the fishery can be harvested sustainably." The Little Androscoggin River is considered EFH for Atlantic salmon (NMFS 1998, 2016).

5.3.5 BENTHIC MACROINVERTEBRATES

KEI (USA) sampled the benthic macroinvertebrate community in two locations downstream of the Lower Barker Dam in 2015 (see Section 5.2.11 for more information). The benthic macroinvertebrate communities downstream of the Lower Barker Dam were abundant and very rich in taxa. Filter-feeding caddisflies, sensitive mayflies, and stoneflies, which are quality forage taxa for trout and salmon and indicators of good water quality, represented a considerable segment of the communities. Based on the study results, the benthic macroinvertebrate community downstream of the Lower Barker Dam is representative of Class A aquatic life standards, which is two statutory classes higher than the designated class (Class C) for this portion of the Little Androscoggin River; this classification was supported by MDEP's independent review of the data (KEI (Maine) 2017).

The MDEP sampled the macroinvertebrate communities at two sites upstream of the Upper Barker Dam. Site S-1033 was sampled in 2014 and Site S-1104 was sampled in 2016; these two sites are 7.7 river miles and 8.3 river miles upstream of the Upper Barker dam, respectively (MDEP 2014, 2016). MDEP concluded that the macroinvertebrate communities at S-1033 and S-

1104 met Class B aquatic life standards, which is one statutory class higher than the designated class (Class C) for this reach of the Little Androscoggin River.

Freshwater mussels play an important role in aquatic ecosystems by filtering water, cycling nutrients, providing structure to the benthic environment, and serving as a food source (Swartz and Nedeau 2007). There are ten native freshwater mussel species known to occur in Maine, of which six have been observed in the Little Androscoggin River (Nedeau et al., 2000; Table 5-13). The creeper is listed as a species of special concern in Maine (MDIFW 2018b).

TABLE 5-13 FRESHWATER MUSSELS KNOWN TO OCCUR IN THE LITTLE ANDROSCOGGIN RIVER.

COMMON NAME	SCIENTIFIC NAME
Eastern elliptio	*Elliptio complanata*
Eastern floater	*Pyganodon cataracta*
Eastern lampmussel	*Lampsilis radiate radiata*
Eastern pearlshell	*Margaritifera*
Triangle floater	*Alasmidonta undulata*
Creeper	*Strophitus undulatus*

Source: Nedeau et al., 2000.

5.3.6 AMPHIBIAN AND AQUATIC REPTILE SPECIES

Nine common amphibian species and six common aquatic reptiles are known to occur in the region and have life history requirements that could result in their use of the riverine or lacustrine habitat found within the Upper Barker Project area (Table 5-14). Three species of salamander (yellow-spotted salamander, eastern newt, and two-lined salamander) inhabit both aquatic and terrestrial habitat. Six species of frogs and toads may occur and require use of aquatic habitat. The primarily aquatic or semi-aquatic reptilian species include the snapping turtle and painted turtle. Four species of snake (redbelly, common garter, ringneck, and northern water snake) may make limited use of riparian areas for shelter and feeding, or in the case of the northern water snake, the impoundment itself (Hunter 1999).

TABLE 5-14 AMPHIBIAN AND AQUATIC REPTILE SPECIES KNOWN TO OR WITH THE POTENTIAL TO OCCUR WITHIN THE PROJECT AREA OR PROJECT VICINITY.

COMMON NAME	SCIENTIFIC NAME
Amphibians	
Yellow spotted salamander	*Ambystoma maculatum*
Eastern newt	*Notophthalmus viridescens*
Two-lined salamander	*Eurycea bislineata*
American toad	*Bufo americanus*
Spring peeper	*Pseudacris crucifer*
Bullfrog	*Rana catesbeiana*
Green frog	*Rana clamitans*
Pickerel frog	*Rana palustris*
Wood frog	*Rana sylvatica*
Reptiles	
Painted turtle	*Chrysemys picta*
Snapping turtle	*Chelydra serpentine*
Ringneck snake	*Diadophis punctatus*
Northern water snake	*Nerodia sipedon*
Redbelly snake	*Storeria occipitomaculatum*
Common garter snake	*Thamnophis sirtalis*

Source: Hunter 1999; Degraaf 2001; MDIFW 2005

In summary, existing fisheries, aquatic, benthic macroinvertebrate, and water quality data (described in Section 5.2), along with run-of-river operations, the provision of downstream passage, and opportunities for anglers and recreationists, demonstrate that the Upper Barker Project likely has minimal effects on existing fish and aquatic resources in the Upper Barker Project area. Furthermore, KEI (USA) is proposing no changes to existing operations or project facilities; therefore, there will be no construction or changes to the project facilities that would affect aquatic resources.

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5.4 UPLAND WILDLIFE AND BOTANICAL RESOURCES

18 CFR 5.6(d)(3)(v) requires "A description of the wildlife and botanical resources, including invasive species, in the project vicinity. Components of this description must include: (A) Upland habitat(s) in the project vicinity, including the project's transmission line corridor or right-of-way and a listing of plant and animal species that use the habitat(s); and (B) Temporal or spatial distribution of species considered important because of their commercial, recreational, or cultural value."

5.4.1 WILDLIFE HABITATS IN THE PROJECT AREA AND VICINITY

As discussed above, the Project is located in the Central Interior biophysical region of Maine, characterized by flat to gently rolling terrain. The region is a transition zone as dominant vegetation changes from a northern Appalachian forest dominated by oak, pine, and mixed hardwoods in southern Maine to a spruce-fir-northern hardwood forest in northern and eastern Maine (MDIFW, 2015).

Upland habitats that occur most frequently in the Project Vicinity include: deciduous and mixed forest; coniferous forest; grassland, agriculture and old fields; and urban and suburban areas (MDIFW, 2015). The Project itself is dominated by deciduous forest and areas of urban and suburban development.

DECIDUOUS

The entire shoreline is dominated by deciduous forest which is common to the Central Interior region. Overstory species may include white ash (*Fraxinus americana*), red maple (*Acer rurbrun*), and red oak (*Quercus rubra*). Other overstory species may include American elm, (*Ulmus americana*), American beech (*Fagus grandifolia*), or sugar maple (*Acer saccharum*). Shrub-layer vegetation is represented by species such as maple- leaved viburnum (*Viburnum acerifolium*) or saplings of American beech and maple. Herbaceous vegetation commonly found in this habitat includes bracken fern (*Pteridium aquilinum*), Canada mayflower (*Maiabthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*) twinflower (*Linnaea borealis*) and trillium (*Trillium* sp.) (FERC, 1996).

URBAN/SUBURBAN

Urban and suburban areas are categorized as such when the percent cover by buildings, road and other impervious surfaces is greater than vegetative cover (MDIFW, 2015). These areas are predominantly associated with the twin cities of Lewiston and Auburn within the project vicinity. The Project is surrounded by this land cover type.

The area immediately surrounding the Project consists of a narrow band of riparian forest surrounded by extensive urban and residential development, including an active railroad track along the northern shore and Mill Street along the southern shore.

5.4.2 WILDLIFE RESOURCES IN THE PROJECT AREA AND VICINITY

A list of potential wildlife species that may occur within the Project along with latin names is included as Appendix D. There are 61 mammalian species found in Maine, not associated with the marine environment. Due to habitat constraints within the Project (i.e., fragmentation due to urban development) large mammals such as moose, white-tailed deer, or black bear are likely to be uncommon within the Project. Large mammals that may occur are likely transient individuals and do not represent resident populations. Common mammals found with the project area and immediate vicinity are primarily habitat generalists accustomed to urban development. Common mammals such as these include red fox, raccoon, opossum, skunk, eastern chipmunk, eastern gray squirrel, red squirrel, and the white-footed mouse. The close proximity of hardwood riparian forest and the river likely provides habitat for bat species such as the little brown myotis, silver haired bat, and big brown bat (Degraaf, 2001).

Maine provides habitat for 292 species of birds statewide. Based on habitat available within the Project common birds that may occur include. the black-caped chickadee, white-breasted nuthatch, black and white warbler, blue jay, red eyed verio, least flycatcher, and wild turkey. Raptor species that may occur within the Project are likely those that prefer hardwood dominated landscapes may include sharp shined hawk or broad winged hawk or species common to rivers and water bodies such as the osprey and bald eagle. Shorebirds may include the, solitary, upland and spotted sandpipers as well as wading birds such as the great blue heron (MDIFW, 2015).

5.4.3 TEMPORAL AND SPATIAL DISTRIBUTION OF WILDLIFE SPECIES

Species considered important because of their commercial, recreational, or cultural value are not likely to use the project area and immediate surrounding lands for permanent habitat. Spatial and temporal distribution of wildlife species within the project area can be inferred based on life-history of species and taxa groups. Most terrestrial species common to the area are habitat generalists, and therefore likely found in a variety of habitats throughout the project vicinity (MDIFW, 2015).

Migratory waterfowl species, such as the Canada goose, mallard and wood duck, would be expected to occupy the project area during breeding season and winter season from December through February. Similarly, neotropical avian species such as the ruby-throated hummingbird and various flycatchers and warblers, likely occupy the lands surrounding the Project during the spring, summer, and fall before returning to the tropics of Central and South America during the winter season (MDIFW, 2015). Many species of passerines found in Maine make their homes in the abundant conifer-dominated forests of the state. Passerine species also inhabit the shrubland habitats in the state, including regenerating forests, utility right-of-ways, roadsides, and railroads such as those in proximity of the Project. Additionally, as mentioned above, many other avian species make their homes in the littoral zones that spread throughout the state (MDIFW, 2015).

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, 2013).

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 costal 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, 2013).

5.4.5 INVASIVE PLANTS AND WEEDS

There are currently 19 invasive plant species that are known to occur in Maine (MDACF, 2013) (Table 5-15). Several of the invasive plants occurring in Maine may be found at or near the Project, including garlic mustard, honeysuckle, purple loosestrife, and wood blue grass. Aquatic plants such as hydrilla 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 (MDACF, 2013).

TABLE 5-15 INVASIVE PLANTS POTENTIALLY OCCURRING WITHIN THE PROJECT

SCIENTIFIC NAME	COMMON NAME
Alliaria petiolata	Garlic mustard
Berberis thunbergii	Japanese barberry
Celastrus orbiculata	Asiatic bittersweet
Cynanchum louiseae	Black swallowwort
Eleagnus umbellata	Autumn olive
Fallopia japonica	Japanese knotweed
Frangula alnus	Glossy buckthorn
Impatiens glandulifera	Himalayan balsam
Lonicera morrowii	Morrow honeysuckle
Lonicera tartarica	Tartarian honeysuckle
Lythrum salicaria	Purple loosestrife
Myriophyllum heterophyllum	Variable-leaf milfoil
Phragmites australis	Common reed
Poa nemoralis	Wood blue grass
Rhamnus cathartica	Common buckthorn
Rosa multiflora	Multiflora or Rambler rose

Source: MDACF, 2013

Variable leaf-milfoil is reported from the Little Androscoggin River watershed in Hogan Pond, well-above the Project (MDEP, 2013). Variable leaf-milfoil is a submerged aquatic plant with densely packed whorled leaves, and is usually found along the shorelines of lakes and ponds. Individuals can grow in water depths of up to 10-12 feet, forming dense mats near the surface. The plant produces spike-like flowers that grow above the water's surface from mid to late summer. The species reproduces primarily by fragmentation and it can break apart easily due to wave action produced by boats or other disturbances. The introduction of a fragment can result in

the infestation of an entire lake. Once introduced, it is virtually impossible to eradicate (MDEP 2013).

5.4.6 REFERENCES

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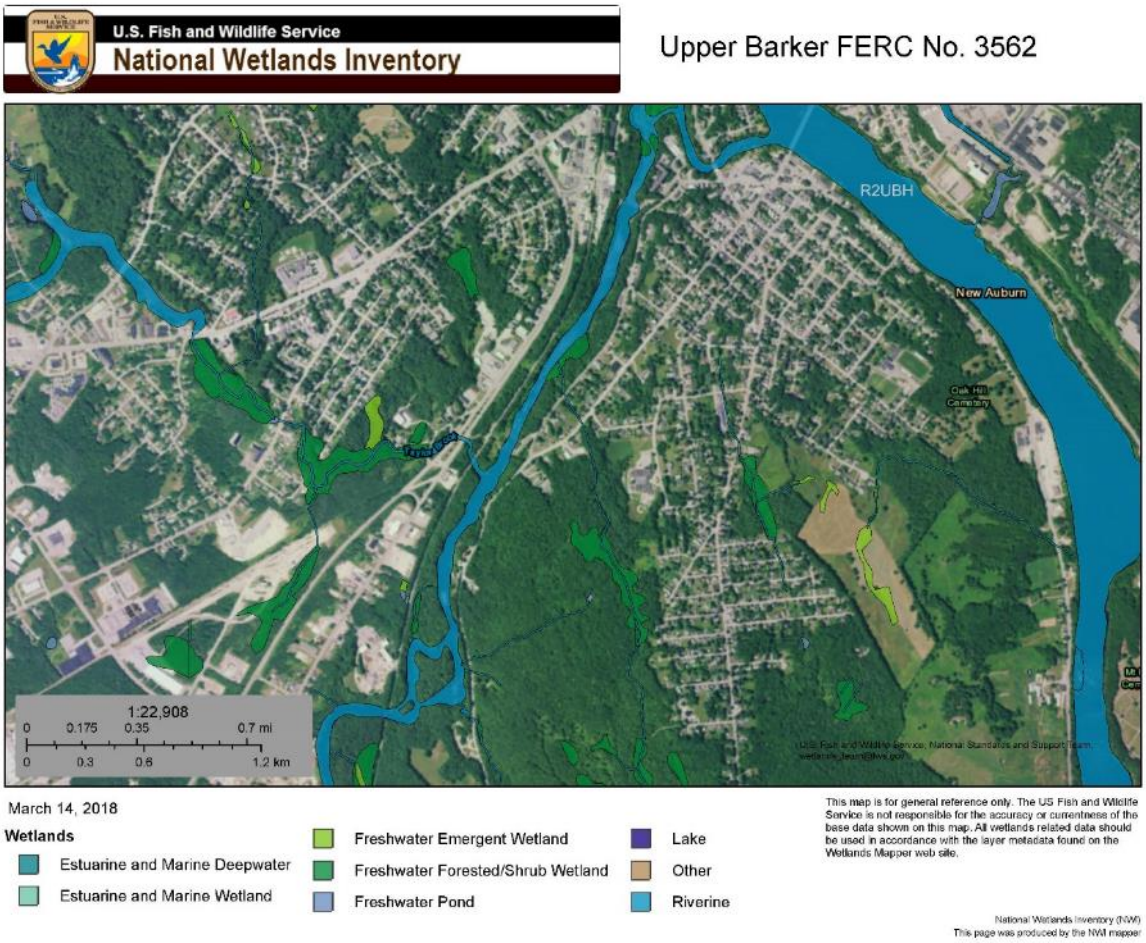
5.5 SHORELINE WILDLIFE AND BOTANICAL RESOURCES

18 CFR 5.6(d)(3)(vi) requires "Description of floodplains, wetlands, riparian, and littoral habitat (1) List of plant and animal species using the habitat (2) Map of wetlands, riparian and littoral habitat (3) Acreage estimate for each type of land including variability connected to project operations."

5.5.1 FLOODPLAIN AND WETLAND SPECIES AND HABITATS OF THE PROJECT AREA AND VICINITY

The majority of the wetlands in the project area are classified by the National Wetlands Inventory (NWI) as R2UBH, or riverine, lower perennial, unconsolidated bottom, permanently flooded (USFWS, 2011a) (Figure 5-7). Low, slow flowing water is characteristic in these areas and the substrate consists mainly of sand and mud (USGS 1996a). Unconsolidated bottoms include wetland habitats with at least 25 percent cover of particles smaller than stones and a vegetative cover less than 30 percent. They are also characterized by a lack of large stable surfaces for plant and animal attachment (USGS, 2006b). Riverine unconsolidated bottom wetlands provide habitat for a variety of species such as the northern leopard frog, green frog, bullfrog, American toad and snapping turtles (see Section 5.3).

FIGURE 5-7 WETLANDS IN THE VICINITY OF THE PROJECT



Source: USFWS, 2018

Additionally, forested wetlands (PFO1C) and (PFO1E) are located adjacent to the project boundary and in close proximity to the Project (USFWS, 2018). Wetlands with this classification are defined as palustrine, forested and seasonally flooded (USFWS 2018b). These wetlands, are characterized by deciduous woody vegetation in the overstory. Common species may include green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), or silver maple (*Acer saccharinum*) among others. Shrub layer vegetation may include species such as speckled alder (*Alnus incanna*) or winterberry (*Ilex verticillata*). In general herbaceous vegetation includes species tolerant of shade and seasonal inundation such as ostrich fern (*Matteuccia struthiopteris*) or sensitive fern (*Onoclea sensibilis*). These areas are seasonally flooded so that surface water is present for extended periods especially early in the growing season (USFWS 2018b).

Some of the wildlife species that are commonly found in freshwater wetlands and may be found in the wetlands near the Project include: wood ducks; loons; snapping and painted turtles; dragonflies; damselflies and warblers and other songbirds (MDEP, 2013).

5.5.2 RIPARIAN AND LITTORAL SPECIES AND HABITATS OF THE PROJECT AREA AND VICINITY

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. Littoral zone habitat is the shallow water area along the perimeter of the impoundment; typically consisting of the shoreline zone located between the high and low water levels.

The banks of the Little Androscoggin River in the vicinity of the Project provide riparian and littoral habitat to a variety of species. Common plant species found in riparian areas include species such as silver maple, green ash, red maple, alder and willow (FERC, 1996). The shoreline habitats of the Little Androscoggin River, including the Project, likely provides habitat for species such as muskrat and habitat generalists such as striped skunk, eastern painted turtle, kingfisher, and osprey. Waterfowl species that may be found in the littoral zone of the Little Androscoggin River include the common goldeneye and the common merganser, as well as the American black duck, the Canada goose, the mallard, and the wood duck (MDIFW, 2015).

Shoreline habitats of the Project are limited to the immediate riparian and littoral zones and a narrow band of upland mixed forest, as discussed in Section 5.4.1. As mentioned, the riparian habitat found along the Project impoundment and bypass reach is heavily forested, with primarily deciduous forests. The littoral zone is limited to a very narrow band given run-of-river operations.

5.5.3 REFERENCES

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5.6 THREATENED AND ENDANGERED SPECIES

18 CFR 5.6(d)(3)(vii) requires "A description of any listed rare, threatened and endangered, candidate, or special status species that may be present in the project vicinity. Components of this description must include: (A) A list of Federal- and state-listed, or proposed to be listed, threatened and endangered species known to be present in the project vicinity; (B) Identification of habitat requirements; (C) References to any known biological opinion, status reports, or recovery plan pertaining to a listed species; (D) Extent and location of any federally- designated critical habitat, or other habitat for listed species in the project area; and (E) Temporal and spatial distribution of the listed species within the project vicinity."

5.6.1 THREATENED AND ENDANGERED WILDLIFE RESOURCES AND HABITATS

The Endangered Species Act (ESA) was passed in 1973 to protect those animals and plants and associated habitats that are in danger of becoming extinct. The USFWS classifies animals and plants into two categories: "endangered species" are in danger of extinction throughout the area in which they are usually found and "threatened species" are those that could become endangered in the near future. The bald eagle was removed from the ESA list on June 28, 2007. However, bald eagles remain federally protected under the Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act.

Wildlife species in Maine may also be protected under the Maine Endangered Species Act (MESA). Depending on their level of vulnerability to extinction, species may be listed as Endangered or Threatened. Under MESA, a species may also be identified as Special Concern if it does not meet the criteria of endangered or threatened but is particularly vulnerable and could easily become threatened, or is suspected to be endangered or threatened but for which insufficient data exists (MDIFW, 2010a).

MESA includes the designation and protection of Essential Habitats, which are defined as “areas currently or historically providing physical or biological features essential to the conservation of endangered or threatened species in Maine and which may require species management considerations” (MDIFW, 2010a). The Natural Resources Protection Act (NRPA) provides protection to certain natural resources including Significant Wildlife Habitats and is administered by the MDEP.

The USFWS has identified one fish, one mammal, and one plant as listed on the federal endangered species list (USFWS, 2018) for Androscoggin County: Atlantic salmon, northern long eared bat and small whorled pogonia (Table 5-16).

TABLE 5-16 FEDERALLY LISTED ENDANGERED OR THREATENED WILDLIFE SPECIES DOCUMENTED AS OCCURRING IN ANDROSCOGGIN COUNTY

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS
Atlantic salmon	*Salmo salar*	Endangered
Northern long eared bat	*Myotis septentrionalis*	Threatened
Small whorled pogonia	*Isotria medeoloides*	Threatened

Source: USFWS, 2018

A thorough review of the Maine list of threatened and endangered species was completed. Based on the available habitat and ranges of the species listed, no Maine state listed species were identified as potentially occurring within the Project. The silver-haired bat is listed as Species of Special Concern and may occur in the Project (MDIFW, 2018).

On October 8, 2015 the Service published a not warranted finding on the petition to list the American eel (FR 80, No 195, 2015/10/08, pp 60834-60838). As a result, the American eel is currently provided no protection under the ESA.

5.6.2 THREATENED AND ENDANGERED WILDLIFE SPECIES DISTRIBUTION AND LIFE HISTORY INFORMATION

ATLANTIC SALMON

Atlantic salmon are an anadromous fish species with a complex life history. Individuals spend the majority of their adult life in marine environments but return to freshwater rivers and streams to spawn (Fay et al. 2006). Atlantic salmon are native to the North Atlantic Ocean and have been found worldwide as far south as Portugal in the eastern Atlantic and the Connecticut and Housatonic Rivers in the western Atlantic, and north to Ungava Bay in Quebec as well as the Nastapoka River in Hudson Bay (Morin 1991). Atlantic salmon were initially listed as endangered on November 17, 2000, on eight coastal Maine watersheds by the NMFS and the USFWS (65 FR 69459). NMFS and the USFWS expanded the listing to include Atlantic salmon that inhabit large Maine rivers (Androscoggin, Kennebec, and Penobscot) that were partially or

wholly excluded in the initial listing (74 FR 29344; June 19, 2009). NMFS determined that Atlantic salmon that inhabit the Gulf of Maine watersheds from the Androscoggin River eastward to the Dennys River are a distinct population segment (i.e., GOM DPS) and thus should be listed as a "species."

Currently, the GOM DPS includes Atlantic salmon that occupy freshwater from the Androscoggin River to the Dennys River, as well as anywhere Atlantic salmon occur in the estuarine and marine environments. The historical upstream limits of the species freshwater range are primarily determined by impassable falls in the Penobscot River watershed, including Big Niagara Falls on Nesowadnehunk Stream in Township 3 Range 10, Grand Pitch Falls on Webster Brook in Trout Brook Township, and Grand Falls on the Passadumkeag River (74 FR 9344; June 19, 2009). Additionally, conservation hatchery populations maintained by Green Lake National Fish Hatchery and Craig Brook National Fish Hatchery are included in the GOM DPS. Landlocked and commercially raised salmon are excluded from the listing (74 FR 29344; June 19, 2009).

Although ATS in the Androscoggin are part of the Merrymeeting Bay Salmon Habitat Recovery Unit (SHRU); the Little Androscoggin is not classified as critical habitat (i.e., critical to the recovery of the species) (NMFS 2009; personal communication, Jeff Murphy, NMFS, December 11, 2013). The Little Androscoggin River HUC 10 watershed does not actually include the Little Androscoggin River. This particular HUC 10 watershed includes only the Androscoggin River and its tributaries from the confluence with the Kennebec up to, but not including, the Little Androscoggin River.

A draft Recovery Plan for the Gulf of Maine DPS of Atlantic salmon was submitted for public review on March 29, 2016. The recovery plan represents a recovery strategy based on the biological and ecological needs of the species as well as current threat-term viability (USFWS and NOAA, 2016). This plan supersedes the approved 2005 plan for the DPS listed in 2000. This plan reflects a new recovery planning approach (termed the Recovery Enhancement Vision, or REV) being adopted by the USFWS. REV plans focus on the statutory elements of recovery criteria, recovery actions, and time and cost estimates (USFWS and NOAA, 2016).

SMALL WHORLED POGONIA

The MNAP maintains a list of rare, threatened, and endangered plants found within the state of Maine, which includes about 353 species (MDACF, 2013). One plant species, the Small whorled pogonia, is documented as occurring within Androscoggin County (USFWS, 2016b). The Small whorled pogonia (SWP), was federally listed as an endangered species in 1982, and reclassified as a threatened species in 1993 (USFWS, 2012).

There is no critical habitat designated for this species at this time. The USFWS prepared a recovery plan and revised that plan in 1992. The Recovery Plan describes and prioritizes actions needed to help recover the species (USFWS, 2016b).

The Small whorled pogonia produces a smooth, hollow stem from 2 to 14 inches tall and topped by 5 or 6 leaves in a circular arrangement (false whorl). One or two flowers stand in the center of the whorl of leaves. The leaves are milky-green or grayish-green, and the flower is yellowish green with a greenish-white lip. In the northern part of the species range, plants with flowering buds emerge from the leaf litter in May and bloom in June (USFWS, 2012). Characteristics of this species' habitat include a sparse herb and shrub layer, a relatively open understory canopy, thick leaf litter on the forest floor, and gently sloping ground. Soils in which small whorled pogonia grows are generally acidic and dry during most of the growing season. Small whorled pogonia is almost always found in proximity to features that create long-persisting breaks in the forest canopy; light availability could be a limiting factor for this species (USFWS, 2012).

No other rare plant species or unique plant communities are known to occur within the Lower Barker Project area. The stakeholders requested no studies of botanical species as part of the relicensing.

NORTHERN LONG-EARED BAT

The northern long-eared bat (NLEB) is listed as a federally threatened species and is listed as Endangered at the state level. The silver-haired bat is a species of special concern in the state of Maine. The NLEB was listed as threatened on April 2, 2015, with a final rule published in the Federal Register on January 14, 2016. On April 27, 2016, the USFWS determined that the designation of critical habitat for the species was not prudent; therefore, no critical habitat is established for the NLEB (USFWS, 2016a).

The northern long-eared bat feeds on invertebrates and is known to glean prey from vegetation and water surfaces. The NLEB winters in underground caves and cave like structures, but summers singly or in small colonies in cavities, under bark, or in hollows of live and dead trees typically greater than 3 in. in diameter. Suitable roosting trees also include exfoliating bark, cavities, or cracks (USFWS, 2016a). The silver-haired bat is a summer resident of Maine and inhabits clear-cuts, coniferous forest, and mixed forest. The silver-haired bat also feeds primarily on insects, often over ponds, streams, and forest clearings (DeGraaf, 2001).

Currently there is a narrow band of hardwood riparian forest along the impoundment which is fragmented by urban development. While the Project falls within the range of the NLEB it is unlikely that the overwintering or summer roosting occurs with the Project, although feeding may occur over the impoundment. This is also true for the silver haired bat. Based on their known distribution, these bat species could occur in the Upper Barker Project area. The stakeholders requested no bat studies of as part of the relicensing.

MIGRATORY BIRDS

The protection of birds is regulated by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)).

Bald eagles are no longer listed under the ESA, but maintain federal protection under the Bald and Golden Eagle Protection Act. Bald eagles typically nest within 0.25 to 1 mile of large bodies of open water, such as lakes and large rivers. Eagles nest in large, super-canopy trees or snags often in late-successional forest. They prefer a nest site at the edge of the forest, near foraging areas, unobstructed views, and with little human disturbance. Most eagles forage primarily on fish, with lesser quantities of waterfowl, carrion, and small mammals. The bald eagle often winters along large interior or coastal bodies of water that remain free of ice.

5.6.3 ESSENTIAL FISH HABITAT

Pursuant to the amended Magnuson-Stevens Fishery Conservation and Management Act (Act), Congress mandated that habitats essential to federally managed commercial fish species be identified, and that measures be taken to conserve and enhance habitat. In the amended Act,

Congress defined essential fish habitat (EFH) for federally managed fish species as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (PFMC, 2010). Essential fish habitat is discussed in Section 5.3. There are no current records of federally managed essential fish habitat within the project area.

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5.7 RECREATION AND LAND USE

18 CFR 5.6(d)(3)(viii) requires "A description of the existing recreational and land uses and opportunities within the project boundary. The components of this description include: (A) Text description illustrated by maps of existing recreational facilities, type of activity supported, location, capacity, ownership and management; (B) Current recreational use of project lands and waters compared to facility or resource capacity; (C) Existing shoreline buffer zones within the project boundary; (D) Current and future recreation needs identified in current State Comprehensive Outdoor Recreation Plans, other applicable plans on file with the Commission, or other relevant local, state, or regional conservation and recreation plans; (E) If the potential applicant is an existing licensee, its current shoreline management plan or policy, if any, with regard to permitting development of piers, boat docks and landings, bulkheads, and other shoreline facilities on project lands and waters; (F) A discussion of whether the project is located within or adjacent to a: (1) River segment that is designated as part of, or under study for inclusion in, the National Wild and Scenic River System; or (2) State-protected river segment; (G) Whether any project lands are under study for inclusion in the National Trails System or designated as, or under study for inclusion as, a Wilderness Area. (H) Any regionally or nationally important recreation areas in the project vicinity; (I) Non-recreational land use and management within the project boundary; and (J) Recreational and non recreational land use and management adjacent to the project boundary."

5.7.1 REGIONAL RECREATION OPPORTUNITIES

The Upper Barker Project is contained within the Maine Lakes and Mountains tourism region as defined by the Maine Office of Tourism (MOT). The Maine Lakes and Mountains area is home to hundreds of glacial lakes and mountains and is widely known for its outdoor recreation opportunities including skiing, hiking, boating, and fishing. Within this region, there are 14 state parks, trails, campgrounds, and reserved lands (MDACF 2018). In 2016, those visiting the Maine Lakes and Mountains region accounted for 12 percent of all over-night and day trips taken in Maine (MOT 2017a). The most popular interests of overnight and day visitors to the region are touring or sightseeing, family fun or children's activities, and active outdoor activities (MOT 2017b).

Some notable parks near the Upper Barker Project include Androscoggin Riverlands State Park, Range Ponds State Park, and Bradbury Mountain State Park. Androscoggin Riverlands State Park is approximately 7 miles north of the Project and is the fifth largest park in the Maine parks system. The park includes over 10 miles of hiking and biking trails as well as extensive opportunities for boating, fishing, picnicking, snowmobiling, and snowshoeing (MDACF 2018). Range Ponds State Park, located approximately 7 miles southwest of the Upper Barker Project in the town of Poland, provides opportunities for swimming, boating, hiking, fishing, hunting,

snowmobiling, and snowshoeing (MDACF 2018). Bradbury Mountain State Park, located approximately 13 miles southeast of the Upper Barker Project in the town of Pownal, is one of the first state parks established in Maine and offers various activities including camping, hiking, and cross-country skiing (MDACF 2018).

5.7.2 COUNTY AND MUNICIPAL RECREATION AREAS

Within Androscoggin County, there are a number of municipal recreation areas, particularly within the urban centers for Lewiston and Auburn. Between these two cities, there are over 30 municipal parks, all of which are located within an eight-mile radius of the Upper Barker Project. These parks provide the following amenities: playgrounds; picnic areas; softball fields; hand-carry and trailered boat launches; basketball courts; swimming pool; birding and wildlife watching opportunities; disc golf; skateboarding; multi-use trails supporting hiking, cross-country skiing, and snowshoeing; and ATV and snowmobiling trails.

Some parks in the vicinity of the Project are:

- Mount Apatite - a 325 acre park located in the city of Auburn. The park has several miles of trails and is a popular site for mineral collection (Maine Trail Finder 2018). Mount Apatite is approximately 3.4 miles west from the Project.
- Thorncrag Nature Sanctuary - a 372 acre wildlife preserve in the city of Lewiston, located approximately 3.5 miles northeast from the Project. The preserve has over 4 miles of trails and is a popular site for bird and nature watching (Maine Trail Finder 2018).
- Sherwood Forest - a 28-acre conservation area in the city of Auburn owned in partnership between the city of Auburn and the Androscoggin Land Trust (ALT), a local non-profit. Sherwood Forest has 2.4 miles of trails as well as an outdoor classroom (Maine Trail Finder 2018). The Forest is approximately 1 mile southeast from the Project.
- Garcelon Bog - a 109 acre conservation area in the city of Lewiston, approximately 2.5 miles northeast from the Project. The bog has two trails that pass through a variety of habitats and provide areas for outdoor education (Maine Trail Finder 2018).
- Barker Mill Trail - A public walking trail that runs parallel to the Little Androscoggin River starting at the Lower Barker dam and continuing upstream to the Upper Barker dam. The trail provides a walking and biking path, shoreline access for angling, and an informal hand-carry boat launch just upstream of the Lower Barker Dam.
- Little Andy Park- A public park containing picnic tables and a hand-carry boat launch located 1.2 river miles downstream of the project on the Little Androscoggin River. The hand-carry boat launch provides access to both the Little Androscoggin River and the Androscoggin River.

- Rodney Bonney Memorial Park - A public park in the City of Auburn, located approximately 1 miles northeast from the Upper Barker Project. The park consists of an open grassy area with several park benches and playground equipment. The park is part of the Lewiston-Auburn Greenways Trail system and ends at a pedestrian walkway connecting the City of Auburn with the City of Lewiston located on an old railroad trestle bridge (Maine Trail Finder 2018).
- Moulton Park - A public park in the City of Auburn, located approximately 1 mile north from the Project. The park consists of an open field and a small skate park. This park is a terminus of a branch of the Lewiston-Auburn Greenways Trail system (Maine Trail Finder 2018).

5.7.3 EXISTING PROJECT RECREATION OPPORTUNITIES AND USE

Recreation activities occurring in the Upper Barker project area are generally traditional outdoor pursuits such as fishing, hunting, hiking, camping and boating. KEI (USA) permits public use of the project land and waters for recreation, however there are no formal recreation facilities within the project boundary of the Upper Barker Project. KEI (USA) has limited ownership of the lands surrounding the Project. KEI (USA) seasonally implements a boat barrier in the impoundment above the dam from approximately May 31 through October 15. The Barker Mill Trail provides shoreline access to the river right[6] bank between the Upper Barker dam and the Lower Barker dam; an informal hand-carry boat launch is on river right immediately upstream of the Lower Barker dam. There is no formal portage route at the Project. Railroad tracks on the river left bank preclude development of recreational facilities. The right and left banks downstream of the dam are steep, rocky, and densely forested.

Recreation activities at the Project are very limited, primarily consisting of shoreline fishing. FERC exempted the Upper Barker Project from filing the Form 80 recreation report via letter dated April 4, 1996.

5.7.4 RECREATION NEEDS IDENTIFIED IN MANAGEMENT PLANS

Management plans that cover recreation resources within the vicinity of the Upper Barker Project are summarized below.

[6] From the perspective of an observer looking downstream.

2014-2019 Maine State Comprehensive Outdoor Recreation Plan

The Maine State Comprehensive Outdoor Recreation Plan (MSCORP) provides information on the supply and demand for outdoor recreation opportunities in Maine, assesses recreation issues, provides an implementation plan, as well as serves to qualify Maine for funding from the federal Land and Water Conservation Fund (LWCF) to acquire or develop lands for public outdoor recreation. There are no recommendations specific to the Upper Barker Project, but the recreation goals outlined in the MSCORP may be applied by governments at the state, county, or municipal levels including Androscoggin County and the cities of Lewiston and Auburn. Recreation priorities outlined in the MSCORP that may bear relevance to the Project are (MDACF 2015):

- To connect Mainers with the health and wellness benefits of outdoor recreation;
- To support regionally connected trail systems in less developed regions to increase access and enhance economic development;
- To connect to future tourism markets through recreation interests; and
- To increase access to and awareness of local and regional recreation opportunities through effective communication and collaboration between the public, municipal, and private landowners.

City of Auburn Comprehensive Plan: 2010 Update

The City of Auburn Comprehensive Plan: 2010 Update was developed to expand upon policies outlined in the original Comprehensive Plan and to create new policies to address emerging issues for the City. The 2010 Update serves as a decision-making tool for the City when addressing issues concerning natural resources, public facilities and infrastructure, historic preservation, economic and community development, housing, and recreation and open space. The plan does not specifically address recreation activities at the Upper Barker Project. Among the recreation goals of the 2010 Update that may bear relevance to the Project are (City of Auburn 2011):

- To increase recreation and boat access to the Androscoggin River and Little Androscoggin River;
- To improve current recreational river access through trail and park maintenance;

- To increase the amount of open space in the City by collaborating with local conservation organizations including the Androscoggin Land Trust, overseers of the Lower Barker Trail, and the Lake Auburn Watershed Protection Commission; and
- To maintain and enhance city trails by supporting the efforts of local conservation and outdoor recreation organizations.

Western Maine Regional Open Space Policy

The Western Maine Regional Open Space Policy (WMROSP) was published by the Androscoggin Valley Council of Governments (AVCOG), a resource sharing organization for all the municipalities in Androscoggin, Franklin, and Oxford Counties. The WMROSP does not identify any specific lands for conservation, but develops policies to be used by the AVCOG, member municipalities, and State and federal agencies and directs conservation opportunities in the future. Among the goals of the policy that may bear relevance to the Project are (AVCOG, 2009):

- To promote open spaces as a way to improve Western Maine's "Quality of Place";
- To promote economic development which protects and conserves open spaces;
- To work with private land owners to continue the tradition of public access to private lands for outdoor recreation; and
- To conserve energy and encourage the growth of alternative energy sources including wind and hydroelectric.

2014 New Auburn Village Center Study

The New Auburn Village Center Study builds upon the 2009 New Auburn Master Plan and outlines the holistic development of New Auburn through strategic improvements to infrastructure, transportation, and open spaces (T. Y. Lin International 2014). The study is focused on the development of approximately 38 acres in the vicinity of the Upper Barker Project and promotes the development of the economy and infrastructure of the area while leveraging the assets provided by the Androscoggin and Little Androscoggin Rivers. Specific components of the study which may be relevant to the Project are:

- To promote connectivity and open space planning to revitalize the economy of New Auburn by providing new recreation opportunities and access to the river;
- To relocate or close bridges and roads to provide access to the Androscoggin and Little Androscoggin Rivers; and

- To expand the Riverwalk by connecting the riverfront with trails and open spaces.

Androscoggin River Greenway Plan

The Greenway plan was developed through collaboration between the Androscoggin Land Trust, the City of Auburn, and the City of Lewiston to provide access (e.g., pedestrian, bike, river) and a network of trails connecting the Androscoggin River corridor with surrounding neighborhoods, businesses, and recreation opportunities (Wright-Pierce 2013). Objectives of the plan are to maintain existing pedestrian and bicycle greenway segments and trails; to develop and improve the greenway by creating loop trails connecting with the river; to extend the Riverwalk; to improve and expand boat access to the river; and to create and improve portage routes. Specific components of the plan in the vicinity of the Upper Barker Project include developing the New Auburn Loop trail, improving on-road and off-road pedestrian and bike trails along the Little Androscoggin River, and constructing a pedestrian bridge across the Little Androscoggin River to connect the Barker Mill Trail with Moulton Park.

City of Lewiston Comprehensive Plan

The Lewiston Comprehensive Plan establishes the vision for future development, strategies for sustainable growth, and outlines steps for implementation (City of Lewiston 2017). The plan outlines the framework for implementing public policy, protecting natural resources, making land use decisions, and supporting public and private investments and developments. The plan does not specifically address recreation opportunities at the Upper Barker Project or the Little Androscoggin River. Objectives of the plan that may be relevant to the Project include:

- Supporting the Androscoggin Land Trust Greenway Plan and developing the Riverfront;
- Developing and restoring the canals for recreation and economic purposes;
- Maintaining, upgrading and rehabilitating existing public parks and recreation facilities;
- Supporting health and exercise related events;
- Expanding the trail system to connect rural and urban areas; and
- Improving and creating walking, biking, and hiking trails.

Riverfront Island Master Plan

The Riverfront Island Master Plan focuses on developing Lewiston's downtown riverfront and making it an urban and commercial riverfront destination (City of Lewiston 2012). Goals of the plan which may be relevant to the Project are:

- to continue to develop the Riverwalk by providing water access and scenic views;
- to create and improve connections between new and existing parks and the Riverfront and;
- to make the area more walkable and create a Canal Walk.

5.7.5 LAND USES AND MANAGEMENT WITHIN THE PROJECT VICINITY

The Upper Barker Project lies wholly within Androscoggin County, Maine, which has a total area of approximately 497 square miles (MRLC 2011). The dominant land cover class in Androscoggin County is forestland (57.6 percent) followed by wetlands (11.1 percent) and agricultural (10.8 percent) (Table 5-17) (Figure 5-8). Overall, only a small percentage of Androscoggin County is developed (6.1 percent) (Table 5-17) (MRLC 2011). Open water constitutes 5.2 percent of the area of Androscoggin County.

TABLE 5-17 LAND USES IN ANDROSCOGGIN COUNTY

LAND USE	SQUARE MILES	PERCENT
Developed	30.5	6.1%
Agricultural	53.9	10.8%
Forestland	286.4	57.6%
Wetlands	54.9	11.1%
Grasslands	2.9	0.6%
Scrub/Shrub	11.4	2.3%
Barren Land	2.9	0.6%
Open Space	28.5	5.7%
Open Water	25.8	5.2%
Total	497.2	

Source: MRLC 2011.

The Upper Barker Project is located completely within the city of Auburn. Auburn has a mix of urban development and forested areas (Figure 5-8). The immediate shoreline of the project impoundment is predominantly wooded with some development (Figure 5-8). Land use on privately owned lands in the city, including those adjacent to the project boundary, are regulated

by the Auburn Planning & Permitting department. The areas of Auburn closest to the Project are zoned as general business; multi-family urban and suburban; and rural residential (Figure 5-9) (Auburn, 2011). Any development on private lands requires the appropriate permits and must adhere to the design and development standards of the Auburn Planning & Permitting department.

FIGURE 5-8 LAND USE MAP OF VICINITY OF THE PROJECT

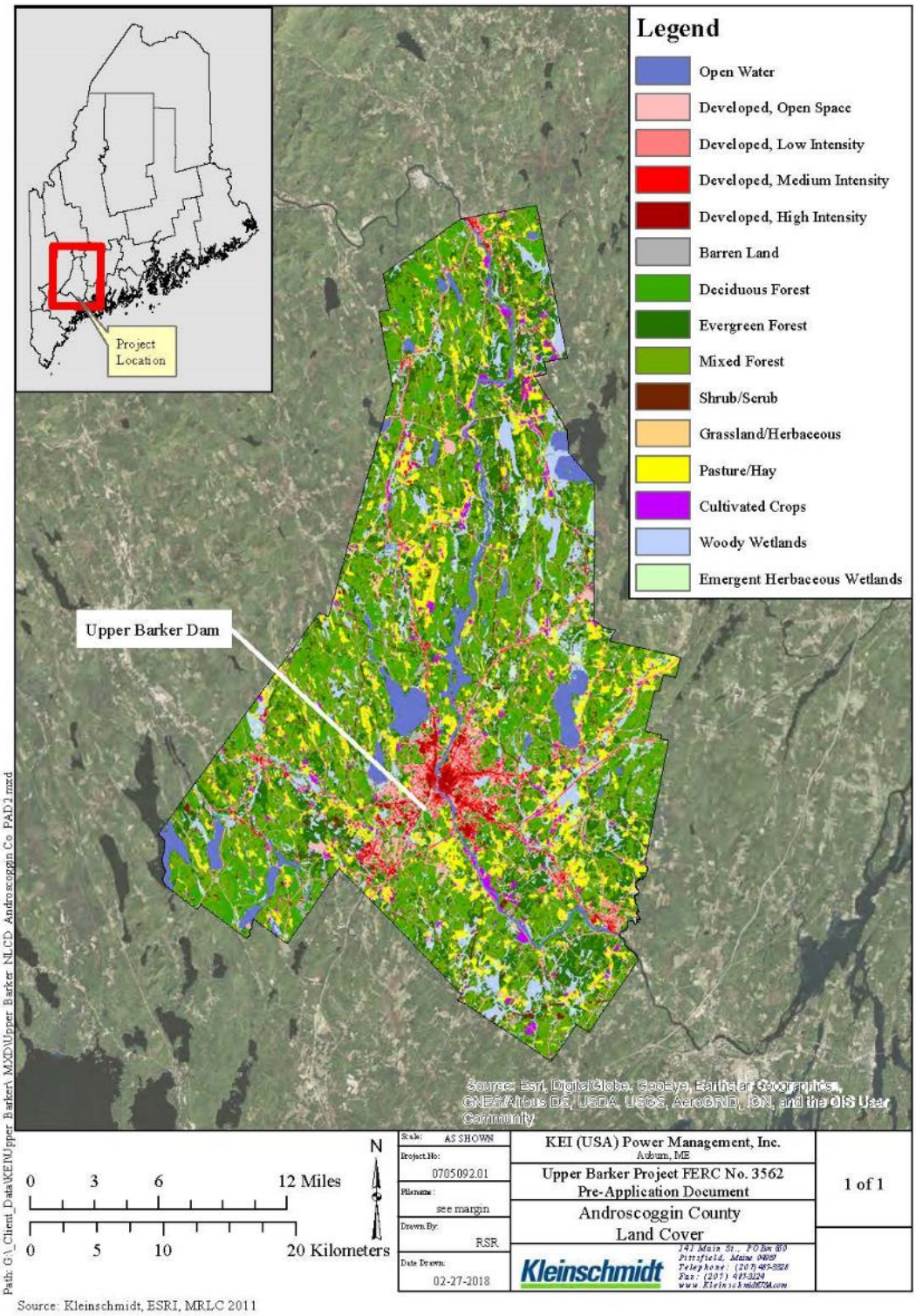
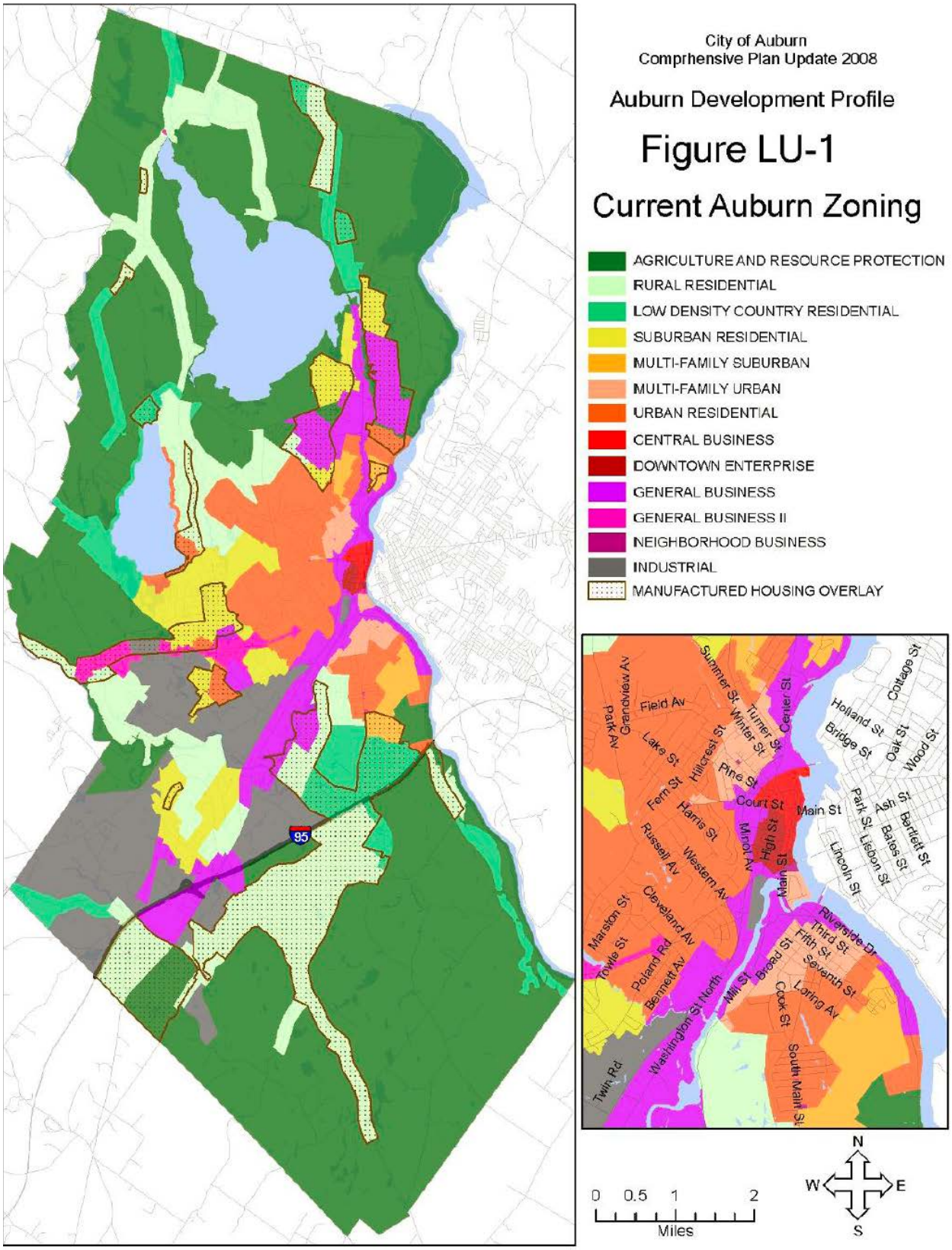


FIGURE 5-9 ZONING MAP OF THE CITY OF AUBURN



Source: Auburn, 2011

5.7.6 LAND USE AND MANAGEMENT OF PROJECT LANDS

Project operations and maintenance are the primary activities that occur on project lands. There are no formal public recreation facilities at the Project and access to the dam is blocked to unauthorized vehicles or pedestrians.

5.7.7 REFERENCES

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5.8 AESTHETIC RESOURCES

18 CFR 5.6(d)(3)(ix) requires " A description of the visual characteristics of the lands and waters affected by the project. Components of this description include a description of the dam, natural water features, and other scenic attractions of the project and surrounding vicinity. Potential applicants are encouraged to supplement the text description with visual aids."

5.8.1 VISUAL CHARACTER OF THE PROJECT VICINITY

The Upper Barker Project is located the city of Auburn in the Lewiston-Auburn metropolitan area which is the largest developed area in Androscoggin County (Figure 5-9). Androscoggin County is predominantly rural, consisting of rugged forests and agricultural lands with minimal development in 14 towns and cities across the County (FERC 1996). Over half (approximately 58 percent) of Androscoggin County is forested (MRLC 2011). The city of Auburn is mostly urban with pockets of forests in the outer edges of the city. Lands immediately surrounding the Upper Barker Project are densely forested with steep and rocky banks (FERC 2011).

The Little Androscoggin River originates at Bryant Pond, 30 miles northwest from the Project, in Oxford County. The Little Androscoggin River flows southeasterly through Oxford and Androscoggin counties to its confluence with the Androscoggin River in the city of Auburn.

5.8.2 NEARBY SCENIC ATTRACTIONS

The Upper Barker Project is contained within the Maine Lakes and Mountains tourism region. Within the Upper Barker project vicinity are numerous scenic attractions of local and regional importance. There are 14 state and 32 municipal parks in the project vicinity. These parks offer a variety of trails which offer views of the Androscoggin River and its tributaries, and other scenic lands.

There are numerous covered bridges in the Maine Lakes and Mountains region. Most covered bridges in Maine were built between the mid-1800s and early 1900s. At its peak, Maine had 120 covered bridges, today only nine remain. Six of those bridges are located in the Maine Lakes and Mountain region, they include: Babb's Bridge, Bennett Bridge, Hemlock Bridge, Lovejoy Bridge, Parsonsfield-Porter Bridge, and Sunday River Bridge (Artist's Bridge) (MLMTC 2018). The Sunday River Bridge is often referred to as Artist's Bridge because it is the most painted and photographed covered bridge in Maine (MLMTC 2018).

There are four scenic byways located within the Maine Lakes and Mountains Region. The Rangeley Lakes Scenic Byway is designated a National Scenic Byway by the U.S. Department of Transportation Federal Highway Administration (MLMTC 2018). The Byway extends approximately 52 miles through western Maine and offers magnificent views of several mountains, Rangeley Lake, Angel Falls, Mooselookmeguntic Lake, Sandy River, Beaver Pond, and Toothaker Island. The byway also provides opportunity for wildlife watching and outdoor recreation. Grafton Notch is a state scenic byway that extends approximately 21 miles through Grafton Notch State Park. The byway offers scenic views of Lake Umbagog, Screw Auger Falls, and Mother Walker Falls (MLMTC 2018). Pequawket Trail is a state scenic byway that extends approximately 60 miles and goes through a section of the White Mountains National Forest on the New Hampshire border. The byway offers scenic views of Mount Washington, Hemlock Covered Bridge, and Jockey Cap Rock. State Route 27 is a state scenic byway that extends approximately 47 miles from the Canadian border to central Maine. The byway offers scenic views of Mount Abraham, Carabassett River, Flagstaff Lake, and Cathedral Pines, the largest area of old growth forest in Maine (MLMTC 2018).

5.8.3 VISUAL CHARACTER OF PROJECT LANDS AND WATERS

The Upper Barker impoundment extends upstream approximately 1.7 river miles and is bordered by forest, a railroad, and small business activity on the river left bank and by forest on the river right bank. A short gravel road leads to the powerhouse and dam. The project includes a 21-foot high 230-foot long masonry-gravity dam and a 35-foot gate section; the powerhouse is adjacent to the dam on river right. A public road runs parallel to the Upper Barker Project area. During winter months the dam is visible from this road, however the foliage fills in during fall and summer months obscuring views of the Project.

PHOTO 5-3 UPPER BARKER DAM

5.8.4 REFERENCES

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5.9 CULTURAL RESOURCES

18 CFR 5.6(d)(3)(x) requires "A description of the known cultural or historical resources of the proposed project and surrounding area. Components of this description include: (A) Identification of any historic or archaeological site in the proposed project vicinity, with particular emphasis on sites or properties either listed in, or recommended by the State Historic Preservation Officer or Tribal Historic Preservation Officer for inclusion in, the National Register of Historic Places; (B) Existing discovery measures, such as surveys, inventories, and limited subsurface testing work, for the purpose of locating, identifying, and assessing the significance of historic and archaeological resources that have been undertaken within or adjacent to the project boundary; and (C) Identification of Indian tribes that may attach religious and cultural significance to historic properties within the project boundary or in the project vicinity; as well as available information on Indian traditional cultural and religious properties, whether on or off of any federally-recognized Indian reservation (A potential applicant must delete from any information made available under this section specific site or property locations, the disclosure of which would create a risk of harm, theft, or destruction of archaeological or Native American cultural resources or to the site at which the resources are located, or would violate any Federal law, including the Archaeological Resources Protection Act of 1979, 16 U.S.C. 470w-3, and the National Historic Preservation Act of 1966, 16 U.S.C. 470hh)."

5.9.1 HISTORY OF THE PROJECT VICINITY

The State of Maine's cultural history began during the Paleo-Indian Period around 11,500 years before present (YBP). As early as the 1490s, Native Americans, the ancestors of today's Abenaki Indians, settled and travelled along the Androscoggin River (Bethel Historical Society, 2007). The Anasagunticooks or Androscoggin tribe of the Abenakis occupied the Merrymeeting Bay valley including the project vicinity with their chief stronghold located on Laurel Hill, Auburn, located just northeast of the Project (Mower, 1938; Ne-Do-Ba, 1997). The Abenaki survived by hunting large game and fishing, siting fishing camps near the base of falls where fish collected as they made their way upstream. The Abenaki also used the Androscoggin River as a "great water road", both in summer and winter when ice over facilitated easier travel than land routes (Bethel Historical Society, 2007).

Around 1600, Europeans first ventured up into Merrymeeting Bay and then up the lower Androscoggin River, named "Pejepscot" (Bethel Historical Society, 2007). The Pejepscot settlement originated with land purchase and settlement by Thomas Purchase and George Way in about 1624 to 1625. By 1673, the English had established a commercial fishing operation at Pejepscot Falls in Brunswick. Fifteen years later, Governor Andross erected Fort Andross at Brunswick, the first fortification on the Androscoggin River. Upriver areas took longer to settle

and it was not until the defeat of French Canada by the British in 1763 that the region upriver of the lower Androscoggin considered safe with new towns including Durham, Lewiston, Auburn, Livermore, Rumford, and Bethel developing just before and during the American Revolution (City of Auburn, 2010).

The City of Auburn was originally a part of a large section of the "Pejepscot Purchase", which was settled in 1814 and originated from various legal battles regarding the purchase of territory lands from the Abenaki tribe in 1694 by Richard Wharton (Mower, 1938; Wheeler and Wheeler, 2004). European settlement in the City of Auburn historically focused on the rich agricultural lands to the south and west of the Project. One early village settlement in the City was established around a mill erected by Jacob Mason, on the Little Androscoggin, in 1786 (BMPC, 1889). The majority of development in and around downtown Auburn dates from the middle to late 1800s, during settlement from other parts of New England and Canada and during the rise of the shoe manufacturing industry (City of Auburn, 2008).

5.9.2 IDENTIFICATION OF HISTORIC AND ARCHEOLOGICAL SITES IN THE PROJECT VICINITY

Twenty-nine prehistoric sites have been located within the City of Auburn, primarily located on the banks of Lake Auburn, the Androscoggin River, and the Little Androscoggin River (City of Auburn, 2010).

There are 22 properties in the City of Auburn listed on the National Register of Historic Places (City of Auburn, 2010; NPS, 2013). Several are within proximity of the Project:

- Barker Mill at 143 Mill Street, located adjacent to the Project bypass reach. Originally constructed in 1873, the former mill is currently an apartment complex (NPS, 2013).
- The Main Street Historic District, approximately 0.5 mile north of the Project. The Historic District includes the following NRHP properties:
  - Horatio G. Foss House at 19 Elm Street;
  - A. A. Garcelon House at 223 Main Street; and
  - Edward Little House at 217 Main Street.

5.9.3 PRIOR CULTURAL RESOURCE INVESTIGATIONS

Pre-historical archaeological surveys have been completed along the banks of the Androscoggin River and the Little Androscoggin River (upstream of the Project) and one historic

archaeological site, the Fort Laurel Hill Native American settlement, is documented in the vicinity of the Project (City of Auburn, 2008).

5.9.4 TRIBAL RESOURCES

The project boundary includes a very limited reach of the Little Androscoggin River. While the project area has been documented as historically being inhabited by the Abenaki, none of Maine's five federally recognized Indian tribes have indicated religious or cultural significance to historic properties within the project boundary. The Penobscot Indian Nation has expressed an interest in the potential cultural resources within the Project, as discussed in greater detail in Section 5.11.

5.9.5 REFERENCES

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5.10 SOCIOECONOMIC RESOURCES

18 CFR 5.6(d)(3)(xi) requires "A general description of socio-economic conditions in the vicinity of the project. Components of this description include general land use patterns (e.g., urban, agricultural, forested), population patterns, and sources of employment in the project vicinity."

The following section provides a summary of selected socioeconomic variables for the project vicinity, Androscoggin County, as well as the city of Auburn and the state of Maine.

5.10.1 GENERAL LAND USE PATTERNS

Approximately 61% of Androscoggin County, where the Project is located, is forested (NOAA C-CAP, 2006). Although forests account for approximately 90% of Maine's land use, a vast majority of those lands are privately owned and forest-related jobs account for only 2.4% of Maine's jobs and 1.1% of jobs in Androscoggin County. Education and health services is the largest employer in Androscoggin County, followed by retail trade and manufacturing (U.S. Census, 2016a).

5.10.2 POPULATION PATTERNS

In 2016 an estimated 107,319 people were living in Androscoggin County, making it the fifth most populated county in the state of Maine. Of those people living in Androscoggin County 22,948 were living in the city of Auburn (Table 5-18). The city of Auburn is the fifth largest city in the state of Maine. Androscoggin County is less densely populated, with a population density of 230 people/mi², compared to the city of Auburn which has a population density of 389 people/mi² (Table 5-18) (U.S. Census 2016a, 2016b).

TABLE 5-18 POPULATION STATISTICS FOR AUBURN, ANDROSCOGGIN COUNTY AND MAINE

	CITY OF AUBURN	ANDROSCOGGIN COUNTY	MAINE
Population			
Population (2016 estimate)	22,948	107,319	1,331,479
Population (2010)	23,055	107,702	1,328,361
Population Growth (2000 to 2010)	-0.5%	-0.4%	0.2%
Geography (2010)			
Land area in square miles	59.33	467.93	30,842.92
Population Density	388.6	230.2	43.1
Gender (2010)			
Male	48.3%	48.9%	48.9%

	City of Auburn	Androscoggin County	Maine
Female	51.7%	51.1%	51.1%
Age (2010)			
Persons under 5 years old	6.1%	6.4%	5.2%
Persons under 18 years old	22.1%	22.6%	20.7%
Persons 65 years old and over	15.2%	14.1%	15.9%
Race (2010)			
Caucasian	92.8%	91.8%	94.1%
Black	2.5%	3.7%	1.3%
American Indian and Alaska Native	0.4%	0.4%	0.7%
Asian	0.9%	0.7%	1.1%
Native Hawaiian and Other Pacific Islander	Z	0.1%	Z
Hispanic or Latino	1.5%	1.7%	1.4%
Two or more races	2.1%	2.0%	1.5%

Source: U.S. Census, 2016a, 2016b

5.10.3 Households/Family Distribution and Income

From 2012-2016, the annual per capita personal income for Androscoggin County was $25,788 (in 2016 dollars), slightly below the state of Maine per capita personal income of $28,473. In 2012-2016, Androscoggin County had 44,747 households and an average household size of approximately 2.33 individuals. From 2012-2016, the County had same number of persons below poverty level as the state average, 12.7% respectively. (U.S. Census 2016a and 2016b).

Auburn residents had an annual per capita income of $28,133 based on 2012-2016 data, comparable to the overall average for the state of Maine. The city of Auburn had 9,774 households and an average household size of approximately 2.28 individuals for 2012-2016. The percentage of persons below poverty level in the city from 201-2016 was 14.8% compared to the poverty rate for Androscoggin County at 12.7% (U.S. Census 2016a and 2016b).

Approximately 89.4% of the population of Androscoggin County had an education attainment of high school graduate or higher, while 20.7% held Bachelor's degrees or higher (U.S. Census 2016a). Approximately 90% of the population of Auburn had an education attainment of high school graduate or higher, while 26.2% held Bachelor's degrees or higher (U.S. Census 2016b).

5.10.4 PROJECT VICINITY EMPLOYMENT SOURCES

Table 5-19 below provides 2011 data on employment sources in the city of Auburn and Androscoggin County. In Androscoggin County the education and health services sector is the largest employer, employing 27% of the workforce. The retail trade and manufacturing sectors were also important, accounting for approximately 16% and 12% respectively (U.S. Census 2011a). In 2012, Androscoggin County was ranked 7th out of 16 counties for lowest unemployment rate at 7.4% This is comparable to the mean unemployment rate for the state of Maine which was 7.3% (MCWRI, 2012).

In 2011, there were 11.423 individuals in the labor force in the city of Auburn. As with the county, the education and health services sector provides the greatest number of jobs employing 27% of the workforce. The retail trade and manufacturing sectors were the next largest employers accounting for approximately 14% and 12% respectively (U.S. Census 2011b). In 2012, Auburn was ranked 7th out of 14 towns and cities in Androscoggin County for lowest unemployment rate at 7.2%. This is slightly below the county unemployment rate of 7.4% (MCWRI, 2012).

TABLE 5-19 EMPLOYMENT STATISTICS FOR AUBURN, ANDROSCOGGIN COUNTY AND MAINE

	CITY OF AUBURN	ANDROSCOGGIN COUNTY	MAINE
Civilian Labor Force Employment Status			
Number Employed	11,423	52,591	654,300
Non-Farm Employment by Industry			
Natural Resources, and Mining	87	579	15,584
Construction	768	3,949	47,681
Manufacturing	1,325	6,471	64,953
Wholesale Trade	311	1,580	16,510
Retail Trade	1,551	8,217	90,295
Transportation and Utilities	484	2,342	26,234
Information	349	1,198	12,997
Financial Activities	863	3,499	40,752
Professional and Business Services	903	4,096	55,859
Education and Health Services	3,112	14,044	172,685
Leisure and Hospitality	880	3,075	54,020
Other Services	408	1,851	29,002
Public administration	382	1,690	27,728

Source: U.S. Census, 2011a, 2011b

5.10.5 REFERENCES

Maine Center for Workforce Research and Information (MCWRI). 2012. Unemployment and Labor Force. [Online] URL: http://www.maine.gov/labor/cwri/laus.html. Accessed November 11, 2013.

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5.11 TRIBAL RESOURCES

18 CFR 5.6(d)(3)(xii) requires "A description of Indian tribes, tribal lands, and interests that may be affected by the project. Components of this description include: (A) Identification of information on resources specified in paragraphs (d)(2)(ii)–(xi) of this section to the extent that existing project construction and operation affecting those resources may impact tribal cultural or economic interests, e.g., impacts of project-induced soil erosion on tribal cultural sites; and (B) Identification of impacts on Indian tribes of existing project construction and operation that may affect tribal interests not necessarily associated with resources specified in paragraphs (d)(3)(ii)–(xi) of this Section, e.g., tribal fishing practices or agreements between the Indian tribe and other entities other than the potential applicant that have a connection to project construction and operation."

5.11.1 TRIBAL LANDS AND INTERESTS

The project area has been documented as being historically inhabited by the Abenaki but there are no tribal lands within the project boundary and there are no federal reservations in the vicinity of the Project.

The Project occupies a limited reach of the Little Androscoggin River and is operated in run-of-river mode, which more closely matches the natural hydrologic regime of the River. As such, project operations are not expected to affect any resources that may impact cultural or economic interests.

5.11.2 IDENTIFICATION AND CONSULTATION WITH TRIBES

KEI (USA) will be sending this PAD by mail to the five federally recognized tribes of the state.

6.0 PRELIMINARY LISTING OF POTENTIAL ISSUES, INFORMATIONAL NEEDS, AND MITIGATION BY RESOURCE

18 CFR 5.6(d)(4) requires "Based on the resource description and impacts discussion required by paragraph (d)(3) of this section; the pre-application document must include with respect to each resource area identified above, a list of: (i) Issues pertaining to the identified resources; (ii) Potential studies or information gathering requirements associated with the identified issues; (iii) Relevant qualifying Federal and state or tribal comprehensive waterway plans; and (iv) Relevant resource management plans."

This section of the PAD also discusses relevant qualifying Federal and state or tribal comprehensive waterway plans.

6.1 PRELIMINARY ISSUES BY RESOURCE

This section identifies any known or potential effects of project operations. This including potential effects from continuing operations and those that may result from cumulative effects, on the resources specified in Section 5.0, including those identified through consultation with agencies and stakeholders

6.1.1 GEOLOGY AND SOILS

The Project is operated in a run-of-river mode and will continue to be operated as such under the new license. The majority of the shoreline is heavily forested and undeveloped with portions consisting of exposed bedrock. Project operations are not expected to contribute to significant water level fluctuations in the impoundment or downstream that would contribute to any naturally occurring erosion in the project area.

6.1.2 WATER RESOURCES

In anticipation of MDEP information needs, KEI (USA) conducted water quality monitoring at the Upper Barker project concurrent with the 2015 relicensing study for the Lower Barker Hydroelectric Project. Based upon the results of this recent monitoring, KEI (USA) believes existing information demonstrates attainment of state standards.

6.1.3 FISH AND AQUATIC RESOURCES (INCLUDING T&E SPECIES)

Because the project does not have a bypass reach and will continue to be run-of-river it is not anticipated that the project will adversely affect aquatic habitat in the impoundment and tailwater.

6.1.4 WILDLIFE RESOURCES (INCLUDING T&E SPECIES)

Lands immediately adjacent to the project impoundment and bypass reach are largely forested and undeveloped but are narrow swaths between existing roadways, railroad tracks and urban and residential development and are therefore unlikely to be significantly utilized by wildlife. The Project is and will continue to be operated in a run-of-river mode and effects to terrestrial wildlife are expected to be minimal. Any aquatic mammals, amphibians, and aquatic and semi-aquatic reptiles that may inhabit the project area are utilizing a river system that has been stable for decades. The extent of T&E species in the project area and surrounding lands is not well documented but is not expected to be significant given the limited available habitat.

6.1.5 BOTANICAL RESOURCES (INCLUDING T&E SPECIES AND RIPARIAN, WETLAND AND LITTORAL HABITAT RESOURCES)

The majority of the project shoreline is forested or consisting of armored bedrock. Wetland areas are extremely limited. It is not expected that continued project operations will result in adverse effects on wetland and botanical resources.

6.1.6 RECREATION AND LAND USE

The City of Auburn repeatedly identified the importance of lands along the Little Androscoggin River to the City and its long-range plans for recreational access to the river. As part of the Lower Barker relicensing proceeding, KEI (USA) has proposed, and anticipates FERC will approve, improvements to impoundment and bypass recreational access as well as signage and parking improvements at the Lower Barker Project. The Project occupies a relatively small footprint and is surrounded by privately owned lands. KEI (USA), as required by the license, allows free public access to project lands and waters for recreation. The ability of KEI (USA) to enhance recreation at the Project is hindered by the lack of space, available land, and the precipitous nature of the shoreline adjacent to the dam. Nevertheless, KEI (USA) understands

recreational access is an important issue to stakeholders and will work with them to address concerns through the relicensing process.

6.1.7 AESTHETIC RESOURCES

The Project is in keeping with the industrial architecture of the redeveloped mill buildings in the immediate vicinity. No effects to aesthetic resources are expected from continued project operations.

6.1.8 CULTURAL AND TRIBAL RESOURCES

During the Lower Barker Project relicensing, the Maine Historic Preservation Commission (MHPC) stated that the project area possibly contains one or more prehistoric archaeological sites and required Phase I archaeological survey. Studies concluded that no culturally significant resources exist at Lower Barker. KEI (USA) expects similar conditions occur at Upper Barker.

6.1.9 SOCIOECONOMIC RESOURCES

The Project has limited socioeconomic influence over the immediate area, the City of Auburn. The plant is remotely operated and does not significantly contribute to business or industry in the City. However, both Barker facilities (Upper and Lower) contribute to the City tax base, which for 2017 was approximately $25,240.

6.2 LICENSEE PROPOSED STUDIES AND INFORMATION GATHERING NEEDS BY RESOURCE

The following sections identify initial information gathering and studies for each resource based upon the issues identified in Section 6.1.

6.2.1 GEOLOGY AND SOILS

KEI (USA) believes adequate information exists to assess the effects of proposed project operations on erosion. No studies are proposed at this time.

6.2.2 WATER RESOURCES

Based upon the results of the 2015 monitoring, KEI (USA) believes existing information demonstrates attainment of state standards and is not proposing additional monitoring.

6.2.3 FISH AND AQUATIC RESOURCES (INCLUDING RTE SPECIES)

KEI (USA) believes sufficient baseline fisheries resource information is available to assess project effects. While KEI (USA) is not currently identifying fish passage related studies, fish passage issues will be discussed with the fisheries agencies to identify what future steps may be evaluated during the relicensing process.

6.2.4 WILDLIFE RESOURCES (INCLUDING T&E SPECIES)

KEI (USA) believes adequate information exists to assess the effects of proposed project operations on wildlife resources and will continue to coordinate with the USFWS, NMFS, and MDIFW on any potential threatened or endangered species, given the limited availability of habitat. No studies are proposed at this time.

6.2.5 BOTANICAL RESOURCES (INCLUDING T&E SPECIES AND RIPARIAN, WETLAND AND LITTORAL HABITAT RESOURCES)

KEI (USA) believes adequate information exists to assess proposed project operation effects to botanical resources. No studies are proposed at this time.

6.2.6 RECREATION AND LAND USE

KEI (USA) believes sufficient use level and participation trend data exists and that adequate information exists to assess the effects of the Project on land use. No studies of recreation and land use are proposed for the relicensing effort at this time.

6.2.7 AESTHETIC RESOURCES

KEI (USA) believes adequate information exists to assess the aesthetic effects of project operations. No studies of aesthetic resources at the Project are proposed at this time.

6.2.8 CULTURAL AND TRIBAL RESOURCES

KEI (USA) believes sufficient information from the Lower Barker exist to characterize cultural resources but understands the MHPC may request a Phase 1 archaeological survey of the Little Androscoggin River within the project area and will coordinate with the MHPC on these efforts. There are no existing Indian reservations within proximity of the Project and tribes with a history of regional occupation are not anticipated to be affected by project operations. However KEI

(USA) understands that the Penobscot Indian Nation may have a concern with any significant cultural, historical, or archaeological sites or structures that may be affected within the APE, and will consult with the Nation to address these concerns during the relicensing process.

6.2.9 SOCIOECONOMIC RESOURCES

KEI (USA) believes that adequate information exists to assess the socioeconomic effects of the Project and project operations. No studies relevant to socioeconomics are proposed for the relicensing effort at this time.

6.3 RELEVANT QUALIFYING FEDERAL AND STATE OR COMPREHENSIVE WATERWAY PLANS

Section 10(a) of the Federal Power Act (FPA), 16 U.S.C. § 803(a)(2)(A), requires FERC to consider the extent to which a Project is consistent with Federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the Project. On April 27, 1988, FERC issued Order No. 481-A revising Order No. 481, issued October 26, 1987, establishing that FERC will accord FPA Section 10(a)(2)(A) comprehensive plan status to any Federal or state plan that:

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

FERC currently lists 31 comprehensive plans for the State of Maine. Of these listed plans, 12 are potentially relevant to the Project, as listed below in Table 6-1. These plans may be useful in the relicensing proceeding for characterizing desired conditions.

TABLE 6-1 LIST OF QUALIFYING FEDERAL AND STATE COMPREHENSIVE WATERWAY PLANS POTENTIALLY RELEVANT TO THE UPPER BARKER PROJECT

RESOURCE	COMPREHENSIVE PLAN
Fisheries	Atlantic States Marine Fisheries Commission. 1998. Amendment 1 to the Interstate Fishery Management Plan for shad and river herring. (Report No. 35). April 1999
Fisheries	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.
Fisheries	Atlantic States Marine Fisheries Commission. 2009. Amendment 2 to the Interstate Fishery Management Plan for shad and river herring. Arlington, Virginia. May 2009.
Fisheries	Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for shad and river herring. Arlington, Virginia. February 2010.
Fisheries	Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American eel (*Anguilla rostrata*). (Report No. 36).
Recreation and Land Use	Maine Department of conservation. Maine State Comprehensive Outdoor Recreation Plan (SCORP): 2003-2008. Augusta, Maine. October 2003.
Water Resources, Fisheries, Recreation	Maine Department of Conservation. 1982. Maine rivers study-final report. Augusta, Maine. May 1982. 181pp.
Water Resources, Fisheries, Recreation	Maine State Planning Office. 1987. Maine comprehensive rivers management plan. Augusta, Maine. May 1987. three volumes.
Water Resources, Fisheries, Recreation	Maine State Planning Office. 1992. Maine comprehensive rivers management plan. Volume 4. Augusta, Maine. December 1992.
Water Resources, Recreation, and Aesthetics	Nation Park Service. The nationwide Rivers Inventory. Department of the Interior, Washington, DC. 1993.
Wildlife	U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986
Fisheries, Recreation	U.S. Fish and Wildlife Service n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington D.C.

Source: FERC, 2018

6.4 RELEVANT RESOURCE MANAGEMENT PLANS

In addition to the qualifying Federal, state, and Tribal comprehensive waterway plans listed in Section 6.3, some resource agencies have developed resource management plans to help guide their actions regarding specific resources of jurisdiction. The resource management plans listed in Table 6-2 may be relevant to the Project and may be useful in the relicensing proceeding for characterizing desired conditions.

TABLE 6-2 LIST OF RESOURCE MANAGEMENT PLANS POTENTIALLY RELEVANT TO THE UPPER BARKER PROJECT

RESOURCE	MANAGEMENT PLANS
Fisheries	Maine Department of Marine Resources (MDMR). 2010. Androscoggin River Anadromous Fish Restoration Program. March 30, 2010.
Recreation, Land Use	Androscoggin Valley Council of Governments (AVCOG). 2009. Western Maine Regional Open Space Policy. May 2009.
Land Use	City of Auburn. 2011. City of Auburn Comprehensive Plan 2010 Update. April 2011.
Land Use	City of Lewiston. 1997. Comprehensive Plan. May 1997.
Recreation, Land Use	City of Auburn. 2009. New Auburn Master Plan.

6.5 REFERENCES

Federal Energy Regulatory Commission (FERC). 2018. List of Comprehensive Plans. January, 2018. [Online] URL: https://www.ferc.gov/industries/hydropower/gen-info/licensing/complan.pdf. Accessed March 15, 2018.

APPENDIX A

PROCESS PLAN AND SCHEDULE

TLP SCHEDULE	DURATION	START	FINISH
File NOI/PAD and Request TLP		7/31/18	7/31/2018
FERC Issues Notice NOI and Comments on TLP	60	7/31/18	9/29/2018
STAGE 1			
TLP Approved	30	9/29/18	10/29/2018
Joint Agency Meeting (JAM)	30	10/29/18	11/28/2018
Comments on PAD/Study Request	60	11/28/18	1/27/2019
Issue Draft Study Plan	60	11/28/18	1/27/2019
Comments on Draft Study Plan	30	1/27/19	2/26/2019
Finalize Study Plan	30	1/27/19	2/26/2019
STAGE 2			
Conduct Studies	400	2/26/19	4/1/2020
Issue Draft Study Report	30	4/1/20	5/1/2020
2nd Year Studies	75	10/28/20	1/11/2021
Develop Draft Application	120	10/28/20	2/25/2021
Issue Draft Application, Study Results and Proposal	5	2/25/21	3/2/2021
Comments on Draft Application	90	3/2/21	5/31/2021
STAGE 3			
Final Application Due	5	9/29/21	9/29/21
License Expiration		9/30/23	9/30/23

APPENDIX B

CURRENT LICENSE REQUIREMENTS

147 FERC ¶ 62,222
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

KEI (Maine) Power Management (I) LLC	Project Nos. 3562-024
KEI (Maine) Power Management (II) LLC	4202-023
KEI (Maine) Power Management (III) LLC	11132-028
KEI (Maine) Power Management (IV) LLC	11472-060
	11482-030

ORDER AMENDING LICENSES

(Issued June 23, 2014)

1. On February 19, 2013, and supplemented on May 30, 2014, KEI (USA) Power Management Inc., on behalf of KEI (Maine) Power Management (I) LLC, KEI (Maine) Power Management (II) LLC, KEI (Maine) Power Management (III) LLC, and KEI (Maine) Power Management (IV) LLC, filed a request to amend the licenses for the following five hydroelectric projects: the Barker Mill Upper Project No. 3562, the Lowell Tannery Project No. 4202, the Eustis Project No. 11132, the Burnham Project No. 11472, and the Marcal Project No. 11482.[1] The licensee made the filing to modify the license requirements for the projects' operations from store-and-release mode to run-of-river mode. The Barker Mill Upper Project is located on the Little Androscoggin River, in Androscoggin County, in west-central Maine; the Lowell Tannery Project is located on the Passadumkeag River, in Penobscot County, in east-central Maine; the Eustis Project is located on the North Branch of the Dead River, in Franklin County, in northwestern Maine; the Burnham Project is located on the Sebasticook River, in Waldo and Somerset Counties, in central Maine; and the Marcal Project is located on the Little Androscoggin River, in Androscoggin County, in west-central Maine. There are no federal lands within the five project boundaries.

Background

2. The store-and-release operation requirements and minimum flows are defined in license articles and the existing section 401 Water Quality Certifications (WQC) for the five projects as follows: in Article 402 and the WQC for the Burnham Project,[2] in

[1] Commission staff approved a transfer of the licenses for these five projects to the current licensees in 2009. *See Ridgewood Maine Hydro Partners, L.P.*, 128 FERC ¶ 62,226 (2009). The licenses for Project Nos. 4202 and 3562 had been transferred several times before that.

[2] *Ridgewood Maine Hydro Partners, L.P.*, 107 FERC ¶ 62,006 (2004).

Articles 401 and 402 and the WQC for the Eustis Project,[3] in Articles 401, 402, and 403 and the WQC for the Marcal Project,[4] in Article 19 and the WQC for the Lowell Tannery Project,[5] and in the WQC for the Barker Mill Upper Project.[6] These requirements are set forth in Tables 1 and 2.

Table 1: Licensed Allowable Drawdowns

Project	Time Period	Drawdown (ft)	Full Pond Level (ft)
Barker Mill Upper	Flashboards In Place Flashboard Down	3 3	192.0 189.0
Lowell Tannery	All Times	3	187.5
Eustis	All Times	2	1161.0
Burnham	All Times	1	165.9
Marcal	May 1-October 15 October 16-April 30	1 2	273.3

Table 2: Licensed Minimum Flows

Project	Time Period	Bypass Minimum Flow	Total Minimum Flow
Barker Mill Upper	All Times	--	82 cfs or inflow
Lowell Tannery	All Times Inflow < 1,250 cfs	-- --	150 cfs Inflow
Eustis	All Times	--	94 cfs or inflow
Burnham	April 1-June 30 July 1-September 15 September 16-November 15 November 16-March 31 May 15-June 30 July 1-May 14	225 cfs or inflow 125 cfs or inflow 225 cfs or inflow 125 cfs or inflow -- --	-- -- -- -- Run-of-River 225 cfs or inflow
Marcal	All Times While Generating While Off-Line	-- 20 cfs 56 cfs	56 cfs or inflow -- --

[3] *Ridgewood Maine Hydro Partners, L.P.*, 77 FERC ¶ 62,201 (1996).

[4] *Ridgewood Maine Hydro Partners, L.P.*, 80 FERC ¶ 62,038 (1997).

[5] *Pumpkin Hill Power Company*, 25 FERC ¶ 62,134 (1983).

[6] *Maine Hydro-Electric Development Corporation*, 24 FERC ¶ 62,209 (1983), as amended, *Consolidated Hydro, Inc.*, 51 FERC ¶ 62,219 (1990).

Licensee's Proposal

3. The licensee proposes to amend the five project licenses to eliminate the authorization to conduct store-and-release drawdowns, and to authorize run-of-river operation, limiting drawdowns. Under the licensee's proposal, drawdowns would be limited to those necessary for specified maintenance or emergency operations. Before filing its amendment requests with the Commission, the licensee applied to the Maine Department of Environmental Protection (Maine DEP) for revised water quality certifications to reflect the proposed changes to its license requirements. In December 2012 and January 2013, the Maine DEP issued revised WQCs, attached to this order as Appendices A, B, D, and E, for the Barker Mill Upper, Lowell Tannery Burnham Project, and Marcal Projects, respectively. On December 10, 2012, and May 30, 2014, the Maine DEP issued revised WQCs, attached to this order as Appendix C, for the Eustis Project.[7] The revised WQC for each project authorizes run-of-river operations with temporary modifications allowed under the following conditions: (1) maintenance activities approved by Maine DEP, (2) extreme hydrologic conditions,[8] (3) emergency electrical system conditions,[9] (4) flashboard failure, or (5) agreement between the licensee and appropriate state and/or federal agencies.

4. The licensee also proposes to provide the required minimum flows consistent with each project's revised WQC. Specifically, the licensee details the proposal to amend the license articles for the five projects under Section 4.2: Proposed Project Operations of the amendment application. The licensee's proposed changes to the license requirements for drawdowns and minimum flows are set forth in Tables 3 and 4, respectively.

[7] On December 10, 2012, the Maine DEP issued a revised WQC for the Eustis Project; however, it included a typographical error in condition 3: Water Levels. The Maine DEP issued an additional revised WQC on May 30, 2014, to fix the error.

[8] "Extreme hydrologic conditions" are defined as "the occurrence of events beyond the licensee's control, such as, but not limited to, abnormal precipitation, extreme runoff, flood conditions, ice conditions or other hydrologic conditions such that the operational restrictions and requirements contained herein are impossible to achieve or are inconsistent with the safe operation of the Project."

[9] "Emergency electrical system conditions" are defined as "operating emergencies beyond the licensee's control which require changes in flow regimes to eliminate such emergencies which may in some circumstances include but are not limited to equipment failure or other abnormal temporary operating condition, generating unit operation or third-party mandated interruptions under power supply emergencies; and orders from local, state or federal law enforcement or public safety authorities."

Table 3: Proposed Drawdowns

Project	Time Period	Drawdown (ft)	Full Pond Level (ft)
Barker Mill Upper	Flashboards In Place Flashboard Down	1 1	192.0 189.0
Lowell Tannery	All Times	1	187.5
Eustis	All Times	1	1161.0
Burnham	All Times	1	165.9
Marcal	Flashboards In Place Flashboard Down	1 1	273.3 271.3

Table 4: Proposed Minimum Flows

Project	Time Period	Bypass Minimum Flow	Total Minimum Flow
Barker Mill Upper	All Times	--	Run-of-River
Lowell Tannery	All Times	--	Run-of-River
Eustis	All Times	--	Run-of-River
Burnham	April 1-June 30 July 1-September 15 September 16-November 15 November 16-March 31 All Times	225 cfs or inflow 125 cfs or inflow 225 cfs or inflow 125 cfs or inflow --	-- -- -- -- Run-of-River
Marcal	While Generating While Off-Line All Times	20 cfs or inflow 56 cfs or inflow --	-- -- 56 cfs or inflow

Consultation

5. Prior to filing its amendment applications, the licensee consulted with the Maine DEP. As part of the process for considering the merits of issuing revised WQCs for the projects, the Maine DEP consulted with the Maine Department of Inland Fisheries and Wildlife, the Maine Department of Marine Resources, the Maine Natural Areas Program, and the U.S. Fish and Wildlife Service (FWS). The agencies did not raise any concerns; therefore, the licensee did not conduct a secondary consultation process but provided the agencies with a copy of the amendment application. The licensee also filed applications on July 3, 2012, for project modifications and revised WQCs under the Maine Waterway Development and Conservation Act, and consulted with the Maine DEP on those applications. The Maine DEP issued amended WQCs for the Barker Mill Upper, Lowell Tannery Burnham Project, and Marcal Projects between December 5, 2012 and January 9, 2013, and for the Eustis Project on December 10, 2012, and May 30, 2014. The amended WQCs authorize run-of-river operation and modify the minimum flow requirements.

6. On November 19, 2013, the Commission issued public notice of the application, establishing December 19, 2013, as the deadline for filing comments and motions to intervene. The National Marine Fisheries Service (NMFS) and the U.S. Department of the Interior filed comments on December 2 and 19, 2013, respectively. No other comments or motions to intervene were filed in response to the notice. By letter dated January 9, 2014, the licensee filed a response to NMFS's comments.

Environmental Review

Proposed Amendments and the Environmental Baseline

7. The Commission uses existing environmental conditions as a baseline for its analysis of a proposed action and any alternatives.[10] As noted, the licensee proposes to amend the license requirements for drawdowns and minimum flows. Despite the license requirements (see Tables 1 and 2), the licensee has voluntarily operated the projects in a run-of-river mode without utilizing impoundment drawdowns since either 2004 or 2005, depending on the license.[11] This voluntary operation, which has occurred over the past nine or ten years, has created the existing environment and represents the baseline for evaluating the environmental effects of the licensee's proposal.[12]

8. Although the proposed amendment of the licenses would change the license requirements for drawdowns and minimum flows, these proposed changes would not result in any corresponding operational or environmental changes. Rather, they would simply continue the licensee's existing operations (run-of-river without drawdowns). Run-of-river operation for the past nine to ten years has eliminated the adverse environmental effects associated with historical impoundment level fluctuations allowed under the licensed conditions. Under the proposed amendment, there would be no change to the existing outflows at the projects, and authorizing run-of-river operations would eliminate the possibility of impoundment fluctuations (outside of maintenance and emergency conditions) that are currently allowed in the licenses. In comparison to historic operations, proposed total minimum flows would change from 82 cfs or inflow

[10] *See American Rivers v. FERC*, 201 F.3d 1186, 1195 (9th Cir. 1999).

[11] For the purposes of this analysis, existing license requirements, as indicated in Tables 1 and 2, (not current voluntary run-of-river operations) are considered historic operations.

[12] While a short period of operation in a manner different from licensed conditions would not change the environmental baseline, in this case the extended voluntary period of run-of-river operation without drawdowns (nine or more years) justifies treating the licensee's existing operation of the projects as establishing the environmental baseline.

(whichever is less) to run-of-river at the Barker Mill Upper Project; from 150 cfs or inflow (whichever is less) to run-of-river at the Lowell Tannery Project; from 94 cfs or inflow (whichever is less) to run-of-river at the Eustis Project; and from run-of-river from May 15 through June 30 and 225 cfs or inflow (whichever is less) from July 1 through May 14 to year-round run-of-river at the Burnham Project, providing a more natural flow regime in comparison to historic operations. Bypass minimum flows at the Burnham and Marcal Projects would remain unchanged under the proposed action. Despite these changes to the licensed conditions, the licensee proposes to continue to operate the projects as it has for years; resulting in no changes to the way the projects have been and are currently operating. The proposal would make the revised WQCs included in the amendment application a part of the license for each of the five projects.

Aquatics

9. The licensee proposes no construction; therefore, our analysis concerns only operational effects. A continuation of today's environmental conditions, represented by the voluntarily-implemented more stable impoundment elevations, would continue to reduce shoreline erosion and sedimentation and improve water quality as compared to historical conditions. Under the run-of-river operating regime, due to a reduction in soil disturbance, there is less uptake of pollutants in the water column in comparison to historical conditions. Stable impoundment elevations result in more stable fish rearing habitats along the project shorelines and also stabilize wetland, riparian, and littoral habitats due to more consistent inundation and less desiccation of habitat. There are no federally listed species at the projects that would be subject to desiccation. However, the state-listed yellow lampmussel, found along the Passadumkeag River at the Lowell Tannery Project, would continue to benefit from stable impoundment elevations by reducing the potential for stranding and desiccation in comparison to historical drawdown conditions.

Atlantic salmon

10. By letter dated November 26, 2013, NMFS requested initiation of section 7 consultation under the Endangered Species Act (ESA) for the proposed action, stating that federally listed Gulf of Maine Distinct Population Segment of Atlantic salmon (*Salmo salar*) are known to occur in the areas of the Burnham and Lowell Tannery Projects. However, as explained previously, the licensee is proposing no changes to the existing environment. The licensee is proposing to continue operating the projects as it has for the past nine to ten years; therefore, no changes are proposed that could affect Atlantic salmon habitat at either of these two projects. As a result, Commission staff concludes that the proposed action will have no effect on Atlantic salmon or its critical habitat, and that no further consultation under the ESA is required for the proposed action. The licensee and NMFS are discussing habitat conservation plans for Atlantic

salmon in a separate proceeding involving the Lowell Tannery Project that has no direct relation to the proposed amendment.[13]

Other Resources

11. Conditions for recreational use at the projects have improved over historic conditions due to better access to existing boat launches and docks resulting from stable impoundment elevations. Section 106 of the National Historic Preservation Act (NHPA) requires that every federal agency take into account how each of its undertakings could affect historic properties.[14] The proposal includes no land disturbing modifications that could potentially affect historic or cultural resources.

Conclusion

12. In summary, the licensee's proposed amendments to change project operations at each of its five projects would result in a continuation of existing conditions, would eliminate the possibility of environmental impacts that could occur under licensed conditions, and would not constitute a major federal action significantly affecting the quality of the human environment. Therefore, the proposals should be approved.

The Director orders:

(A) KEI (USA) Power Management Inc.'s request, filed on February 19, 2013, and supplemented on May 30, 2014, to amend the licenses for the Barker Mill Upper Project No. 3562, the Lowell Tannery Project No. 4202, the Eustis Project No. 11132, the Burnham Project No. 11472, and the Marcal Project No. 11482, to authorize run-of-river operation and modify the minimum flow requirements, is approved.

(B) The Barker Mill Upper Project license is subject to revised conditions 1 and 2 submitted by the Maine Department of Environmental Protection under section 401(a)(1) of the Clean Water Act, 33 U.S.C. § 1341(a)(1) (2012), as those conditions, filed on December 20, 2012, are set forth in Appendix A to this order.

[13] By letter dated March 18, 2014, Commission staff designated KEI as the non-federal representative to conduct section 7 consultation for the Incidental Take Process at the Lowell Tannery Project and the Browns Mills Project No. 5613.

[14] Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places.

(C) Ordering paragraph B(2) of the Barker Mill Upper Project license[15] is revised to read as follows:

> (2) Project works consisting of: (1) a 21-foot-high, 230-foot-long masonry gravity dam topped by 3-foot-high flashboards; (2) a 35-foot-long gate section containing two slide gates; (3) a 41-acre reservoir at elevation 192 feet m.s.l. (with 3-foot-high flashboards); (4) a powerhouse located immediately downstream of the dam at the east abutment, containing a 950-kW turbine connected to a generator having a rated capacity of 1,111kVa with a 0.9 power factor; (5) a tailrace; (6) a downstream fish passage facility; (7) 50-foot-long 4.16 kV generator leads; (8) a 4.16/12.47 kV, 1.0 MVA three-phase step-up transformer; (9) a 50-foot-long 12.47-kV transmission line; and (10) appurtenant facilities.

(D) Article 21 of the Barker Mill Upper Project license is revised to read as follows:

> Article 21. The licensee shall operate the project in run-of-river mode whereby outflow equals inflow to the project reservoir for the protection of water quality, fishery, wildlife, and visual resources. This flow may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement among the licensee, the Maine Department of Inland Fisheries and Wildlife, and the Maine Department of Marine Resources. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

(E) The Lowell Tannery Project license is subject to revised conditions 1 and 2 submitted by the Maine Department of Environmental Protection under section 401(a)(1) of the Clean Water Act, 33 U.S.C. § 1341(a)(1) (2012), as those conditions, filed on December 5, 2012, are set forth in Appendix B to this order.

(F) Ordering paragraph B(2) of the Lowell Tannery Project license[16] is revised to read as follows:

> (2) Project works consisting of: (1) a 230-foot-long, 21.5-foot-high concrete gravity dam, including 30- and 89-foot-long spillway sections topped by 3.5-foot-high flashboards; (2) a low level outlet gate and log sluice section; (3) a 68.5-acre

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[15] Commission staff approved an amendment of ordering paragraph (B)(2), item 4, in 1993. *See Consolidated Hydro Maine, Inc.*, 65 FERC ¶ 62,248 (1993).

[16] The project's installed capacity in ordering paragraph (B)(2) of the license was corrected in 1996. *See Consolidated Hydro Maine, Inc.*, 75 FERC ¶ 62,027 (1996).

reservoir at elevation 187.5 feet m.s.l.; (4) a powerhouse located near the north dam abutment containing a single turbine-generator unit with a rated capacity of 1,000 kW; (5) a fishway located adjacent to the powerhouse; (6) a tailrace channel; (7) the 2.3-kV generator leads; (8) the 1,000 kVA, 2.3/12.5-transformer; (9) the 200-foot-long, 12.5-kV transmission line; and (10) appurtenant facilities.

(G) Article 19 of the Lowell Tannery Project license is revised to read as follows:

Article 19. The licensee shall operate in run-of-river mode such that inflow to the reservoir is equal to outflow for the purpose of protecting and enhancing aquatic resources in the Passadumkeag River. These flows may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods for fishery management purposes upon mutual agreement between the licensee and the Maine Department of Inland Fisheries and Wildlife.

(H) The Eustis Project license is subject to revised conditions 1 and 3 submitted by the Maine Department of Environmental Protection under section 401(a)(1) of the Clean Water Act, 33 U.S.C. § 1341(a)(1) (2012), as those conditions, filed on December 10, 2012, and May 30, 2014, respectively, are set forth in Appendix C to this order.

(I) Article 401 of the Eustis Project license is revised to read as follows:

Article 401. The licensee shall operate the project in run-of-river mode such that outflow is equal to inflow on a year-round basis for the protection and enhancement of water quality and aquatic resources in the North Branch of the Dead River. The run-of-river operation will be monitored with stream flow and water level monitoring devices required by Article 403. Releases from the Eustis Project may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement between the licensee, the Maine Department of Environmental Protection, and the Maine Department of Inland Fisheries and Wildlife. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

(J) Article 402 of the Eustis Project license is revised to read as follows:

Article 402. The licensee shall manage impoundment fluctuation levels for the protection and enhancement of water quality and aquatic resources in the North Branch of the Dead River. The licensee shall limit the maximum drawdown of water levels in the impoundment to within 1 foot of full pond (no lower than elevation 1,160.0 feet above mean sea level) year-round. Management of

impoundment fluctuation and tailrace flows is required within 60 days of installation of stream flow and water level monitoring devices required by Article 403. The drawdown limitations may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods for project maintenance, construction, and inspections upon mutual agreement between the licensee, the Maine Department of Environmental Protection, and the Maine Department of Inland Fisheries and Wildlife (Maine DIFW). Scheduled draw-downs for maintenance, construction, and inspections shall not occur from ice-out through July 31 and shall be scheduled in consultation with Maine DIFW. If the drawdown limitations are so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident. This notification shall include the reason for the drawdown and documentation of prior consultation with Maine DIFW.

(K) The Burnham Project license is subject to revised conditions 1.A. and 1.B. submitted by the Maine Department of Environmental Protection under section 401(a)(1) of the Clean Water Act, 33 U.S.C. § 1341(a)(1) (2012), as those conditions, filed on January 9, 2013, are set forth in Appendix D to this order.

(L) Article 402 of the Burnham Project license is revised to read as follows:

Article 402. Water Levels and Minimum Flows. The licensee shall maintain the water level elevation and provide seasonal minimum flows according to revised water quality certification conditions 1.A. and 1.B., respectively, filed on January 9, 2013.

(M) The Marcal Project license is subject to revised conditions 1 and 2 submitted by the Maine Department of Environmental Protection under section 401(a)(1) of the Clean Water Act, 33 U.S.C. § 1341(a)(1) (2012), as those conditions, filed on December 24, 2012, are set forth in Appendix E to this order.

(N) Article 401 of the Marcal Project license is revised to read as follows:

Article 401. Upon approval of the plan required in Article 405, the licensee shall maintain a minimum impoundment elevation of 272.3 feet National Geodetic Vertical Datum (NGVD) when flashboards are in place, and a minimum impoundment elevation of 270.3 feet NGVD when flashboards are not in place.

These minimum impoundment surface elevations may be temporarily modified if required by operating emergencies beyond the control of the licensee, or for short periods upon mutual agreement between the licensee, the Maine Department of Inland Fisheries and Wildlife (Maine DIFW), the Maine Department of Marine Resources (Maine DMR), and the Maine Department of

Environmental Protection (Maine DEP). If the impoundment water surface elevation is so modified, the licensee shall notify the Commission, the Maine DIFW, the Maine DMR, and the Maine DEP as soon as possible, but no later than 10 days after each such incident.

(O) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 825*l* (2012), and the Commission's regulations at 18 C.F.R. § 385.713 (2013). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Kelly Houff
Chief, Engineering Resources Branch
Division of Hydropower Administration
and Compliance

APPENDIX A

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION CERTIFICATION UNDER SECTION 401 OF THE FEDERAL CLEAN WATER ACT

On December 20, 2012, the Maine Department of Environmental Protection approved a minor revision to the original Water Quality Certification, issued April 13, 1983, under Section 401 of the Clean Water Act to KEI (MAINE) POWER MANAGEMENT (III) LLC for the Upper Barker (Barker's Mill) Hydropower Project with the following modifications to Conditions 1 and 2. All other Findings of Fact, Conclusions, and Conditions remain as approved in the original Water Quality Certification.

1. Except as irreconcilably limited by temporary abnormal operating conditions, by unit operation or interruption under power supply emergencies, or by order of state, local or federal authorities, where all such conditions are beyond the applicant's control, the applicant shall operate the Upper Barker (Barker's Mill) Hydroelectric facility in run-of-river mode wherein the impounded water elevation is limited to between 192 feet and 191 feet when the flashboard are in place and between elevations 189 feet and 188 feet when the flashboards are not in place, during normal operation.

2. Except as irreconcilably limited by order of state, local or federal authorities, the applicant shall operate Upper Barker (Barker's Mill) Hydroelectric facility in run-of-river mode wherein outflow is equal to inflow and there is no significant effect on overall river flow regime.

APPENDIX B

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION CERTIFICATION UNDER SECTION 401 OF THE FEDERAL CLEAN WATER ACT

On December 5, 2012, the Maine Department of Environmental Protection approved a minor revision to the original Water Quality Certification, issued July 27, 1983, under Section 401 of the Clean Water Act to KEI (MAINE) POWER MANAGEMENT (II) LLC for the Pumpkin Hill (Lowell Tannery) Hydropower Project with the following modifications to Conditions 1 and 2. All other Findings of Fact, Conclusions, and Conditions remain as approved in the original Water Quality Certification.

1. Except as irreconcilably limited by temporary abnormal operating conditions, by unit operation or interruption under power supply emergencies, or by order of state, local, or federal authorities, where all such conditions are beyond the applicant's control, the applicant shall operate the Pumpkin Hill Hydroelectric facility in run-of-river mode wherein the impounded water level fluctuation is limited to one foot or less during normal operation.

2. Except as irreconcilably limited by order of state, local, or federal authorities, the applicant shall operate Pumpkin Hill Hydroelectric facility in run-of-river mode wherein outflow is equal to inflow and there is no significant effect on overall river flow regime.

APPENDIX C

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION CERTIFICATION UNDER SECTION 401 OF THE FEDERAL CLEAN WATER ACT

On December 10, 2012, and May 30, 2014, the Maine Department of Environmental Protection approved a minor revision to the original Water Quality Certification, issued March 9, 1999, under Section 401 of the Clean Water Act to KEI (MAINE) POWER MANAGEMENT (I) LLC for the Eustis Hydropower Project with the following modifications to Conditions 1 and 3. All other Findings of Fact, Conclusions, and Conditions remain as approved in the original Water Quality Certification.

1. MINIMUM FLOWS

Except as temporarily modified by emergencies beyond the applicant's control (operating emergencies beyond the applicant 's control include, but may not be limited to; equipment failure, flash board failure or other temporary abnormal operating conditions, generating unit operation or interruption under power supply emergencies, and orders from local, state or federal law enforcement or public safety authorities), or as modified by the Department, the project shall operate in run-of-river-mode of operation wherein discharge flow is equal to inflow.

3. WATER LEVELS

Except as temporarily modified by approved maintenance activities or by operating emergencies beyond the applicant's control, water levels in the impoundment shall be maintained within 1 foot of full pond elevation of 1161.0 feet.

APPENDIX D

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
CERTIFICATION UNDER SECTION 401 OF THE
FEDERAL CLEAN WATER ACT

On January 9, 2013, the Maine Department of Environmental Protection approved a minor revision to the original Water Quality Certification, issued February 10, 2004, under Section 401 of the Clean Water Act to KEI (MAINE) POWER MANAGEMENT (II) LLC for the Burnham Hydropower Project with the following modification to Condition 1. All other Findings of Fact, Conclusions, and Conditions remain as approved in the original Water Quality Certification.

1. WATER LEVELS AND MINIMUM FLOWS

A. Water Levels: Except as temporarily modified by (1) maintenance activities approved by DEP, (2) extreme hydrologic conditions, as defined in the original Water Quality Certification Order (WQC), section 1.C., (3) emergency electrical system conditions, as defined in the original Water Quality Certification Order (WQC), section 1.D., (4) flashboard failure, or (5) agreement between the applicant and appropriate state and/or federal agencies, beginning within 60 days of issuance of a FERC license for the project or upon such other schedule as established by FERC, water levels in the Burnham impoundment shall be maintained within one foot of the full pond elevation of 165.9 feet (crest of flashboards) to the maximum extent possible. Maintenance drawdowns shall be limited to August and September, with attainment of full pond no later than October 15, and the applicant shall notify the MDIF&W Regional Fisheries Biologist and the MDMR Stock Enhancement Division in advance of any approved maintenance drawdown.

B. Minimum Flows: Except as temporarily modified by (1) maintenance activities approved by DEP, (2) extreme hydrologic conditions, as defined in the original Water Quality Certification Order (WQC), section 1.C., (3) emergency electrical system conditions, as defined in the original Water Quality Certification Order (WQC), section 1.D., or (4) agreement between the applicant and appropriate state and/or federal agencies, beginning within 60 days of issuance of a FERC license for the project or upon such other schedule as established by FERC, minimum flows shall be released from the Burnham Project in accordance with the following schedules:

Bypass Minimum Flows

April 1 through June 30	225 cfs or inflow, whichever is less
July 1 through September 15	125 cfs or inflow, whichever is less
September 16 through November 15	225 cfs or inflow, whichever is less
November 16 through March 31	125 cfs or inflow, whichever is less

Total Flows

The year-round operational mode shall be run-of-river operation at all times when flows exceed seasonal requirements that are equal to the minimum bypass flow, above, plus generating flow of at least 50 cfs; when flow is less than seasonal requirements, power generation will cease.

APPENDIX E

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION CERTIFICATION UNDER SECTION 401 OF THE FEDERAL CLEAN WATER ACT

On December 24, 2012, the Maine Department of Environmental Protection approved a minor revision to the original Water Quality Certification, issued May 23, 1997, under Section 401 of the Clean Water Act to KEI (MAINE) POWER MANAGEMENT (IV) LLC for the Mechanic Falls (Marcal) Hydropower Project with the following modifications to Conditions 1 and 2. All other Findings of Fact, Conclusions, and Conditions remain as approved in the original Water Quality Certification.

1. WATER LEVELS

Except as temporarily modified by approved maintenance activities, by operating emergencies beyond the applicant's control, including but not be limited to, equipment failure or other temporary abnormal operating condition, by flashboard failure, or by orders from local, state or federal law enforcement or public safety authorities, the Applicant shall operate the Mechanic Falls Hydroelectric facility in run-of river mode wherein outflow is equal to inflow and impounded water levels shall be maintained during normal operation within 1.0 foot of full pond elevation of 271.3 when flashboards are not in place and within 1.0 foot of flashboard crest elevation of 273.3 feet when flashboards are in place.

3. MINIMUM FLOWS

Except as temporarily modified by approved maintenance activities or operating emergencies beyond the applicant's control, including but not be limited to, equipment failure or other temporary abnormal operating condition, or by orders from local, state or federal law enforcement or public safety authorities, the applicant shall operate the Mechanic Falls Hydroelectric facility in run-of-river mode, wherein out now is equal to inflow and there is no significant effect on overall river flow regime as measured beyond the confluence of the tailrace and the Little Androscoggin River. Run-of-river mode shall provide a minimum flow of 56 cfs or inflow, whichever is less, released from the dam to the bypass reach when the facility is not generating power, and shall provide a minimum of 20 cfs or inflow, whichever is less, released to the bypass reach when the facility is generating power.

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Maine Hydro-Electric Development Corporation) Project No. 3562-001

ORDER ISSUING LICENSE (MINOR)

(Issued August 22, 1983)

Maine Hydro-Electric Development Corporation (MHEDC) filed on June 21, 1982, an application for license under Part I of the Federal Power Act (Act) to construct, operate and maintain the Barker Mill Upper Project No. 3562. 1/ The project would be located on the Little Androscoggin River, near the City of Auburn, Androscoggin County, Maine. The proposed project would affect the interests of interstate commerce.

Notice of the application has been published and comments have been received from interested Federal, State and local agencies. No protests or motions to intervene have been received, and none of the commenting agencies objected to issuance of the license.

The Barker Mill Upper Project would utilize an existing 21-foot-high, 230-foot-long masonry-gravity dam with a breached section near the west abutment. The breach was caused by the failure of the dam's flood gate section in the mid-1930's. MHEDC proposes to repair the breach by installing in its place two slide gates supported by steel stanchions, repair the dam's masonry structure, install 3-foot-high wooden flashboards which would restore the 41 acre reservoir to a water surface elevation of 192 feet M.S.L.; and construct a new powerhouse immediately below the east dam abutment atop the foundation of an abandoned powerhouse. The powerhouse would contain a 950-kW turbine-generator.

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 (1982), FERC Statutes and Regulations ¶30,238. 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, FERC Statutes and Regulations ¶29,052, 47 Fed. Reg. 19014 (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.

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The run-of-the-river project would generate up to 4,900,000 kWh annually saving the equivalent of 8,000 barrels of oil or 2,200 tons of coal.

Safety and Adequacy

The Commission's New York Regional Office Staff inspected the project and found the existing dam and appurtenance structures in poor condition with a partial breach in the left portion of the dam. The dam is assigned a low hazard potential.

The rehabilitated dam would be capable of withstanding the 100-year flood. Failure of the dam during greater floods than the 100-year flood would not endanger downstream life or property. The powerhouse would be safe if construction is performed with sound engineering practices. It is concluded that the project is safe and adequate.

Hydroelectric Power Evaluation

The project will make good use of the flow and fall of the Little Androscoggin River.

The planning status report for the Androscoggin River Basin, Maine-New Hampshire, discusses the existing and potential water resource developments. The project is not in conflict with any planned or authorized development, and will be best adapted to the comprehensive development of the Androscoggin River Basin upon compliance with the terms and conditions of this license.

Economic Feasibility

MHEDC proposes to sell all the power output to Central Maine Power Company. Staff has analyzed the economic feasibility of the proposed project redevelopment. It is concluded that the proposed project is economically feasible to develop based upon revenues derived from sale of power under rates set by the State of Maine under Section 210 of the Public Utility Regulatory Policy Act of 1978.

Recreational Facilities

The U.S. Department of the Interior (Interior) indicated that MHEDC should consult with the Bureau of Parks and Recreation of the State of Maine relative to the need for providing for additional recreation activities, such as canoeing, boating, and picnicking. Interior further recommended that should a need for recreational facilities be determined, a recreation plan should be developed that would include a map showing the location and type of facilities proposed, a schedule for their development, and a statement of who would be responsible for their development, operation, and maintenance. Article 19 provides for implementation of these recommendations.

Fish Passage Facilities

The Maine Departments of Marine Resources and Inland Fisheries and Wildlife (IFW) and the U.S. Fish and Wildlife Service (FWS) recommended that MHEDC provide suitable downstream fish-passage facilities at the project dam. The agencies further recommended that MHEDC provide space in the project works to accommodate a future upstream fish passage facility and plan for funding and construction of such facilities.

Since present plans for fish restoration include trapping American shad and alewife at the downstream Brunswick Topsham Project, FERC No. 2284, and trucking them to upstream waters, a downstream passage facility at the proposed project is necessary. Article 20 requires MHEDC to consult with the appropriate agencies in designing the downstream passage facility. Article 15 of the license provides for the future installation of an upstream fish passage facility at the appropriate time.

Minimum Flow and Water Levels

IFW, FWS and the Maine Department of Environmental Protection (DEP) recommended that MHEDC provide an instantaneous minimum flow of 20 cubic feet per second (cfs) at the dam or inflow to the project, whichever is less, to permit operation of the downstream fish passage facility. Further, IFW stated that with the exception of extreme drought conditions, actual project outflow should be considerably higher since the project is proposed to be operated in "pure run-of-river" mode. FWS also recommended that MHEDC provide an instantaneous discharge from below the project tailrace of 175 cfs or inflow to the project, whichever is less, to protect downstream aquatic habitat.

MHEDC later indicated to the staff that the project would cycle during low flow periods and has indicated to staff that it believes that the 20 cfs is appropriate for release at the project. The river area immediately below the dam and powerhouse is a reservoir for the Lower Barker Mill Project No. 2808 also licensed to MHEDC.

The Upper Barker Mill Project would not bypass any segment of the river and discharges directly into that reservoir. The Lower Barker Mill Project was licensed with a minimum flow of 20 cfs at the dam.

Article 21 requires an interim minimum flow of 20 cfs to be released at the dam to protect the aquatic resources below the project, for operation of the downstream fish passage facility and a study to determine an appropriate long-term minimum flow from the Upper Barker Mill Project.

Flood Insurance Maps

DEP issued Water Quality Certification under Section 401 of the Clean Water Act on April 13, 1983. DEP specified, among other things, that MHEDC conduct a hydraulic backwater analysis based upon final project design in order to determine the new 100 year flood plain resulting from restoration of the reservoir elevation to 192 feet M.S.L. The analysis and update is necessary in order that appropriate changes can be made to floodway and flood boundary maps originally produced by the Corps of Engineers for the City of Auburn, Maine for the Federal Emergency Management Agency Flood Insurance Study. Once the flood insurance maps are updated, appropriate changes will be made to zoning regulations by the City of Auburn. 2/ Article 29 will require such analysis and update.

Environmental Impacts

There would be minor impacts on water and air quality resulting from the construction activities at the project site. Any adverse environmental effects resulting from the refurbishment of the existing project would be of short-term duration and minor in nature. No known federally listed threatened or endangered species, or historic or archeological sites would be affected by the project. On the basis of the record, including agency comments and staff's independent analysis, it is concluded that approval of the application would not constitute a major Federal action significantly affecting the quality of the human environment.

In accordance with standard Commission practice, Article 26 of this license also requires cultural resources protection measures in the event of any future construction or development at the project, other than the original project development considered and authorized here.

License Term

The proposed scale of development is less than that which would warrant a full 50-year term since the majority of the project facilities currently exist. Therefore, pursuant to the Commission's policy for licensing projects involving moderate redevelopment 3/ this license term will be for a period of 40 years.

2/ See 21 FERC ¶61,182 Order Granting Appeal, FERC Project No. 2879, issued November 26, 1982.

3/ See The Montana Power Company, Mystic Lake Project No. 2301, Order Issuing New License (Major) (issued October 3, 1976), 56 FPC 20008.

It is ordered that:

(A) This license is issued to Maine Hydro-Electric Development Corporation (Licensee), under Part I of the Federal Power Act (Act), for a period of 40 years, effective the first day of the month in which this order is issued, for the construction, operation, and maintenance of the Barker Mill Upper Project No. 3562 located on the Little Androscoggin River near the town of Auburn, Androscoggin County, Maine. This license is subject to the terms and conditions of the Act, which are incorporated by reference as part of this license, and subject to the regulations the Commission has issued under the provisions of the Act.

(B) The Barker Mill Upper Project No. 3562 consists of:

(1) All lands, to the extent of the Licensee's interest in those lands, constituting the project area and enclosed by the project boundary. The project area and boundary are shown and described by a certain exhibit that forms part of the application for license and that is designated and described as:

Exhibit	FERC No. 3562-	Showing
G Sheet 1	3	Project Lands and Boundaries

(2) Project works consisting of: (1) a 21-foot-high, 230-foot-long masonry-gravity dam topped by 3-foot-high flashboards; (2) a 35-foot-long gate section containing two slide gates; (3) a 41 acre-reservoir with a maximum usable storage capacity of approximately 120 acre-feet at elevation 192 feet M.S.L. (with 3-foot-high flashboards) and a drawdown of 3 feet below the flashboards or below the dam crest if flashboards are removed; (4) a powerhouse located immediately downstream of the dam at the east abutment containing a turbine-generator with a total rated capacity of 950-kW; (5) a tailrace; (6) a downstream fish passage facility; (7) 50-foot-long 4.16 kV generator leads; (8) a 4.16/12.47 kV 1.0 MVA three-phase step-up transformer; (9) a 50-foot-long 12.47-kV transmission line; and (10) appurtenant facilities.

The location, nature, and character of these project works are generally shown and described by the exhibit cited above and more specifically shown and described by certain other exhibits and reports that also form part of the application for license and that are designated and described as:

Exhibit	FERC No. 3562-	Showing
F Sheet 1	1	Principal Project Works (Dam, Plan and Section A-A)
F Sheet 2	2	Principle Project Works (Powerhouse, Plan and Cross Section)

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

(4) Exhibits F and G designated in Ordering Paragraph (B) above, are approved and made a part of the license.

(5) Exhibit A entitled "Description of Project and Proposed Mode of Operation" consisting of one page describing mechanical and transmission equipment filed June 21, 1982, is approved herein and made a part of the license.

(C) Pursuant to Section 10(i) of the Act, it is in the public interest to waive the following Sections of Part I of the Act, and they are excluded from the license:

Section 4(b), except the second sentence; 4(e), insofar as it relates to approval of plans by the Chief of Engineers and the Secretary of the Army; 6, insofar as it relates to public notice and to the acceptance and expression in the license of terms and conditions of the Act that are waived here; 10(c), insofar as it relates to depreciation reserves; 10(d); 10(f); 14, except insofar as the power of condemnation is reserved; 15; 16; 19; 20; and 22.

(D) This license is also subject to Articles 1 through 18 set forth in Form L-15 (revised October, 1975), entitled "Terms and Conditions of License for Unconstructed Minor Project Affecting the Interest of Interstate or Foreign Commerce," attached to and made a part of this license. The license is also subject to the following additional articles:

Article 19. The Licensee shall consult with the Maine Bureau of Parks and Recreation and the National Park Service to determine the need, if any, for providing recreational facilities at the project. Licensee shall, within 1 year from the date of issuance of this license, file with the Commission the results of its consultation, with copies to the consulted agencies, and for Commission approval, its plan for any recreational development at the project as determined necessary by agency consultation. The recreation plan shall include, but not be limited to, a map showing the location and type of facilities proposed, a development schedule, and a statement of who will be responsible for their development, operation, and maintenance.

Article 20. The Licensee shall, at least 60 days prior to commencement of project construction, file for Commission approval functional design drawings of the proposed downstream migrant fish passage 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 documenting consultation shall be attached to the filing.

Article 21. The Licensee shall discharge from the Upper Barker Mill Project an interim continuous minimum flow of 20 cfs or inflow to the project reservoir, whichever is less at the project dam, for the protection of water quality, fishery, wildlife, and visual resources during the minimum flow study described herein. Interim minimum flows shall be maintained by Licensee until final minimum flow requirements are approved by the Commission. Interim minimum flows may be temporarily modified if required by operating emergencies beyond the control of Licensee, for short periods for fishery management purposes, or as required for the minimum flow study upon mutual agreement between Licensee and the Maine Department of Inland Fisheries and Wildlife and the Department of Marine Resources.

Licensee shall consult with the U.S. Fish and Wildlife Service, the Maine Department of Inland Fisheries and Wildlife and the Maine Department of Marine Resources in conducting a study to determine the minimum flow releases needed at all project facilities for the protection of fishery and wildlife resources. Licensee shall, within 1 year from the commencement of operation of the project, file with the Commission a report of the results of the study and, for Commission approval, recommendations for minimum flow releases from the Upper Barker Mill facilities.

Article 22. The 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, powerhouse and water conveyance structures, 60 days prior to start of construction. The Director, Office of Electric Power Regulation may require changes in the plans and specifications to ensure a safe and adequate project.

Article 23. The Licensee shall, within 90 days of completion of construction, file for approval of the Director, Office of Electric Power Regulation revised Exhibits A, F, and G to describe and show the project as-built. Revised Exhibit F must reflect, among other things, the fish passage facility required by Article 20.

Article 24. The Licensee shall commence the construction of the project within two years of the date of issuance of the license and shall thereafter in good faith and with due diligence prosecute and complete such construction of project works within four years of the date of issuance of the license.

Article 25. The Licensee shall review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction and shall ensure that construction of cofferdams and deep excavations are consistent with the approved design. At least 30 days prior to start of construction of the cofferdam the Licensee shall file with the Commission's Regional Engineer and Director, Office of Electric Power Regulation, one copy of the approved cofferdam construction drawings and specifications and a copy of the letter(s) of approval.

Article 26. The Licensee shall, prior to the commencement of any construction at the project, consult with the Maine State Historic Preservation Officer (SHPO) about the need for any cultural resource survey and salvage work. 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 historic resources. If the Licensee and the SHPO cannot agree on the amount of money to be expended on archeological or historic work related to the project, the Commission reserves the right to require the Licensee to conduct, at its own expense, any such work found necessary.

Article 27. (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 that can accommodate no more than 10 watercraft at a time where said facility is intended to serve single-family type dwellings; 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.

(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 titles 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 than 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.

(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.

Article 28. The Licensee shall pay the United States the following annual charges, effective the first day of the month in which this license is issued:

For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 1,260 horsepower.

Article 29. The Licensee shall prepare a study analyzing the impact of restoration of the Upper Barker Mill Dam on upstream flood risks. The study shall be undertaken in coordination with and must be acceptable to the Federal Emergency Management Agency (FEMA) and the City of Auburn, Maine pursuant to the requirements of the National Flood Insurance Program. A letter of acceptance of the study by FEMA shall be filed with the Commission within 1 year from the date of issuance of this license.

Article 30. The Licensee shall continue to consult and cooperate with the appropriate Federal, State and other natural resources agencies for the protection and development of the environmental resources and values of the project area. The Commission reserves the right to require changes in the project works or operations that may be necessary to protect and enhance those resources and values.

(E) The Licensee's failure to file a petition appealing this order to the Commission shall constitute acceptance of this license. In acknowledgment of acceptance of this order and its terms and conditions, it shall be signed by the Licensee and returned to the Commission within 60 days from the date this order is issued.

Lawrence R. Anderson
Director, Office of Electric
Power Regulation

Project No. 3562-001

IN TESTIMONY of its acknowledgment of acceptance of all of the terms and conditions of this Order, Maine Hydro-Electric Development Corporation, this ____ day of _____, 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)

Form L-15
(October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR UNCONSTRUCTED MINOR PROJECT AFFECTING THE INTERESTS OF INTERSTATE OR FOREIGN COMMERCE

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.

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.

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. 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 7. 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.

Article 8. 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 9. 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 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 Commission may prescribe for the purposes hereinbefore mentioned.

Article 10. 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 11. 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 12. 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 13. 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 14. 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 15. 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 16. 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 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 17. 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.

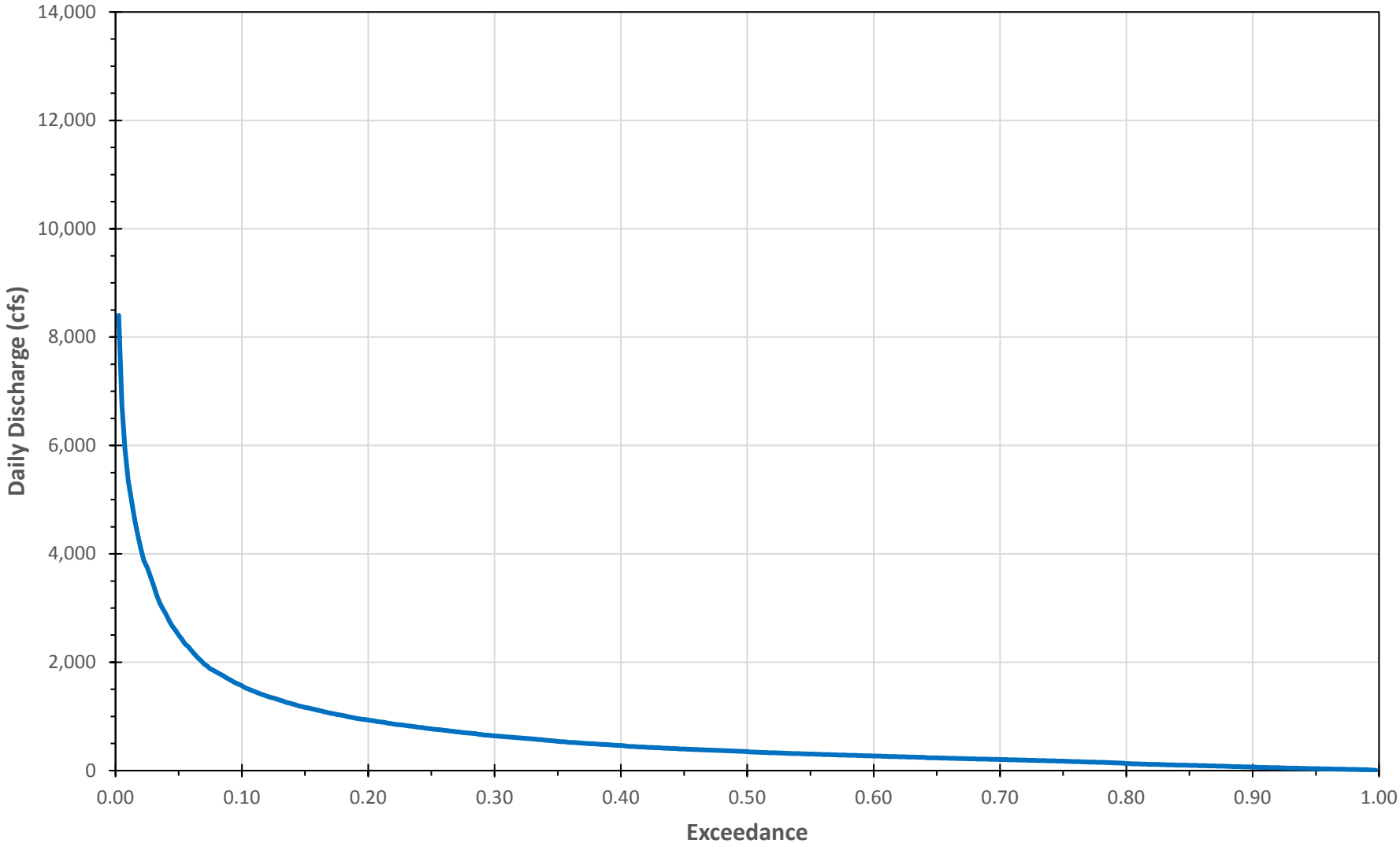
Article 18. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

APPENDIX C

FLOW DURATION CURVES

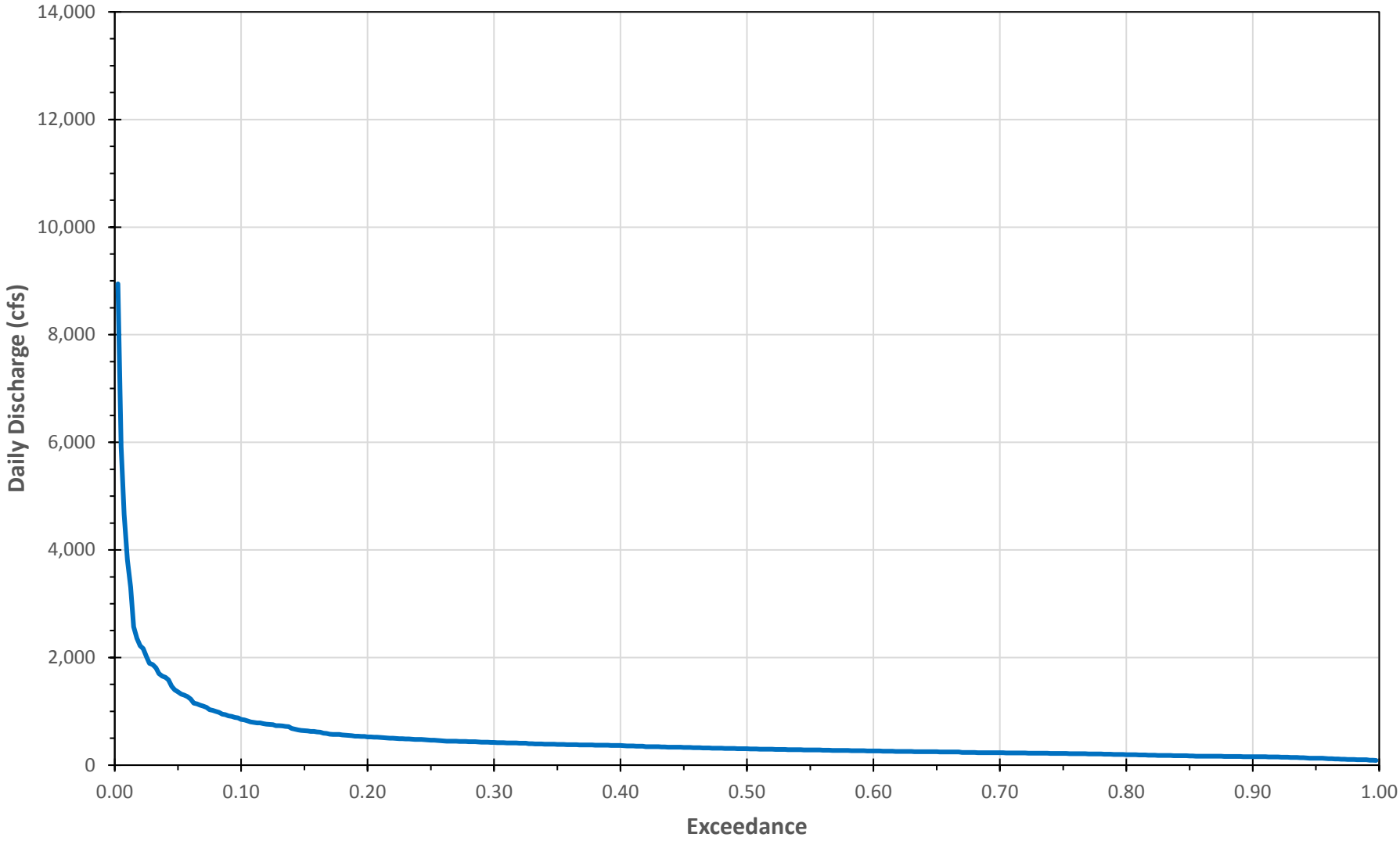
Little Androscoggin River at Upper Barker Dam
Annual Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



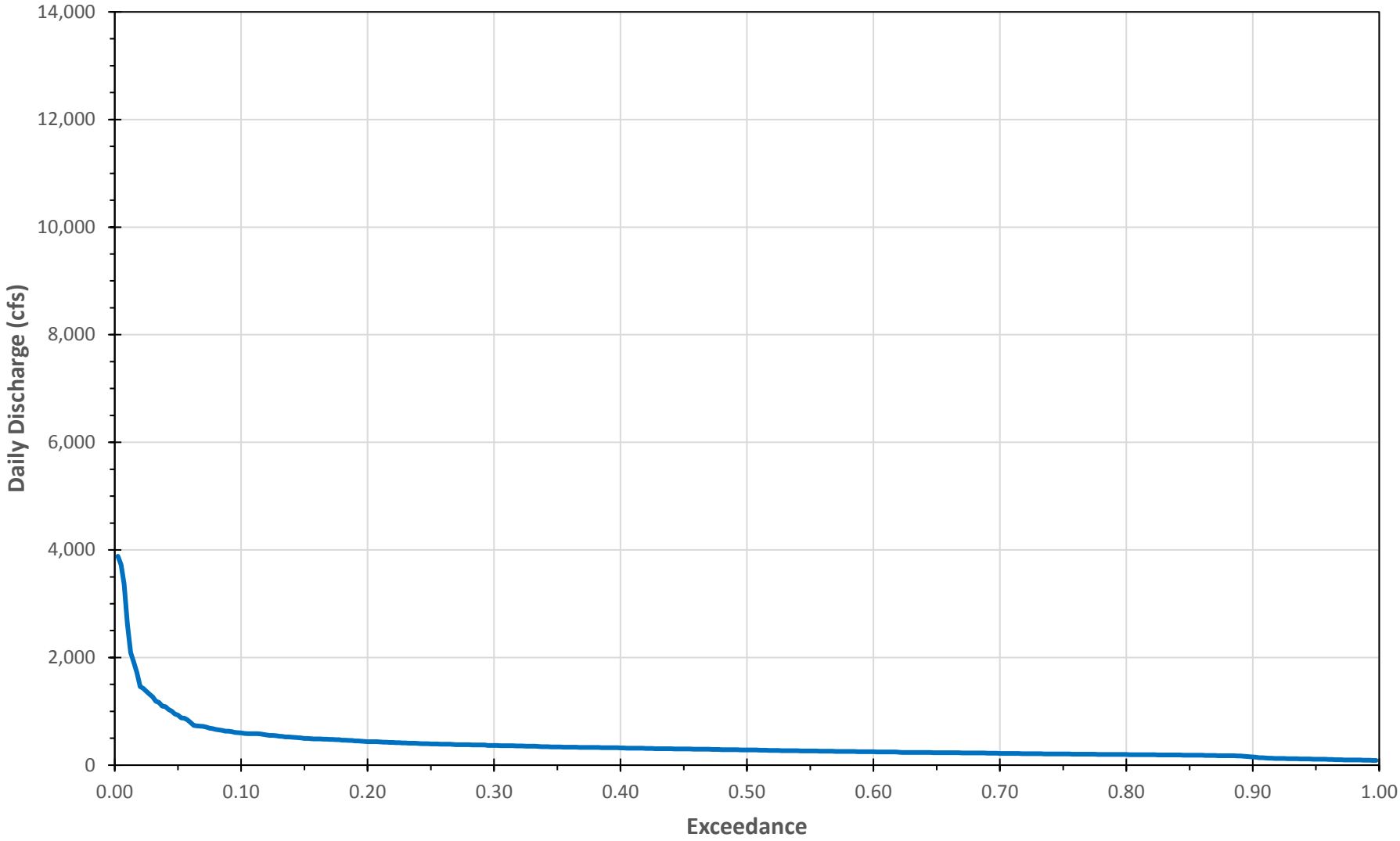
Little Androscoggin River at Upper Barker Dam
January Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



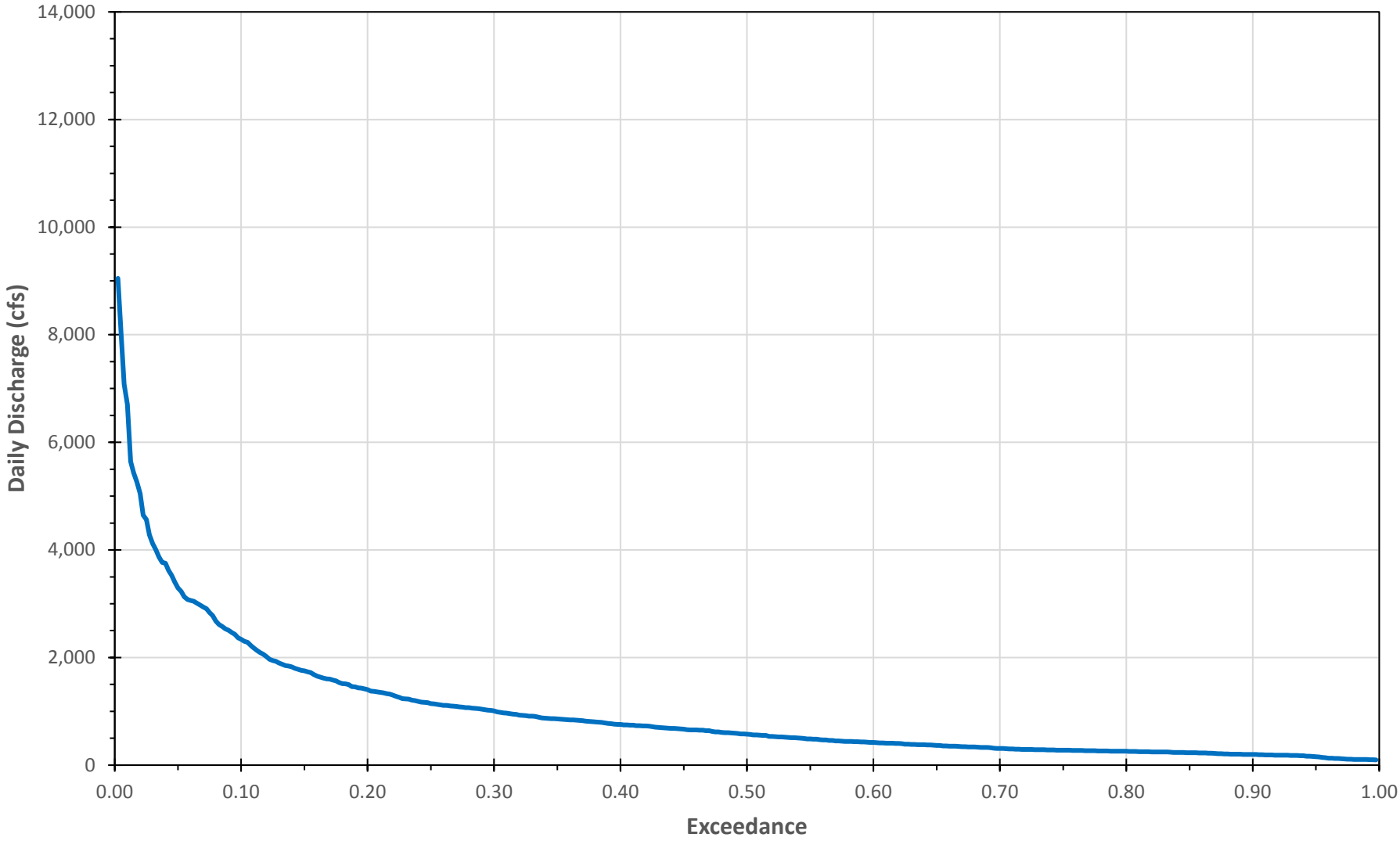
Little Androscoggin River at Upper Barker Dam
February Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



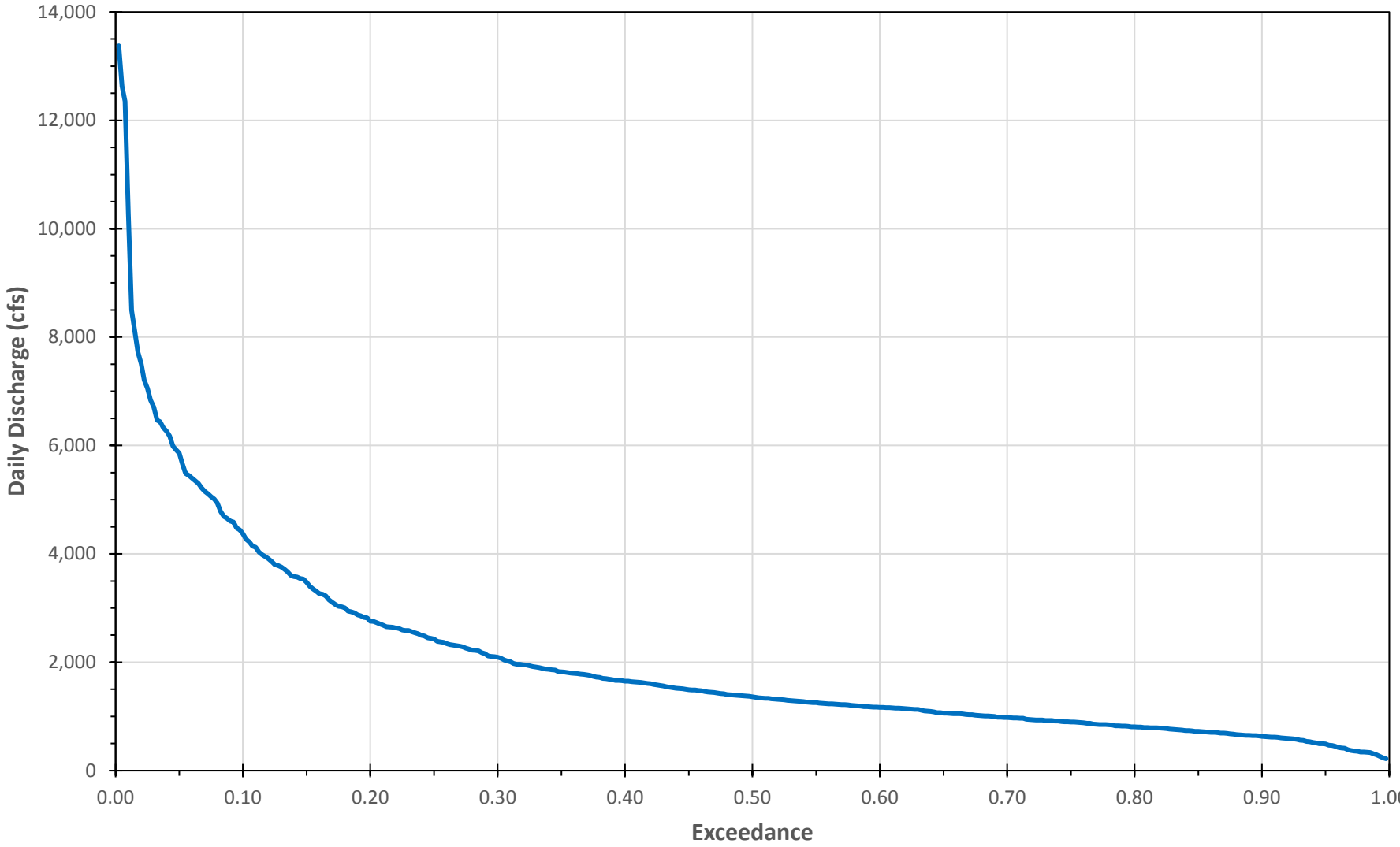
Little Androscoggin River at Upper Barker Dam
March Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



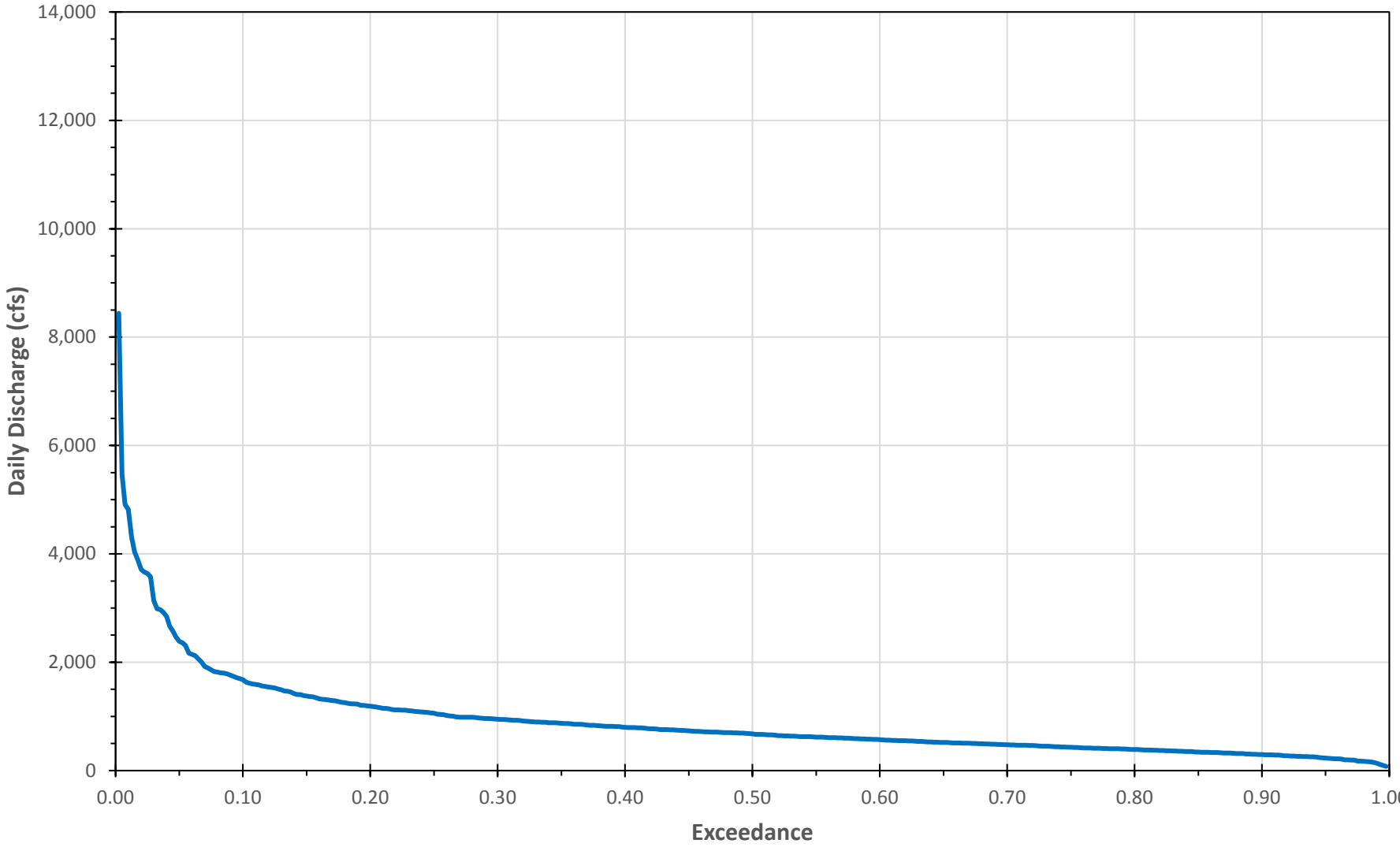
Little Androscoggin River at Upper Barker Dam
April Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



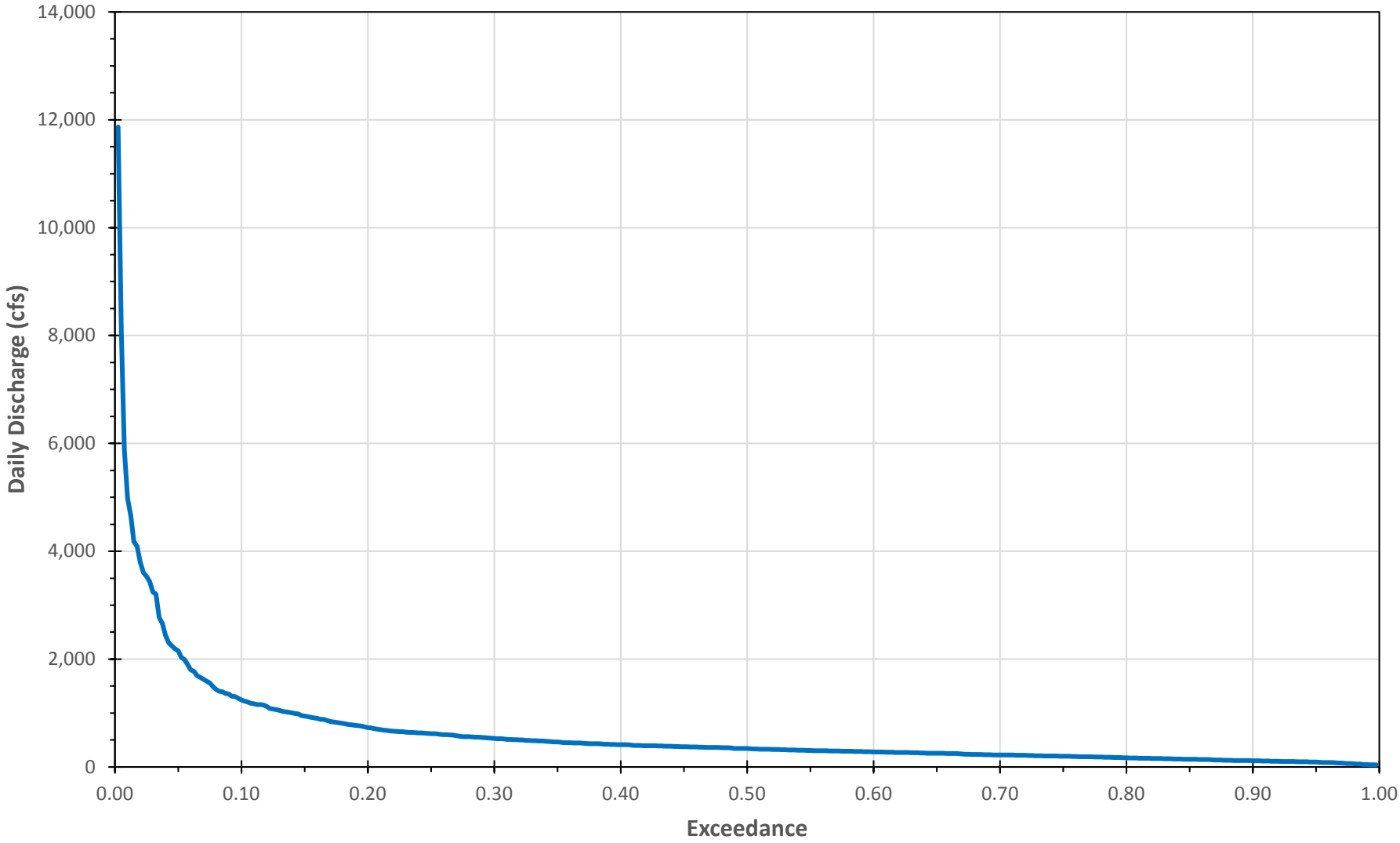
Little Androscoggin River at Upper Barker Dam
May Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



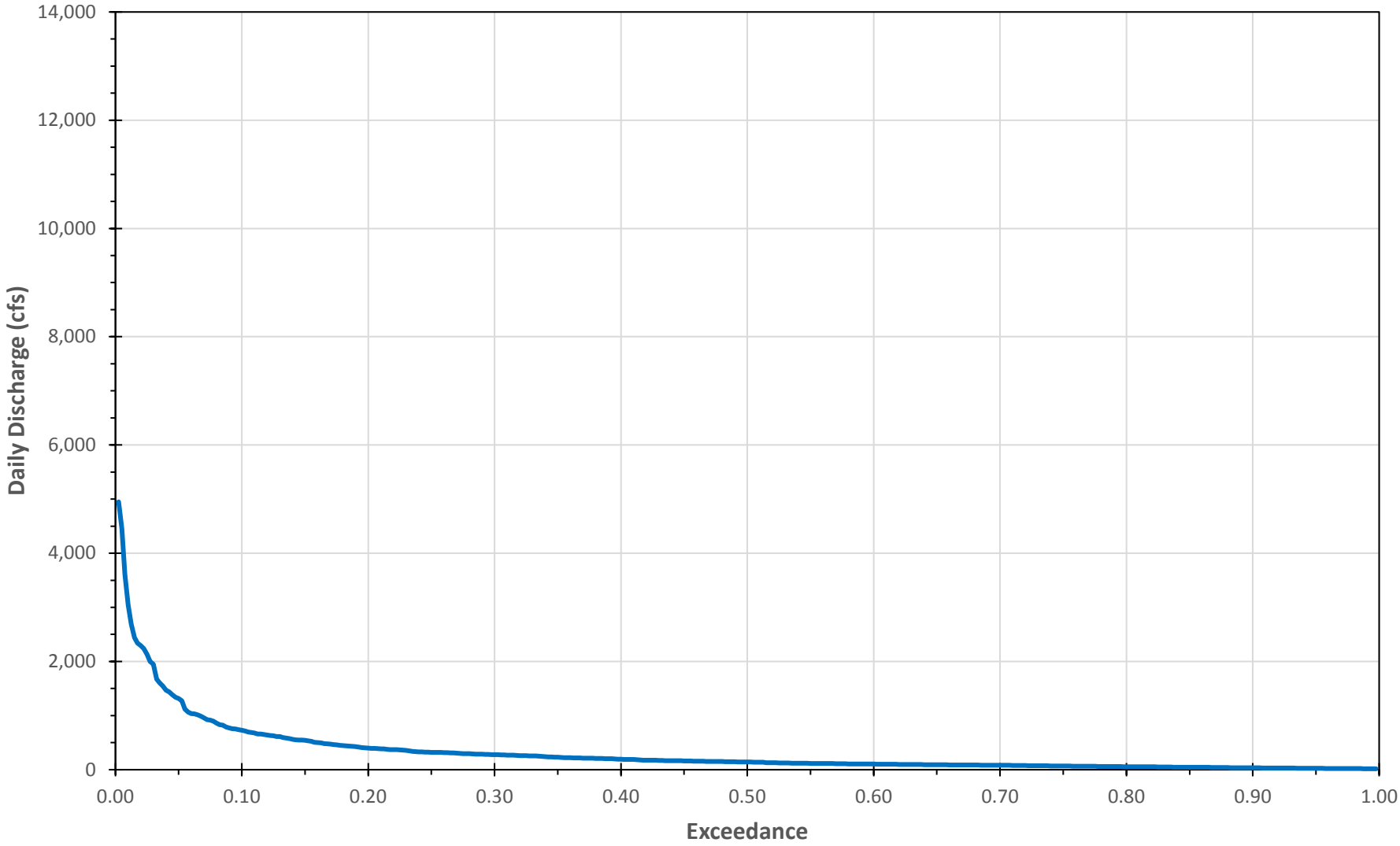
Little Androscoggin River at Upper Barker Dam
June Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



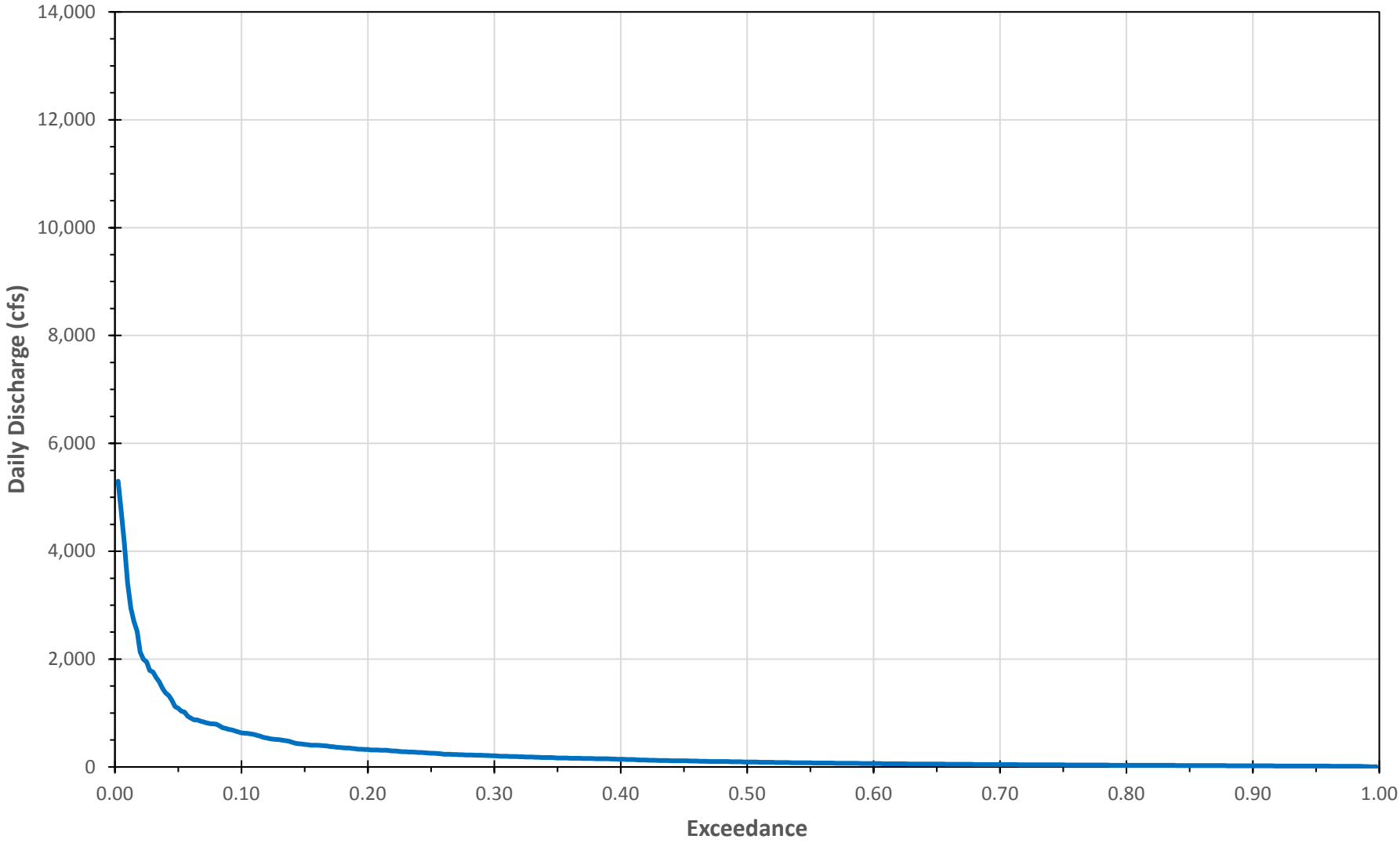
Little Androscoggin River at Upper Barker Dam
July Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



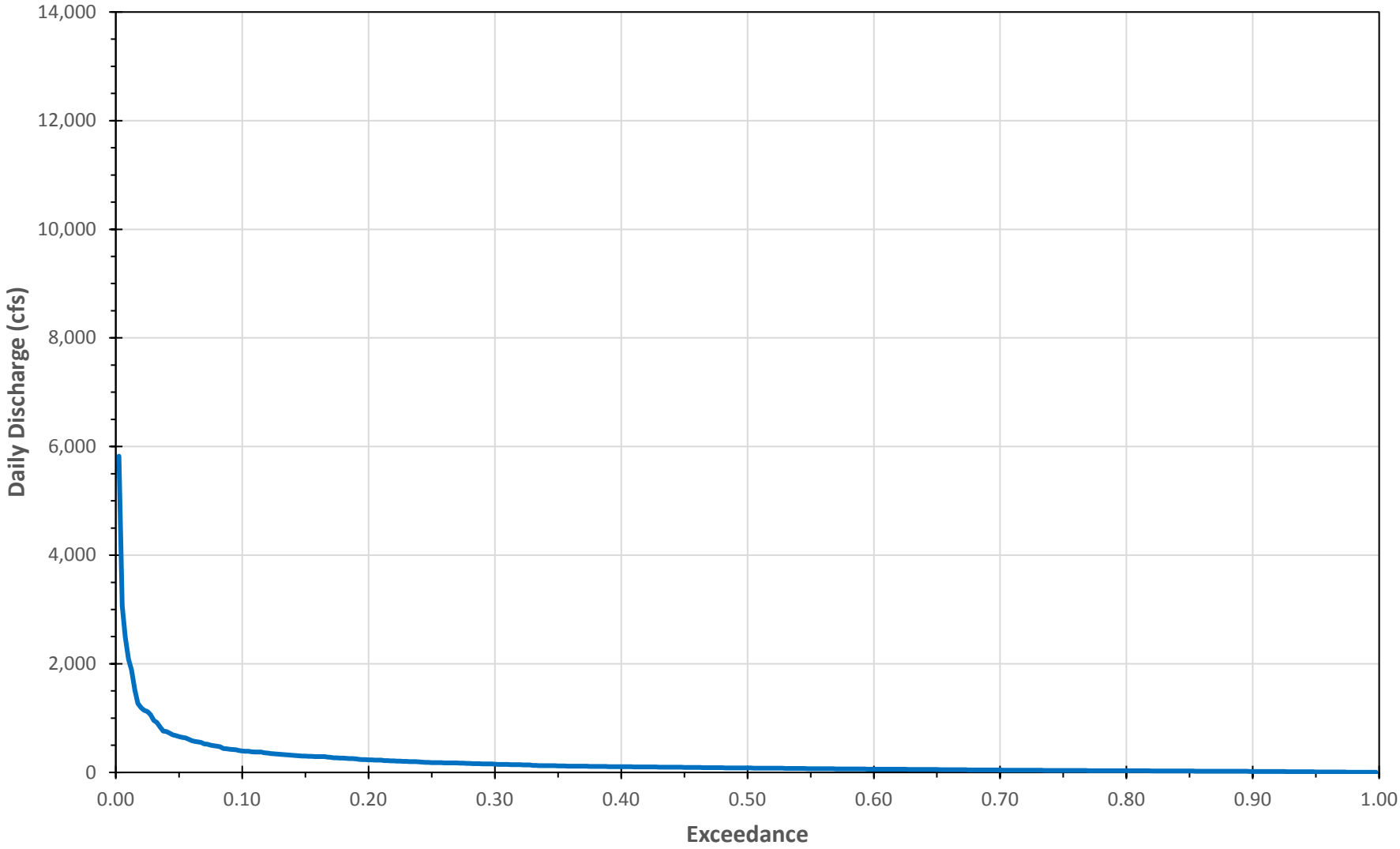
Little Androscoggin River at Upper Barker Dam
August Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



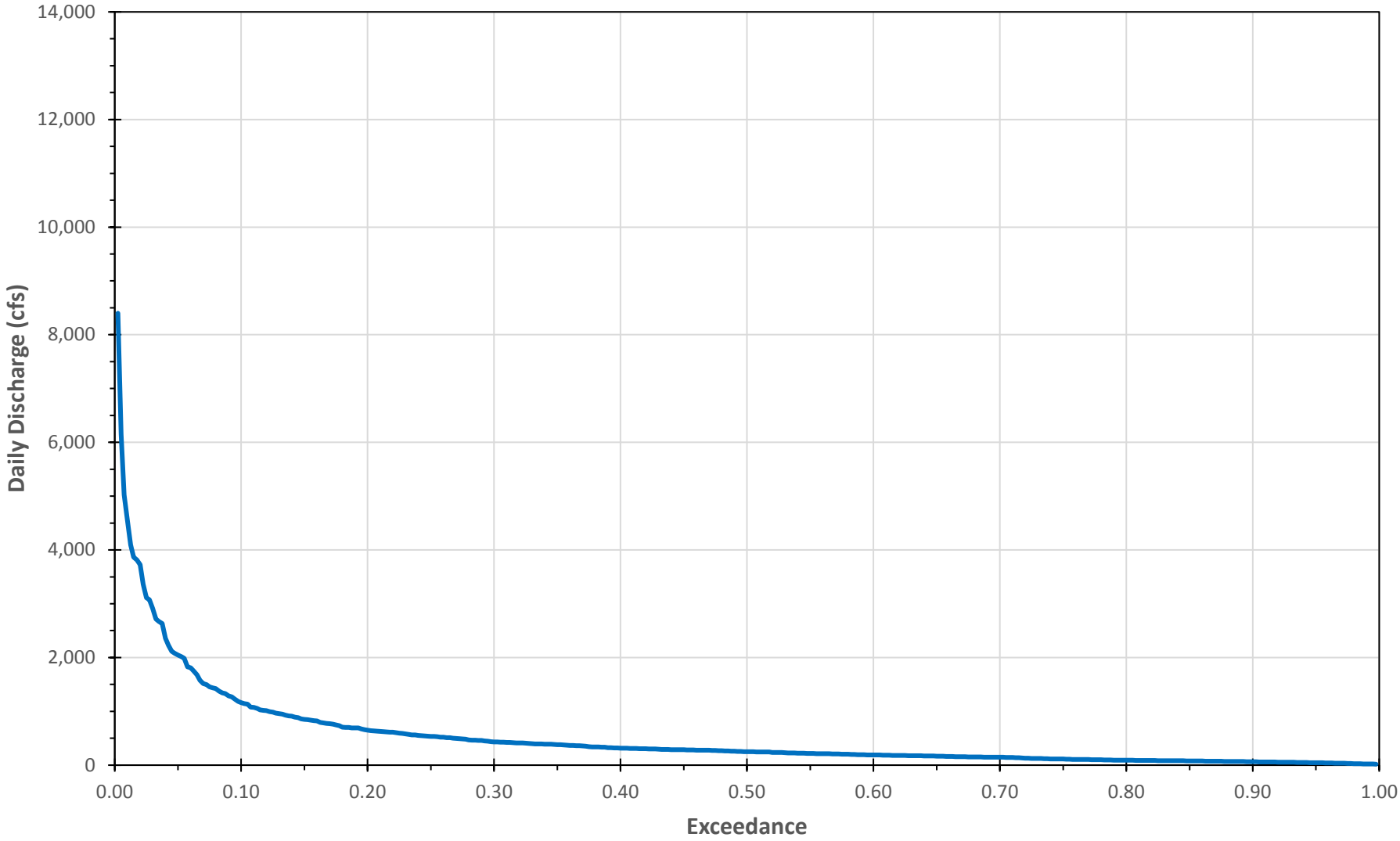
Little Androscoggin River at Upper Barker Dam
September Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



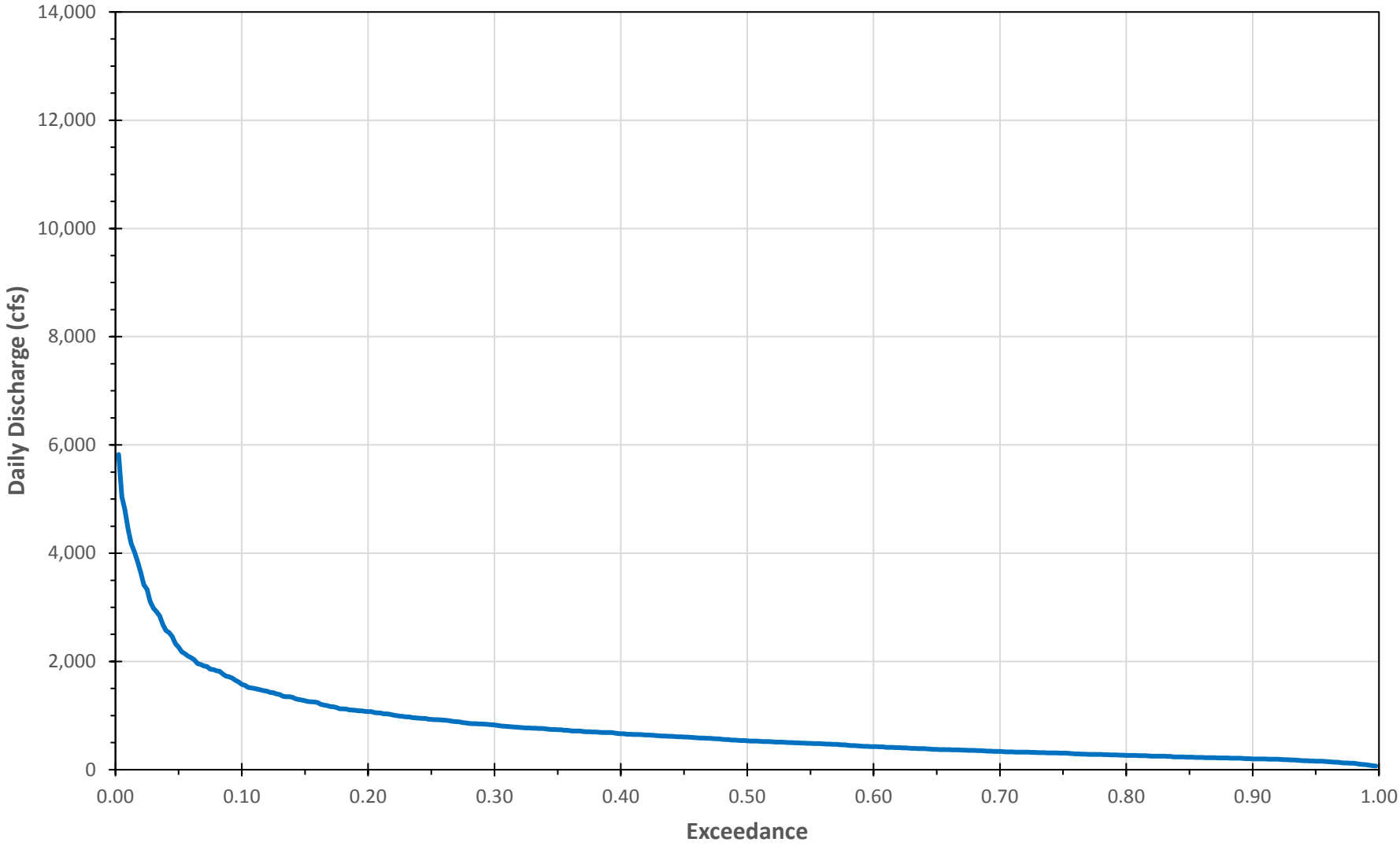
Little Androscoggin River at Upper Barker Dam
October Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



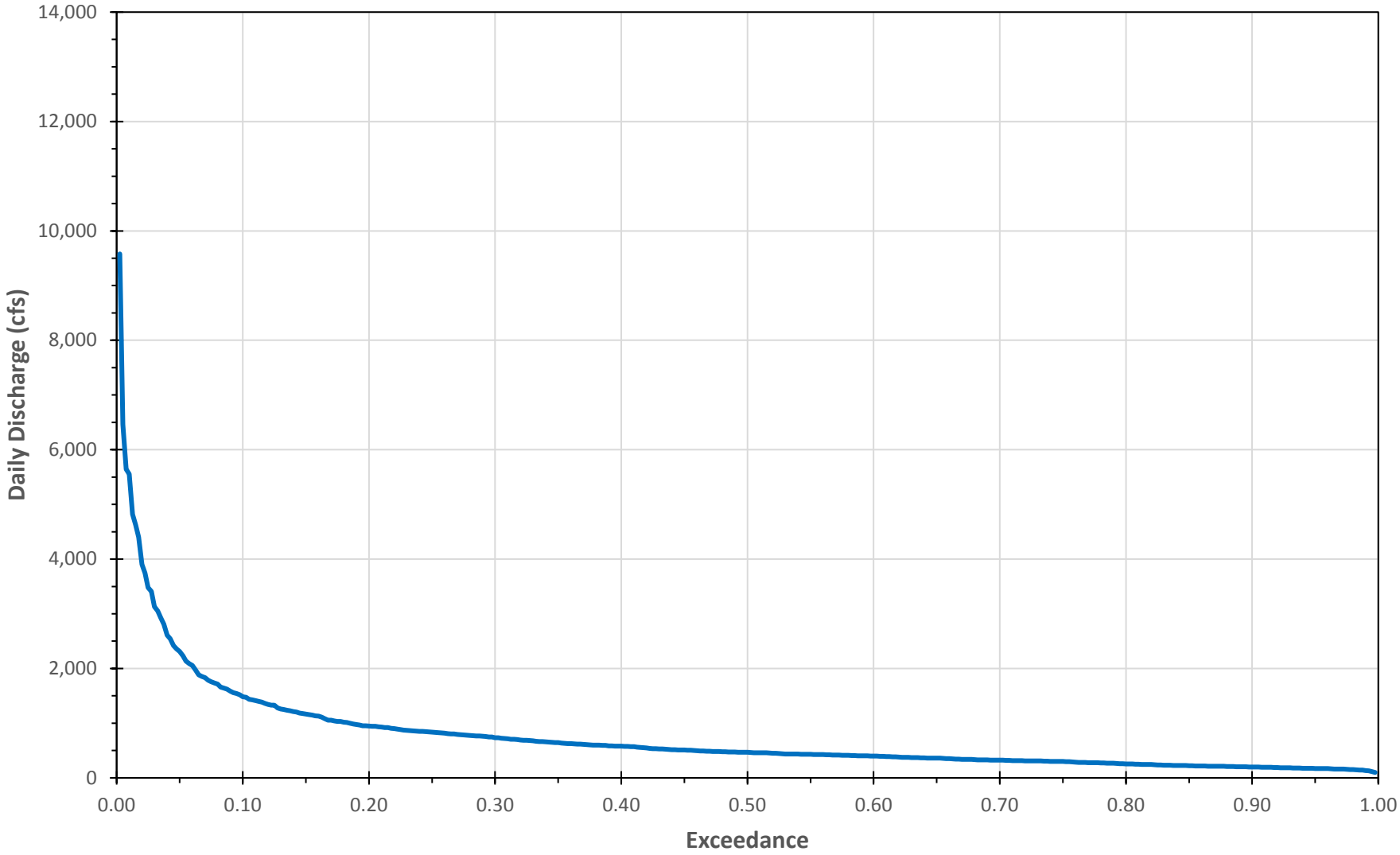
Little Androscoggin River at Upper Barker Dam
November Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



Little Androscoggin River at Upper Barker Dam
December Flow Duration Curve

Prorated from USGS Gage No. 01057000 Little Androscoggin River near South Paris, ME, 01/01/1985 - 12/31/2015



APPENDIX D

LIST OF WILDLIFE SPECIES COMMON TO THE REGION

COMMON NAME	SCIENTIFIC NAME
BIRDS	
American Crow	*Corvus brachyrhynchos*
American Robin	*Turdus migratorius*
Black-and-white Warbler	*Mniotilta varia*
Black-capped Chickadee	*Poecile atricapillus*
Blue Jay	*Cyanocitta cristata*
Broad-winged Hawk	*Buteo platypterus*
Cedar Waxwing	*Bombycilla cedrorum*
Common Raven	*Corvus corax*
Cooper's Hawk	*Accipiter cooperii*
Dark-eyed Junco	*Junco hyemalis*
Downy Woodpecker	*Picoides pubescens*
Eastern Phoebe	*Sayornis phoebe*
Eastern Wood-pewee	*Contopus virens*
European Starling	*Sturnus vulgaris*
Gray Catbird	*Dumetella carolinensis*
Great Horned Owl	*Bubo virginianus*
Hairy Woodpecker	*Picoides villosus*
House Wren	*Troglodytes aedon*
Least Flycatcher	*Empidonax minimus*
Mourning Dove	*Zenaida macroura*
Nashville Warbler	*Vermivora ruficapilla*
Northern Cardinal	*Cardinalis cardinalis*
Northern Flicker	*Colaptes auratus*
Northern Saw-whet Owl	*Aegolius acadicus*
Pileated Woodpecker	*Dryocopus pileatus*
Red-eyed Vireo	*Vireo olivaceus*
Red Knot	*Calidris canutus*
Red-shouldered Hawk	*Buteo lineatus*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Ruby-throated Hummingbird	*Archilochus colubris*
Scarlet Tanager	*Piranga olivacea*
Tufted Titmouse	*Baeolophus bicolor*
Turkey Vulture	*Cathartes aura*
Warbling Vireo	*Vireo gilvus*
Whip-poor will	*Caprimulgus vociferus*
White-breasted Nuthatch	*Sitta carolinensis*
White-throated Sparrow	*Zonotrichia albicollis*
Wild Turkey	*Meleagris gallopavo*
Yellow Warbler	*Dendroica petechia*

COMMON NAME	SCIENTIFIC NAME
Yellow-bellied Sapsucker	*Sphyrapicus varius*
MAMMALS	
Black Bear*	*Ursus americanus*
Coyote*	*Canis latrans*
Eastern Chipmunk	*Tamias striatus*
Ermine	*Mustela erminea*
Gray Fox	*Urocyon cinereoargenteus*
Gray Squirrel	*Sciurus carolinensis*
Hoary Bat	*Lasiurus cinereus*
Long-tailed Weasel	*Mustela frenata*
Masked Shrew	*Sorex cinereus*
Moose*	*Alces alces*
Muskrat	*Ondatra zibethicus*
Northern Long-eared Bat	*Myotis septentrionalis*
Northern Short-tailed Shrew	*Blarina brevicauda*
Porcupine	*Hystricomorph Hystricidae*
Pygmy Shrew	*Sorex minutus*
Raccoon	*Procyon lotor*
Red Bat	*Lasiurus borealis*
Red Fox	*Vulpes vulpes*
Smoky Shrew	*Sorex fumeus*
Southern Flying Squirrel	*Glaucomys volans*
Striped Skunk	*Mephitis mephitis*
Virginia Opossum	*Didelphis virginiana*
White-footed Mouse	*Peromyscus leucopus*
White-tailed Deer*	*Odocoileus virginianus*
Woodland Jumping Mouse	*Napaeozapus insignis*

*Potential transient use of the Project