Brookfield

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

Tel 207.755.5600
Fax 207.755.5655
www.brookfieldrenewable.com

January 30, 2020

VIA E-FILING

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

Shawmut Hydroelectric Project FERC No. 2322-060
Application for New License

Dear Secretary Bose:

In accordance with 18 CFR § 5.16(c), the Licensee for the Shawmut Hydroelectric Project, Brookfield White Pine Hydro LLC (White Pine Hydro or Licensee), respectfully submits for filing the *Application for New License for Major Project – Existing Dam – Shawmut Hydroelectric Project*. The application is being filed in accordance with the Integrated Licensing Process (ILP) and consists of the requisite exhibits and environmental analysis. Notification via email that the application has been filed and a link to download associated electronic files through FERC's eLibrary are being provided to entities listed on the attached Distribution List.

As required by 18 CFR § 5.18, the application discusses White Pine Hydro's proposal for continued maintenance and operation of the Shawmut Project as well as stakeholder comments submitted in response to the Draft License Application. Licensees' proposal is to continue the fundamental operation of the Project including the continued operation of the Project as run-of-river and the management of the daily impoundment fluctuation during normal operations to within one foot of the normal full pond elevation of 112.0'. Licensee is not proposing additional capacity related development in this proceeding.

The Exhibit E, Environmental Report, discusses the results of the studies conducted in support of the relicensing, and considers how the information and data collected during those studies addresses issues that were raised by agencies and other relicensing participants, and how that data addresses the Licensee's proposal. In support of this proposal, and based on the study results, Exhibit E evaluates the potential impacts to developmental and non-developmental resources that may occur as a result of continued project operation under a new license.

Exhibit E also includes stakeholder comments regarding, and as appropriate, Licensee's proposals for, the protection and mitigation of effects on, or enhancement to, resources that are associated with the continued operation of the Project. Included as appendices are; a draft Recreation Facilities Management Plan, a draft Operations Monitoring Plan, and a draft Historic Properties Management Plan.

As part of the National Historic Preservation Act Section 106 consultation process and in accordance with 18 CFR § 4.32(b)(3)(ii), the Licensee is filing draft cultural resource study reports and the Draft Historic Properties Management Plan (HPMP) with the Commission under separate cover. The study reports and Draft HPMP contain privileged cultural resources information and are only being provided to the Maine Historic Preservation Commission, representatives of the area Native American Tribes, and the Commission.

In accordance with the Commission's Order No. 630 (68 FR 9857), Exhibit F, including the Supporting Design Report, contains Critical Energy Information (CEII) and is being submitted under separate cover for the Commission's non-public file. Exhibit F contains sensitive and detailed engineering information that, if used incorrectly, may compromise the safety of the Project and those responsible for its proper operation. Members of the public requesting CEII information for the Shawmut Project must comply with the Commission's procedures for obtaining access to CEII as required under CFR § 388.113. All public requests for CEII should be made to the Commission's CEII Coordinator.

Consistent with the FERC's current policy for Project license terms, White Pine Hydro is seeking the maximum license term possible for the Project (up to 50 years) in consideration of recent and ongoing investments in fish passage measures.

If you have any questions regarding this filing, please contact either me, by email at Frank.Dunlap@BrookfieldRenewable.com or Mr. Luke Anderson at Luke.Anderson@BrookfieldRenewable.com.

Sincerely,

Frank H. Dunlap
Licensing Specialist

Attachment: Application for New License for the Shawmut Hydroelectric Project

cc: Distribution List
L. Anderson, White Pine Hydro

DISTRIBUTION LIST
Shawmut Hydroelectric Project (FERC No. 2322)
Final License Application

I, Frank H. Dunlap, Licensing Specialist, Brookfield Renewable Energy Group, hereby certify that a link to the foregoing document on the Commission website has been transmitted to the following parties on January 30, 2020.

Frank H. Dunlap

One copy, via e-filing to:

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

Via email, or one copy on compact disk,
Regular mail, postage paid to:

Federal Agencies

Matt Cutlit
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

John Spain
Regional Engineer, Division of Dam Safety and Inspections
Federal Energy Regulatory Commission
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New York, NY 10001

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January 2020 Application for New License

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Kirk Francis
Chief
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Indian Island, ME 04468

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Indian Island, ME 04468

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Landis Hudson
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P.O. Box 782
Yarmouth, ME 04096

Nick Bennett
Natural Resources Council of Maine
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Augusta, ME 04330

Greg Ponte
Kennebec Valley Chapter
Trout Unlimited
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Waterville, ME 04901

Distribution List
Shawmut Project (FERC No. 2322)
January 2020 Application for New License

Local / Governments

Kennebec County Government
125 State Street
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Town of Benton
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Benton, ME 04901

Town of Clinton
27 Baker Street
Clinton, ME 04927

Town of Fairfield
19 Lawrence Avenue
PO Box 149
Fairfield, ME 04937

Town of Skowhegan
225 Water Street
Skowhegan, ME 04976

Somerset County Government
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Skowhegan, ME 04976

City of Waterville
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Waterville, ME 04901

Town of Winslow
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Environmental Services Manager
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Licensing Specialist
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BROOKFIELD WHITE PINE HYDRO LLC
APPLICATION FOR NEW LICENSE FOR
MAJOR WATER POWER PROJECT – EXISTING DAM
SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

Submitted by:

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

Prepared by:

Kleinschmidt Associates
141 Main Street
Pittsfield, ME 04967

January 2020

Brookfield

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Shawmut Hydroelectric Project
FERC Project No. 2322

Application for New License
For A Major Water Power Project - Existing Dam

Executive Summary

Volume I – Public

Initial Statement

Exhibit A – Project Description

Exhibit B – Project Operation and Resource Utilization

- Appendix B-1 – Annual and Monthly Flow Duration Curves 2004-2019

Exhibit C – Construction History

Exhibit D – Statement of Costs and Financing

Exhibit E – Environmental Report

- Appendix E-1 - DLA Consultation Comment/Response Summary
- Appendix E-2 - Relicensing Consultation Documentation
- Appendix E-3 - Fish Assemblage Study
- Appendix E-4 - Recreation Sites Amenities Maps
- Appendix E-5 - Draft Recreation Facilities Management Plan
- Appendix E-6 - Draft Project Operations Monitoring Plan

Exhibit G – Project Maps

Exhibit H – Description of Project Management and Need for Project Power

- Appendix H-1 Single Line Diagram

Volume II – Privileged

- Appendix E-7 - Historic Archaeology Phase 1 Study Report
- Appendix E-8 - Precontact Archaeology Phase I Study Report
- Appendix E-9 - Draft Historic Properties Management Plan

Volume III – CEII/CUI

Exhibit F – General Design Drawings and Supporting Design Report

- Appendix F-1 - Supporting Design Report

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EXECUTIVE SUMMARY

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SHAWMUT PROJECT FERC NO. 2322-060
APPLICATION FOR NEW LICENSE
EXECUTIVE SUMMARY

Brookfield White Pine Hydro LLC (White Pine Hydro) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the Shawmut Hydroelectric Project (Shawmut Project or Project) (FERC No. 2232). The 8.650 megawatt (MW) Shawmut Project is located on the Kennebec River in south-central Maine. The Project boundary extends approximately 12.3 miles upstream from the Shawmut Dam.

FERC issued a new license to operate the Shawmut Project to former licensee Central Maine Power Company on January 5, 1981; the expiration date for the license was January 31, 2021. On August 1, 2018, White Pine Hydro filed an amendment application to extend the license term by one year, and on December 11, 2018 FERC issued an order (165 FERC ¶ 62,152) extending the Project license term to January 31, 2022. The extension of the license term also changed the filing date for this Application for New License from January 31, 2019 to January 31, 2020.

White Pine Hydro has prepared this application for new license for the Shawmut Project in accordance with FERC's Integrated Licensing Process (ILP) and in consultation with interested parties, including federal and state agencies, tribal organizations, non-governmental organizations (NGOs), local governments, and the public.

The final license application Volume I describes the existing and proposed Project facilities (Exhibit A), and operations (Exhibit B), and an analysis of the effects of the proposed relicensing on the project, environmental, recreational and cultural resources identified during scoping, and proposes protection, mitigation, and enhancement (PME) measures as appropriate (Exhibit E). The license application also includes the other exhibits required by FERC; Exhibit C (construction history), Exhibit D (project costs), Exhibit G (project boundary maps), and Exhibit H (project management and need for project power), which are filed as part of the public volume. Portions of Exhibit E relating to cultural resources, including a Historic Properties Management Plan, are included in Volume II, which is being filed as Privileged. Exhibit F (design drawings and Supporting Design Report) contains Critical Energy Infrastructure Information and is included as Volume III, which is being filed as CEII/CUI.

During the FERC public scoping sessions for the relicensing process it was identified that there were two related but separate processes ongoing, 1) fish passage studies and the development of fishways that were proceeding under the requirements of an existing settlement agreement, Interim Species Protection Plan, and the existing license, and 2) relicensing studies and processes which did not need to duplicate the ongoing fisheries work, and that the current status of the two processes would be summarized in the Application for New License. Therefore, in parallel with the Shawmut relicensing process, Brookfield Renewable (the indirect parent company of the Licensee) has worked in consultation with state and federal fishery agencies to develop a Species Protection Plan (SPP) for the four lower Kennebec River hydroelectric projects, including the Shawmut Project. The SPP is designed to replace the two existing Interim Species Protection Plans (ISPP) addressing fish passage and habitat needs for Endangered Species Act (ESA)-listed Atlantic salmon, Atlantic sturgeon and shortnose sturgeon at the lower Kennebec River projects. The ISPP included, among other things, the development of volitional fish passage at the Shawmut site.[1] The ISPP also required downstream fish passage measures and studies to test the effectiveness of the Shawmut Project downstream passage measures. The SPP builds on the measures included in the ISPP and commits White Pine Hydro to certain additional fish passage enhancements, as well as fishway operation, maintenance and monitoring measures. White Pine Hydro filed the SPP and associated Draft Biological Assessment with the Commission on December 31, 2019.

As part of the application for new license, White Pine Hydro is proposing certain protection, mitigation and enhancement (PM&E) measures for the Shawmut Project including implementation of measures specifically related to the Shawmut Project that are included in the SPP, and which are summarized as follows:

- Continue to operate the new upstream fish lift (expected to be installed and operational by May 2021) in accordance with an agency approved operational plan.
- Install a fish guidance boom (e.g., Worthington boom) in the forebay (in front of Units 7 and 8) to direct downstream migrants to the bypass gate(s).
- Continue to operate the existing downstream fish passage facility and maintain the forebay fish guidance boom.

[1] In 2016, FERC amended (155 FERC ¶ 61,185) the Shawmut Project license to include the terms of the ISPP, and thereby authorized installation and operation of fish passage facilities at the Shawmut Project, including a new upstream fish lift. The fish lift is currently under development and is expected to be operational in May, 2021.

- Conduct up to three years of additional downstream passage studies to reevaluate smolt passage and station survival.

- Conduct up to two years of upstream adult salmon studies to evaluate the performance of the Shawmut fish lift.

- Revise and implement a site-specific Fish Passage Operations and Maintenance Plan.

In addition to the measures included in the SPP, White Pine Hydro is making the following proposals as part of the Application for New License;

- Continue the current run-of-river mode of operation during the term of the new Project license, with a formal condition to maintain a pond level within one foot of the normal full pond elevation of 112.0' during normal operations.

- Modify the Shawmut Project boundary to remove two small parcels of land from the Project. The parcels are located at the upper end of the impoundment and serve no project purposes as they are not necessary for operation, maintenance, recreational or resource protection purposes.

- Continue to provide for public access and use of Project lands and waters as appropriate and consistent with Project purposes and safety. Continue to provide and maintain the existing two Project recreation sites (Hinckley Boat Launch, Canoe Portage Trail).

- Implement an Operations Monitoring Plan for the Project which will document run-of-river operations.

- Implement a Recreation Facilities Management Plan (RFMP) for the Project, which will address management of Project recreation sites over the term of a new license.

- Implement an Historic Properties Management Plan (HPMP) to provide for appropriate management of project related historic properties throughout the term of the license.

Consistent with the FERC's current policy for Project license terms, White Pine Hydro is seeking the maximum license term possible for the Project (up to 50 years) in consideration of recent and ongoing investments in fish passage measures.

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INITIAL STATEMENT

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BEFORE THE
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Brookfield White Pine Hydro LLC	)	**FERC Project No. 2322**
	)	**Shawmut Hydroelectric Project**
	)	

APPLICATION FOR NEW LICENSE
FOR A MAJOR WATERPOWER PROJECT - EXISTING DAM

INITIAL STATEMENT

1. Brookfield White Pine Hydro LLC (hereinafter "White Pine Hydro" or "Licensee" or "Applicant") applies to the Federal Energy Regulatory Commission (hereinafter "FERC" or "Commission") for a New License for the Shawmut Hydroelectric Project ("Project"), an existing licensed major project, as described in the attached exhibits. The Project is licensed as Project No. 2322. The current license for the Project was issued by order dated January 5, 1981. The license has an expiration date of January 31, 2022. Applicant is requesting that the Commission issue a license with the maximum term available in consideration of recent and ongoing investments to the project works. The Applicant is the only entity that has or intends to obtain and will maintain any proprietary right or interest to construct, operate, or maintain the Project.

2. The location of the Project is:

State:	Maine
County:	Kennebec and Somerset
Township/nearby Towns:	Skowhegan, Fairfield, Clinton, and Benton
Stream or other body of water:	Kennebec River

3. The exact name, business address, and telephone number of the Applicant are:

   Brookfield White Pine Hydro LLC
   399 Big Bay Rd
   Queensbury, NY 12804
   Attn: Mr. Thomas Uncher, Vice President
   (518) 743-2018

   The exact name, business address, and telephone number of each person authorized to act as agent for the Applicant in this application are:

Mr. Steven P. Murphy, Director, Licensing
Brookfield White Pine Hydro LLC
33 West First Street
Fulton, NY 13069
Telephone: (315) 598-6130

It is requested that copies of all correspondence pertaining to this application be provided to:

Mr. Frank H. Dunlap
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240
Telephone: (207) 755-5603

and,

Mr. Luke Anderson
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240
Telephone: (207) 755-5603

It is requested that copies of all correspondence pertaining to this application also be provided to:

Ms. Wendy Bley
Kleinschmidt Associates
P.O. Box 650
141 Main Street
Pittsfield, ME 04967
Telephone: (804) 883-5869

4. The Applicant is:

Brookfield White Pine Hydro LLC, a Delaware limited liability company; Licensee for the water power project designated as Project No. 2322 in the records of the Federal Energy Regulatory Commission. The Licensee is not claiming preference under section 7(a) of the Federal Power Act, 16 U.S.C. §796.

5. (i) The statutory or regulatory requirements of the State of Maine, in which the Project is located, which would, assuming jurisdiction and applicability, affect the Project as proposed with respect to bed and banks and the appropriation, diversion, and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting, and distributing power and in any other business necessary to accomplish the purposes of the license under the Federal Power Act are:

(1) Maine Waterway Development and Conservation Act, Maine Revised Statutes Annotated Title 38, §630 et. seq.

(2) Mill and Dam Act, M.R.S.A. Title 38, §651 et. seq.

(ii) The steps which the Applicant has taken or plans to take, to comply with each of the laws cited above are:

(1) The Maine Waterway Development and Conservation Act (MWDCA), enacted in 1983, regulates certain construction or reconstruction of hydropower projects which change water levels or flows above or below a dam. The Applicant is not proposing as part of the relicensing any construction or changes in water levels that would require approval under the MWDCA.

(2) The Mill Act, essentially enacted in 1821, allows riparian owners to maintain dams and raise water. The statute does not require any permits and has been interpreted by the Maine Supreme Judicial Court to apply to hydroelectric generating plants. See Veazie v. Dwinel, 50 Me. 479 (1862). Maine case law has also held that owners of the riverbed have the right to the natural flow of a stream as it passes through their land, Wilson & Son v. Harrisburg, 107 Me. 207 (1910). Licensee either owns or has easement or flowage rights to all Project lands and waters.

6. The Shawmut Hydroelectric Project consists of a dam, two powerhouses, appurtenant facilities, and a 1,310-acre impoundment. The 1912 powerhouse contains six horizontal Francis-type turbines (Units 1-6) and the 1982 powerhouse contains two horizontal tube-type turbines (Units 7-8). The total authorized capacity of the Project is 8.650 megawatts (MW). The Project generation facilities tie to the electric grid at the local utility's non-project substation located adjacent to the Project boundary. See Exhibit A, Project Description and Exhibit F, General Design Drawings for a complete description of the Project.

7. There are no federal lands occupied by the Project. No lands of the United States are affected by the Project. There are no federal facilities used by the Project.

8. This is an existing Project and no new construction, aside from proposed previously authorized fish passage facilities, is planned in association with this relicensing.

9. Brookfield White Pine Hydro LLC owns, and, as Licensee for the Project, will maintain any proprietary right necessary to construct, operate, or maintain the Project.

10. Identify (providing names and addresses):

(i) *Every county in which any part of the Project, and any Federal facilities that would be used by the project, would be located:*

The Project is located within Kennebec and Somerset counties, Maine.

Kennebec County Government
125 State Street
Augusta, ME 04330

Somerset County Government
41 Court Street
Skowhegan, ME 04976

(ii) E*very city, town, or similar local political subdivision in which the project is located and in which any Federal facility that is used by the project is located, or that is within 15 miles of the project dam and has a population of 5,000 or more people is:*

The Project is located in the towns of Skowhegan, Fairfield, Clinton, and Benton:

Town of Skowhegan
225 Water Street
Skowhegan, ME 04976

Town of Fairfield
19 Lawrence Avenue
PO Box 149
Fairfield, ME 04937

Town of Clinton
27 Baker Street
Clinton, ME 04927

Town of Benton
1279 Clinton Avenue
Benton, ME 04901
City of Waterville
One Common Street
Waterville, ME 04901

Town of Winslow
114 Benton Avenue
Winslow, ME 04901

(iii) *Every irrigation district, drainage district or similar special purpose political subdivision in which any part of the project is located and in which any Federal facility that is used by the project is located or that owns, operates, maintains or uses any project facility:*

There are no irrigation districts, drainage districts, or similar special purpose political subdivisions affected by the Project.

(iv) *Every other political subdivision in the general area of the project that there is some reason to believe would be likely to be interested in, or affected by, the notification:*

There are no other political subdivisions in the general area of the Project that would likely be interested in, or affected by, the application.

(v) *All Indian Tribes that may be affected by the project:*

White Pine Hydro is not aware that the Project affects any Native American Tribe. The following is a listing of Native American tribes that may have some level of tribal interests in the area surrounding the Project and have been included in the distribution list for the Project:

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

Penobscot Indian Nation
12 Wabanaki Way
Indian Island, ME 04468

Passamaquoddy Native American Nation
Pleasant Point Reservation
Tribal Building Office
Route No. 190
Perry, ME 04667

Houlton Band of Maliseet
88 Bell Road
Littleton, ME 04730

11. *The Applicant has, in accordance with 18 C.F.R. § 4.32(a)(3), made a good-faith effort to notify, by certified mail, the following entities of the filing of this application:*

(a) Every property owner of record of any interest within the bounds of the Project;

(b) The entities listed in (10) above;

(c) *Other governmental agencies that would likely be interested in or affected by the application.*

A Certificate of Service is attached to the transmittal letter for this Application for New License.

12. *In accordance with 18 C.F.R. §4.51 and16.10 of the Commission's regulations, the following Exhibits are attached to and made part of this application:*

Exhibit A – Project Description
Exhibit B – Project Operation and Resource Utilization
Exhibit C – Construction History
Exhibit D – Statement of Costs and Financing
Exhibit E – Environmental Report
(Cultural resources information filed under separate cover as Privileged)
Exhibit F – General Design Drawings and Supporting Design Report
(Filed under separate cover as CEII)
Exhibit G – Project Maps
Exhibit H – Description of Project Management and Need for Project Power

SUBSCRIPTION

This Application for License for the Shawmut Hydroelectric Project, FERC No. 2322, is executed in the State of New York, County of Warren, by Thomas Uncher, Vice President of Brookfield White Pine Hydro LLC, 339 Big Bay Road, Queensbury, NY 12804, who, being duly sworn, deposes and says that the contents of this application are true to the best of his knowledge or belief and that he is authorized to execute this application on behalf of Brookfield White Pine Hydro LLC. The undersigned has signed this application this 29th day of January, 2020.

BROOKFIELD WHITE PINE HYDRO LLC

By _____

Thomas Uncher
Vice President
Brookfield White Pine Hydro LLC

VERIFICATION

Subscribed and sworn to before me, a Notary Public of the State of New York, this 29th day of January, 2020.

Brenda J Schermerhorn
(Notary Public)

(My Commission Expires July 2, 2023)/seal

BRENDA J. SCHERMERHORN
NOTARY PUBLIC, State of New York
Reg. No. 01SC6169934
Qualified in Saratoga County
My Commission Expires July 2, 2023

EXHIBIT A
PROJECT DESCRIPTION

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SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT A
PROJECT DESCRIPTION

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SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT A
PROJECT DESCRIPTION

1.0 INTRODUCTION

White Pine Hydro LLC (White Pine Hydro) owns and operates the Shawmut Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC) Project No. 2322. The 8.650 megawatt (MW) Project is located on the Kennebec River in south-central Maine in Kennebec and Somerset counties at river mile (RM) 66 and in the towns of Skowhegan, Fairfield, Clinton, and Benton. The Kennebec River basin above the Shawmut Dam has a drainage area of approximately 4,200-square-miles. The Project is one of 10 FERC licensed hydropower and storage projects on the mainstem of the Kennebec River. The Project boundary extends approximately 12.3 miles upstream from the Shawmut Dam.

2.0 PROJECT STRUCTURES

2.1 Existing Structures

Existing structures at the Project consist of a concrete gravity dam, an enclosed forebay, an intake and headworks section, two powerhouses, a tailrace, an interconnection with the local utility's transmission system, and appurtenant facilities (Figure 2-1).

2.1.1 Dam

The dam is a concrete gravity type overflow section with the fixed crest at elevation 108.0' U.S. Geological Survey (USGS) datum[1]. The spillway section is comprised of several sections totaling 1,135-feet-long with an average height of approximately 24 feet; the total dam is approximately 1,480 feet in length. The spillway section is approximately 19-feet high, has 380 feet of hinged flashboards 4-feet high serviced by a steel bridge with a gantry crane, a 730-foot-

[1] Note: All references to elevation in this report are based on USGS datum.

long section topped with an inflatable bladder composed of three sections, each 4.46-feet-high when inflated, and a 25-foot-wide sluice having a crest elevation of 104.0' and equipped with a timber and steel gate. The dam includes a non-overflow section between the hinged flashboards and the forebay headworks structure. An earthen dike with a concrete core wall is situated beyond the west abutment of the headworks structure.

2.1.2 Headworks and Intake Structure

The headworks and intake structure are integral to the dam. The forebay intake section contains 11 headgates and two filler gates. Five of the headgates are installed in openings 10-feet by 15.5-feet and six are installed in openings 10-feet by 12.5-feet. The two filler gates are 4-feet by 6-feet. The headgates are fitted with trash racks. In the 1912 powerhouse (Units 1-6), the intake section has six open flumes each fitted with two 10.5-feet by 14-feet double leaf slide gates and a continuous trash rack which extends from elevation 115.0' down to elevation 88.0'. The clear spacing of the racks in front of Units 1-6 is 1.5 inches. In the 1982 powerhouse (Units 7 and 8), the intake section contains two openings fitted with vertical headgates approximately 12-feet-high by 12-feet-wide and operated by hydraulic cylinders. The trash racks are serviced by a track mounted, hydraulically operated trash rake with trash removal capabilities. The trash racks screening the Units 7 and 8 intakes extend from elevation 115.25' to 88.0' and have clear spacing of 3.5 inches.

The westerly non-overflow section contains a 2-foot-high by 2-foot-wide steel gate which was formerly used as an intake for process water serving the former Keyes Fibre Company mill adjacent to the Project (the mill was demolished in 2018).

A retaining wall connects the west end of the non-overflow section to a concrete cut-off wall which serves as a core wall for an earthen dike.

2.1.3 Forebay

The forebay is located immediately downstream of the headgate structure and is enclosed by two powerhouse structures. The 1912 powerhouse (Units 1-6) is located to the east and the 1982 powerhouse (Units 7-8) is located to the south. There is an approximately 240-foot-long concrete retaining wall located on the west side of the forebay. A second process water intake for the

former Keyes Fibre Company is located in this forebay, similar to that installed in the headworks structure. Located at the south end of the forebay between the powerhouses are two gates; a 10-foot-high by 7-foot-wide Tainter gate and a 6-foot-high by 6-foot-wide deep gate.

2.1.4 1912 Powerhouse

The 1912 powerhouse structure, water wheel flumes, and intake section are 86-feet-wide by 148-feet-long and constructed of reinforced concrete. The walls of the 1912 powerhouse superstructure are of brick construction. The building itself is 35-feet-wide by 148-feet-long. Approximately one-third of the building is two stories high. Steel columns are embedded in the downstream wall of the powerhouse for support of the bridge crane beam and the steel framing used for the second story floor construction. The roof is reinforced concrete supported by concrete encased steel beams. There is an overhead crane for handling equipment.

The water wheel flume and intake section has six open flumes, each fitted with two 10.5-foot-high by 14-foot-wide double leaf slide gates and a continuous trash rack with 1.5-inch spacing between the bars. There are six turbines and six generators (Units 1-6) within the powerhouse which are described in more detail in Section 4.1.

The 1982 powerhouse substructure and superstructure are approximately 59-feet-long by 43-feet-wide and are constructed of reinforced concrete. The building is approximately 28-feet-high from roof to generator floor and the substructure extends down to a maximum depth of approximately 20-feet below the generator floor in the tailrace draft area. The roof is reinforced concrete supported by steel beams. An equipment service hatch, 23-feet by 16-feet, is located on the roof. An overhead bridge crane is used for servicing powerhouse equipment.

The intake section is constructed of reinforced concrete containing two openings fitted with vertical headgates approximately 12-feet-high by 12-feet-wide and operated by hydraulic cylinders, and trash racks with spacing of 3.5 inches between the bars. The trash racks are serviced by a track mounted, hydraulically operated trash rack rake with trash removal capabilities.

The powerhouse contains two turbines and two generators (Units 7-8), which are described in more detail in Section 4.1.

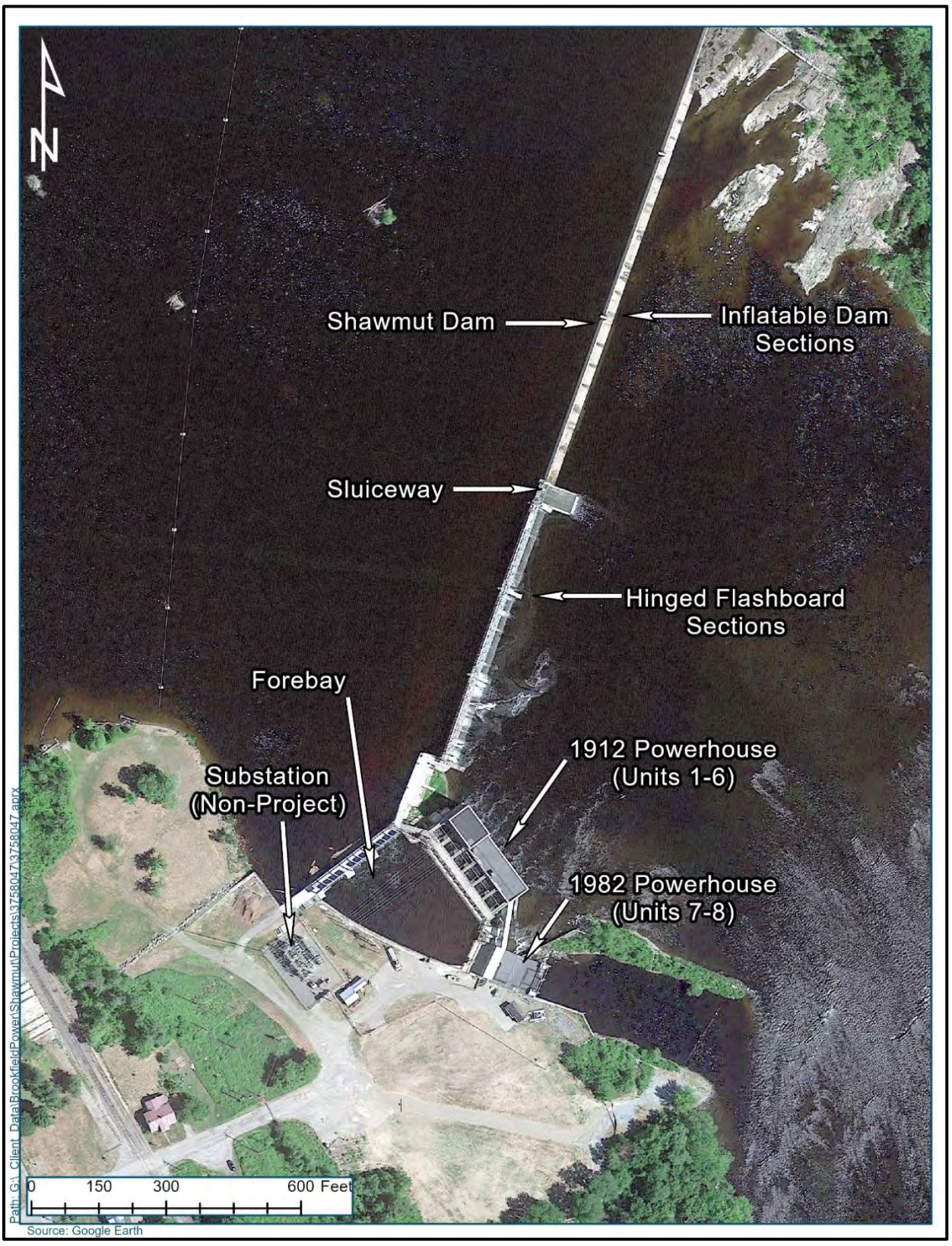

Figure 2-1 Overview of Shawmut Project Facilities

2.1.5 Tailrace

The Project tailraces are excavated riverbed located downstream of the powerhouses. The normal tailwater elevation of the stations is approximately 88.0'. From the 1982 powerhouse, water is released into a 300-foot-long tailrace approximately 45-feet-wide by 12-feet-deep. The tailrace for the 1912 powerhouse is approximately 140-feet-wide by 12-feet-deep and extends approximately 175-feet downstream.

2.1.6 Transmission Lines

The project related transmission facilities include three step-up transformers located in the non-project Central Maine Power Company (CMP) substation adjacent to, but outside of the Project boundary. An electrical single-line diagram showing the project's connection to the CMP transmission system is provided in Exhibit H. Based upon a review of aerial photographs, the length of the generator leads between the powerhouses and the point of interconnection within the local utility's substation is approximately 250 feet from the 1912 powerhouse.

2.1.7 Project Boundary

The Project boundary extends approximately 12.3-miles upstream of the dam, and approximately 4,000-feet downstream of the dam. Above the dam, the Project boundary generally follows the 113.0' or the 114.0' contour, but also includes two parcels of land on the east and west bank in the upper portion of the Project. Project boundary drawings are provided in Exhibit G.

The Licensee proposes to remove the two parcels from the upper end of the Project boundary, which are not required for project purposes. Section 3.3 of Exhibit E discusses the details of the proposed change in the Project boundary and provides maps showing both the existing and proposed Project boundary. The Exhibit G maps show the proposed Project boundary. The total acreage of land and water within the proposed Project boundary combined is estimated to be 1,729 acres. Approximately 1,432 acres within the Project boundary is open water, consisting of an estimated 1,310 acres of impoundment waters and 90 acres of tailwater.

2.2 Proposed Structures

There are no new structures being proposed in this application. New upstream fish passage measures are being implemented at the Project as authorized under the current license. Future

fish passage measures for the Project will be governed by the terms of a Species Protection Plan (SPP) that was filed with FERC on December 31, 2019. Revised Exhibits A and F will be filed when construction of the fish passage facilities has been completed.

3.0 IMPOUNDMENT DATA

3.1 Surface Area and Elevation

The project impoundment encompasses approximately 1,310 acres at normal full pond elevation of 112.0'.

3.2 Storage Capacity

The impoundment has an estimated volume of 4,960 acre-feet. However, because the Project is operated as run-of-river mode, the impoundment has no significant usable storage capacity at the normal full pond elevation of 112.0'.

4.0 TURBINES AND GENERATORS

4.1 Existing Turbines and Generators

In the 1912 powerhouse, there are six horizontal, four-runner, Francis-type turbines rated at 1,200 horsepower (hp) each, and six generators, five rated at 750 kilowatts (kW) each and one rated at 900 kW. The units have a net head of 23.5 feet.

In the 1982 powerhouse, there are two horizontal tube-type hydraulic turbines, rated at approximately 2,880 hp each, and two generators rated at 2,000 kW each. The units have a net head of 22.6 feet.

The total installed capacity of the Project, as limited by the generator nameplates for each unit, is 8,650 kW[2].

[2] By Order Approving As-Built Exhibits (25 FERC ¶ 62,4170) the Commission amended the authorized installed capacity of the Project to be 11,700 horsepower (approximately 8,775 kW). This was based upon licensee's November 21, 1983 filing of a revised Ex. A which, based upon bids for the then new turbine units 7 and 8, anticipated that these units would be rated with a total capacity of 4,090 kW; the units however are actually nameplated at 2,222 kVa each at a.0.9 PF for a total of 4,000 kW. The total installed capacity of 8,650 kW listed in this current exhibit is based upon the as-built nameplates mounted on the generator units.

4.2 Proposed Turbines and Generators

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

5.0 TRANSMISSION LINES

The Project related transmission facilities include three General Electric (GE) transformers rated 750 kilovolt-ampere (KVA) 3 phase, 60 hertz; three GE transformers rated 1,250 KVA 3 phase, 60 hertz; and one Westinghouse step-up transformer rated 5,000 KVA, 3 phase, 60 hertz. The transformers are located approximately 250 feet from the 1912 powerhouse, in the CMP substation adjacent to, but outside of the Project boundary. An electrical single-line diagram showing the Project's connection to the CMP transmission system is provided in Exhibit H.

Table 5-1 General Shawmut Project Information

GENERAL INFORMATION	
Owner	Brookfield White Pine Hydro LLC
FERC Project Number	2322
Current License Term	February 1, 1981 to January 31, 2022
County	Kennebec and Somerset Counties, Maine
Nearest Town(s)	Fairfield, Skowhegan, Clinton, and Benton, Maine
River	Kennebec River
Drainage Area	4,200 square miles
Normal Full Pond Elevation	112.0 feet USGS Datum
Normal Tailwater Elevation	88 feet
Impoundment Length	Approximately 12.0 miles
Gross Storage	Not Determined
Surface Area at Normal Full Pond	1,310 acres
Average Annual Inflow at Shawmut Project	8,582 cfs[1] for the period 2004-2019
Structures	
Dam	
Construction	Concrete gravity
Total Length	1,480 feet
Spillway Length	1,135 feet
Earth Embankment Height	Approximately 8 feet
Hinged Flashboard Section Height	Approximately 19 feet
Inflatable Flashboard Section Height	Approximately 19 feet
East Abutment Height	Approximately 29 feet
Powerhouses	1912 Powerhouse: 148 feet x 35 feet 1982 Powerhouse: 59 feet x 43 feet
Turbine/Generator Units	8 Units
Turbine Manufacturer/Type	Units 1, 2, 3, & 5: J.M. Voith Francis (4 Runners) Units 4 & 6: S.M. Smith Francis (4 Runners)

GENERAL INFORMATION	
	Units 7 & 8: Allis-Chalmers Tube (3 blade)
Turbine Capacitates	Units 1, 2, 3, & 5: 1,200 hp approximately 674 cfs Units 4 & 6: 1,200 hp approximately 674 cfs Units 7 & 8: 2,880 hp approximately 1,200 cfs
Generator Manufacturer	Units 1, 2, & 3: Fort Wayne Units 4 & 6: G.E. Unit 5: G.E. Units 7 & 8: Siemens-Allis
Generator Capacities	Units 1, 2, & 3: 750 KVA at 1.0 power factor (750 kW) Units 4 & 6: 750 KVA at 1.0 power factor (750 kW) Unit 5: 1,125 KVA at 0.8 power factor (900 kW) Units 7 & 8: 2,222 KVA at 0.9 power factor (1750 kW)
Nameplate Installed Capacity	8.650 MW

[1] cfs cubic feet per second

6.0 ADDITIONAL EQUIPMENT

The following listing describes the specification of the appurtenant equipment in use at the Project.

6.1 Battery Set

Manufacturer	SBS
Type	STT2V250
Number of Cells	60

6.2 Battery charger

Manufacturer	G.E.
Type	No. C.R – 75010110G8
Volts	120-240
Amps	12.5

6.3 Powerhouse Cranes

Manufacturer	Hugh R. Blethen
Capacity	12 tons
Lift	19 feet, 10 inches
Operated	Hand
Manufacturer	Harrington/Peerles
Capacity	15 tons
Lift	20 feet
Operated	Electric Hand Control

6.4 Powerhouse Intake Gate Hoists

Manufacturer	Not known
Number	12
Type	Rack and Pinion
Operated	Portable Motor Operator

Manufacturer	Wright
Number	2
Type	10 ton hoist
Operated	Portable Motor Operator/Hand-held

6.5 Forebay Intake Gate Hoist

Manufacturer	Not Known
Number	1
Type	Jib-Rail Mounted
Capacity	5 tons
Operated	Motor

6.6 Log sluice Gate Hoist

Manufacturer	Waterville Iron Works
Number	1
Type	Rack and Pinion
Operated	Motor

6.7 Flashboards Gantry Crane

Manufacturer	Thern
Number	1
Capacity	3.75 tons
Hoist Speed	14 feet per minute
Length of Lift	35 feet

6.8 Spillway Gate Hoist

Manufacturer	Portland Company
Number	1
Capacity	3 tons
Lift	12 feet
Motor	1.5 hp
Travel	5 feet per minute
Hoist Drum	12 inches (2)

6.9 Deep Gate Hoist

Manufacturer	Portland Company
Number	1
Type	Double Screw
Operated	Hand/Toledo

6.10 Intake Rack Gates

Manufacturer	Portland Company
Number	1
Capacity	2 tons
Lift	43 feet
Operated	Motor and Hydraulic

Manufacturer	Berry/Cross Machine
Number	1
Capacity	1 ton
Lift	33 feet
Operated	Motor and Hydraulic

6.11 Downstream Fish Passage Gate

Type	Open Sluice
Size	4 feet by 22 inches
Closure	Stoplogs (3)

6.12 Forebay Filler Gate Hoists

Manufacturer	Not known
Number	1
Type	Rack and Pinion
Operated	Hand

Manufacturer	Not known
Number	1
Type	Rotork
Operated	Motor Operated

7.0 LANDS OF THE UNITED STATES

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

EXHIBIT B

PROJECT OPERATION AND RESOURCE UTILIZATION

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SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT B
PROJECT OPERATION AND RESOURCE UTILIZATION

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SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT B
PROJECT OPERATION AND RESOURCE UTILIZATION

1.0 PROJECT OPERATION

1.1 Operating Mode

The Shawmut Hydroelectric Project (Project) operates as a run-of-river facility and the impoundment experiences little fluctuation during normal operations, maintaining the pond level within a foot of the normal full pond elevation of 112.0 feet U.S. Geological Survey (USGS) datum[1] during normal operations. The maximum hydraulic capacity of the turbines is 6,690[2] cubic feet per second (cfs). After maximum flow to the turbines has been achieved, excess water is spilled through the spillway sluice. When flows exceed the capacity of the spillway sluice (1,840 cfs), sections of the rubber dam are deflated, and the hinged flashboards are dropped, to pass additional water. The project units and spillway can pass approximately 40,000 cfs while maintaining a pond elevation of approximately 112.0'.

Total project outflow may vary as units, gates, and spillway mechanisms (i.e., rubber dam bladders or flashboards) are opened or closed to manage pond elevations within a run-of-river mode. The bladder sections can only be operated in a fully inflated position or a fully deflated position; each section is capable of passing up to approximately 7,000 cfs when deflated while maintaining a pond level of approximately elevation 112.0'. The top elevation of the rubber bladders is 112.5' to allow a six-inch freeboard above normal full pond. As is typical of operational conditions at any hydropower project, pond levels generally fluctuate within a limited range as the facilities (i.e., units, gates, hinged flashboards and rubber bladders) are operated to manage water levels and flows, as well as to manage variable inflows.

[1] All elevations in this document are based on USGS datum.

[2] Based on 1982, 1984, and 1988 index testing, summarized in White Pine Hydro's *Additional Information Filing* dated March 22, 2016.

1.2 Future Operations

Licensee proposes to continue the current run-of-river mode of operation during the term of the new project license, with a formal condition to maintain a pond level within 1 foot of the normal pond elevation of 112.0' during normal operations to manage pond levels in a manner such that outflow generally matches inflow to the Project.

1.3 Annual Plant Factor

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

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

The Project currently has a gross average annual energy production of approximately 51,058 megawatt-hours (MWh) per year and an annual plant factor of approximately 67.4 percent based on its current capacity of 8.650 megawatts (MW). Table 1-1 provides the monthly generation for 2010 through 2019.

Table 1-1 Shawmut Project Net Generation by Month (MWh) 2010-2019

	January	February	March	April	May	June	July	August	September	October	November	December	Total
2010	6,891	6,305	6,112	5,051	5,320	3,654	3,383	1,744	2,008	4,790	3,416	5,311	53,985
2011	4,276	2,504	4,662	4,506	4,477	5,395	3,248	2,908	4,684	4,778	3,915	6,223	51,576
2012	6,301	5,158	4,601	3,522	5,064	4,812	3,773	2,814	3,042	3,111	3,182	6,065	51,445
2013	6,157	5,818	5,987	5,528	4,928	5,156	5,200	3,726	3,445	2,822	3,279	4,141	56,187
2014	5,917	4,420	3,432	4,811	5,576	4,875	5,101	6,037	2,996	1,955	4,367	5,471	54,958
2015	6,499	5,338	5,386	5,014	4,434	5,486	4,268	3,889	2,247	3,827	4,115	5,717	56,220
2016	5,946	5,222	5,547	5,017	4,192	2,499	3,718	2,085	1,796	1,737	2,320	3,922	44,001
2017	5,643	5,711	6,232	4,934	5,301	3,626	5,220	1,913	2,002	1,796	4,808	4,167	51,353
2018	5,292	5,042	5,664	3,831	3,439	2,120	3,360	3,423	2,038	2,887	3,853	4,431	45,380
2019	4,915	4,744	5,100	3,191	4,063	4,048	2,628	1,853	2,064	3,094	5,334	4,439	45,473
Average	5,954	5,060	5,245	4,798	4,912	4,438	4,239	3,140	2,778	3,102	3,675	5,127	51,058

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

1.4.1 River Basin Operations

The Project is located on the Kennebec River at river mile (RM) 66, in south-central Maine in Kennebec and Somerset counties. The Project is one of 10 FERC licensed hydropower and storage projects on the mainstem of the Kennebec River. The Kennebec River basin above the Shawmut Dam has a drainage area of approximately 4,200-square-miles and is regulated by several hydropower storage facilities and hydropower peaking facilities. River flows are re-regulated at the upstream Williams Project (FERC No. 2335) to provide relatively consistent flows to downstream resources. Operated as a run-of-river facility, the Shawmut impoundment fluctuates little during normal operations.

1.4.2 Operation During Adverse Conditions

Under the existing regulation of Kennebec River flows that are achieved via storage and hydroelectric reregulation facilities located upstream of Shawmut, periods of extreme low-river flows due to adverse water conditions generally are minimal and infrequent. During these periods of low inflow, generation at the plant is reduced by using fewer units.

1.4.3 Operation During Flood Conditions

During flood conditions, flow in excess of the hydraulic capacity of the generating units is passed through the gated and overflow spillways. White Pine Hydro notifies the Maine Emergency Management Agency (MEMA) of flood conditions and control measures. MEMA has developed a volunteer monitoring network for flood stage observation and is responsible for public notification and warning. Further information on project operations during flood conditions is provided in Exhibit H, Section 3.1.1.

1.5 Project Operation During Maintenance Activities

The Project is remotely operated using a Supervisory Control & Data Acquisition System (SCADA) link to White Pine Hydro's National System Control Center (NSCC) in Marlborough, Massachusetts. A local operating crew is also available during weekdays, and weekends as necessary, to perform routine maintenance and operations of the facility. The dam is inspected routinely by White Pine Hydro Engineering and Operations staff, and dam maintenance is

performed as needed. White Pine Hydro typically conducts an annual two-week shutdown of the Shawmut Project units for inspection and maintenance in September. Otherwise, turbine-generator unit shutdowns may occur, as needed, to perform repairs or unanticipated maintenance activities.

During both scheduled and unscheduled maintenance and unit shutdown events, the Licensee will continue to pass inflow downstream through operation of the remaining units, through the spillway sluice, or through spill by deflating inflatable flashboard sections, as necessary. If planned maintenance activities will require impoundment drawdown below normal levels or an interruption in run-of-river operations, White Pine Hydro will first consult with the applicable state and federal agencies. In some cases, planned maintenance may require separate permits from state and federal agencies, which may include but not limited to a Maine Waterway Development and Conservation Act (MWDCA) permit and U.S. Army Corps of Engineers (USACE) Section 404 permit. In such cases, White Pine Hydro operates the Project in accordance with these permits until the maintenance is complete and normal project operations have resumed.

1.5.1 Turbines

White Pine Hydro typically conducts an annual two-week shutdown of the Shawmut Project units for inspection and maintenance in September. Otherwise, turbine-generator unit shutdowns may occur, as needed, to perform repairs or unanticipated maintenance activities.

During both scheduled and unscheduled maintenance and unit shutdown events, the Licensee will continue to pass inflow downstream through operation of the remaining units, through the spillway sluice, or through spill by deflating inflatable flashboard sections, as necessary.

In addition to planned unit maintenance activities, there will be times when an operator has to clear accumulated debris (e.g., leaves, trees, branches) from the intakes. This will require backing off the units to flush the debris away from the intake. White Pine Hydro will continue to pass inflow downstream through the spillway sluice, or through spill by deflating inflatable flashboard sections during this activity.

1.5.2 Impoundment Drawdowns

Drawdown of the impoundment will be required from time to time to perform major maintenance on project structures or to accommodate requests or orders from federal or state agencies and entities concerned with public safety, construction/maintenance of downstream public works projects, and other similar activities.

2.0 DEPENDABLE CAPACITY AND AVERAGE ANNUAL ENERGY PRODUCTION

2.1 Project Hydrology

Monthly and annual flow duration curves, for the period 2004-2019 are provided in Appendix B-1. Flow data for the Project was prorated from USGS Gage #01049265 on the Kennebec River at North Sidney, Maine. River flow statistics for the same period are provided in Exhibit E, Section 4.5.1.1.

2.2 Dependable Capacity

The ISO New England seasonal claimed capability (SCC) ratings listed in the January 1, 2018, Capacity, Energy, Loads, and Transmission (CELT) Report are 6.291 MW for both summer and winter periods.

2.3 Area-Capacity Curve

As a run-of-river project, the Shawmut Project has no usable storage, and therefore no area-capacity or rule curve has been developed for the Project.

2.4 Estimated Hydraulic Capacity

The maximum hydraulic capacity of the project's turbine units is approximately 6,690 cfs.

Index tests were conducted on the various units in 1982, 1984, and 1988. The results of these index tests as related to the approximate minimum and maximum unit flows are listed in Table 2-1.

2.5 Tailwater Rating Curve

The normal tailwater elevation for the Project is 88.0 feet. The tailwater rating curve for the Project is shown in Figure 2-1.

2.6 Power Plant Capability Versus Head

At an average net head of approximately 23 feet, the Project has a total rated nameplate generating capacity of 8,650 kilowatts (kW).

Table 2-1 Minimum and Maximum Shawmut Project Unit Flows

UNIT	MIN FLOW (CFS)	MAX FLOW (CFS)	INDEX TEST DATE
1	407	648	8/30/1984
2	436	645	8/30/1984
3	442	658	8/30/1984
4	367	672	5/26/1988
5	332	742	5/27/1988
6	264	667	5/27/1988
7	*	1312	11/16/1982*
8	*	1347	8/3/1982*

*Index test only shows maximum flow/ maximum power data.

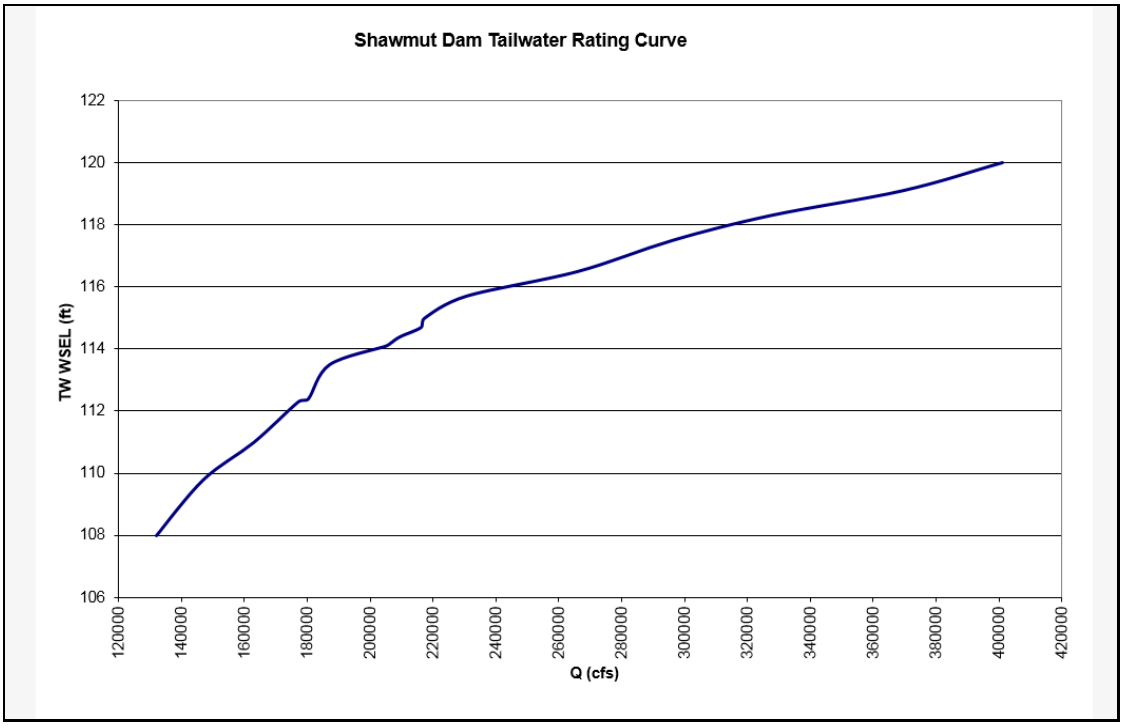


Figure 2-1 Shawmut Dam Tailwater Rating Curve

3.0 USE OF PROJECT POWER

White Pine Hydro is an independent power producer and does not provide electric service to any particular group or class of customers, or prepare and submit load and capability forecasts or resource plans to any regulatory body.

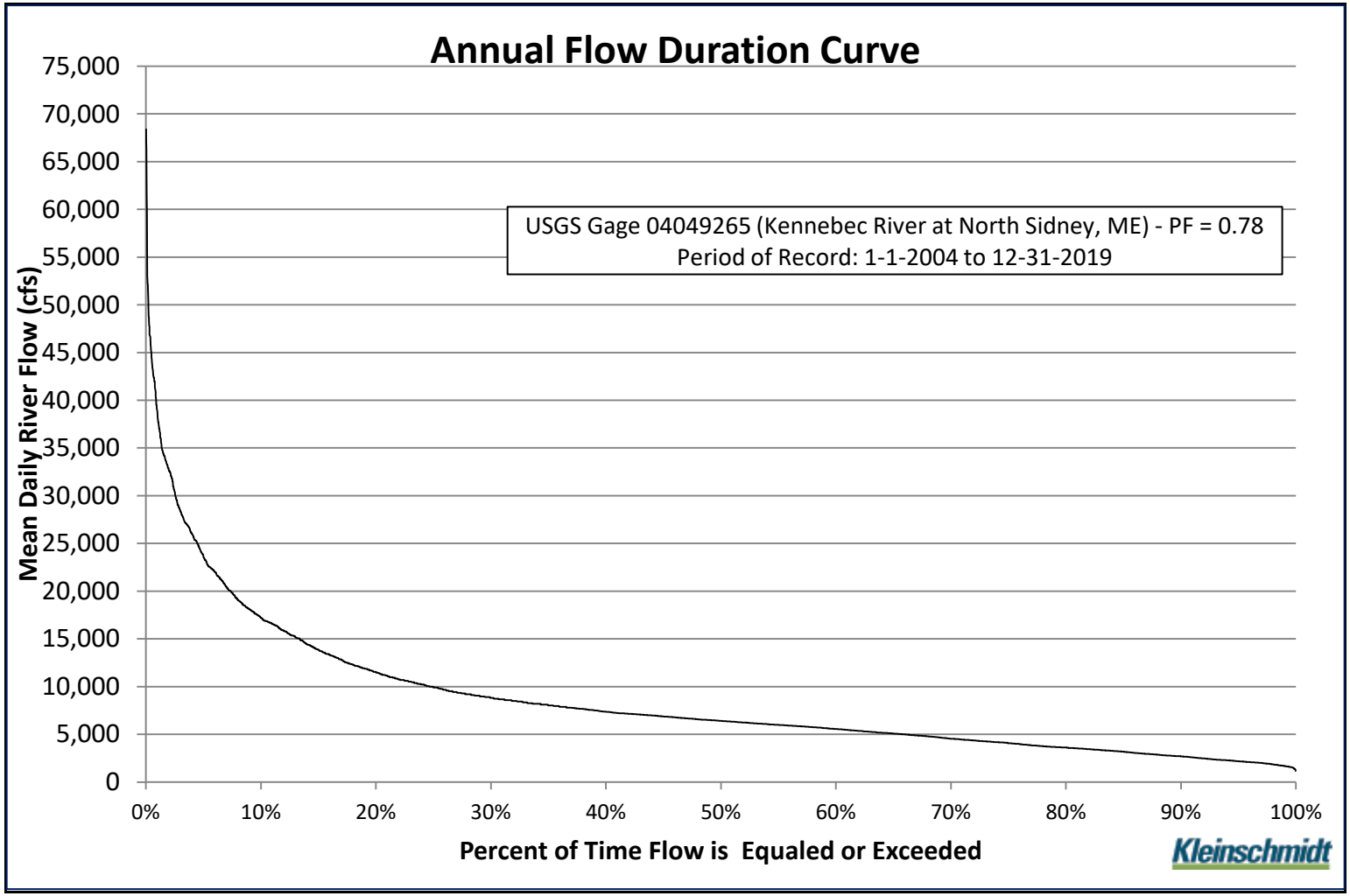
The Project generates carbon-free renewable power for Maine and the regional power pool administered by ISO New England. Currently, output is sold on the open market through bidding into the New England Power Pool (NEPOOL) market administered by ISO New England, the non-profit independent system operator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

4.0 PLANS FOR FUTURE DEVELOPMENT

White Pine Hydro is developing fish passage facilities and measures at the Project in accordance with its current license and any Commission approved Species Protection Plan (SPP). White Pine Hydro has no plans to alter project operations at this time nor does White Pine Hydro have any other future development plans at the Project.

APPENDIX B-1

ANNUAL AND MONTHLY FLOW DURATION CURVES 2004-2019



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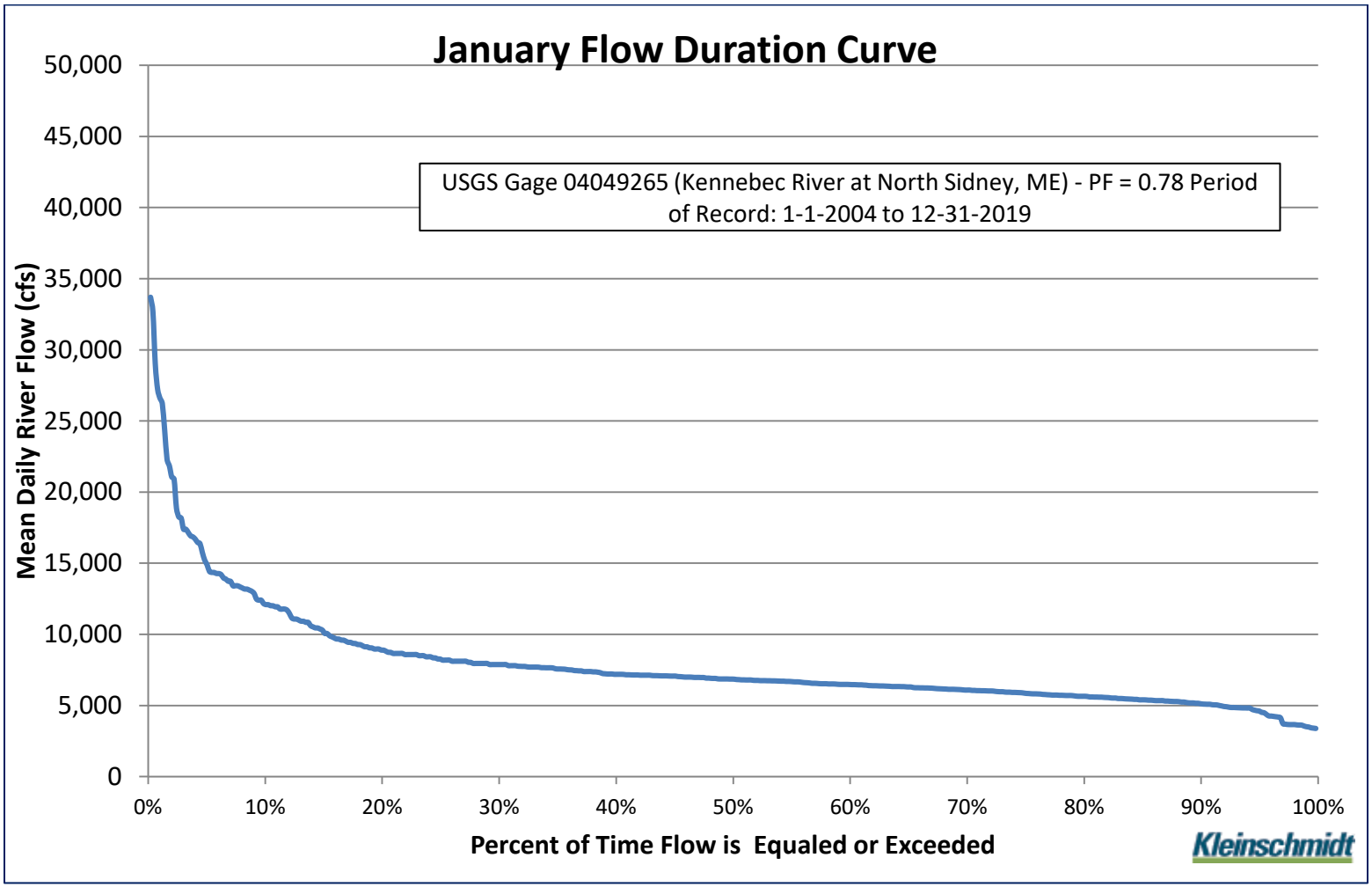

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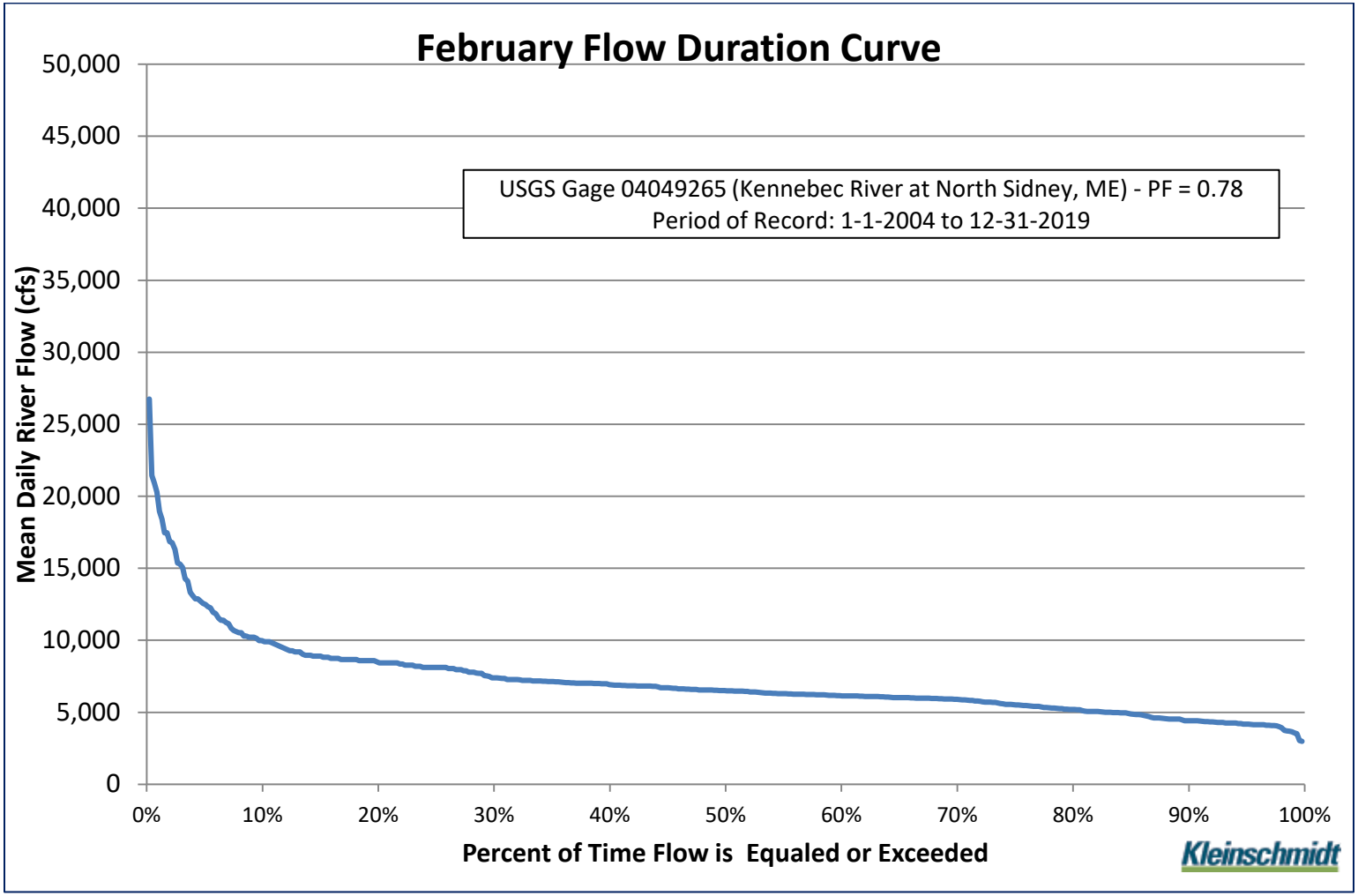

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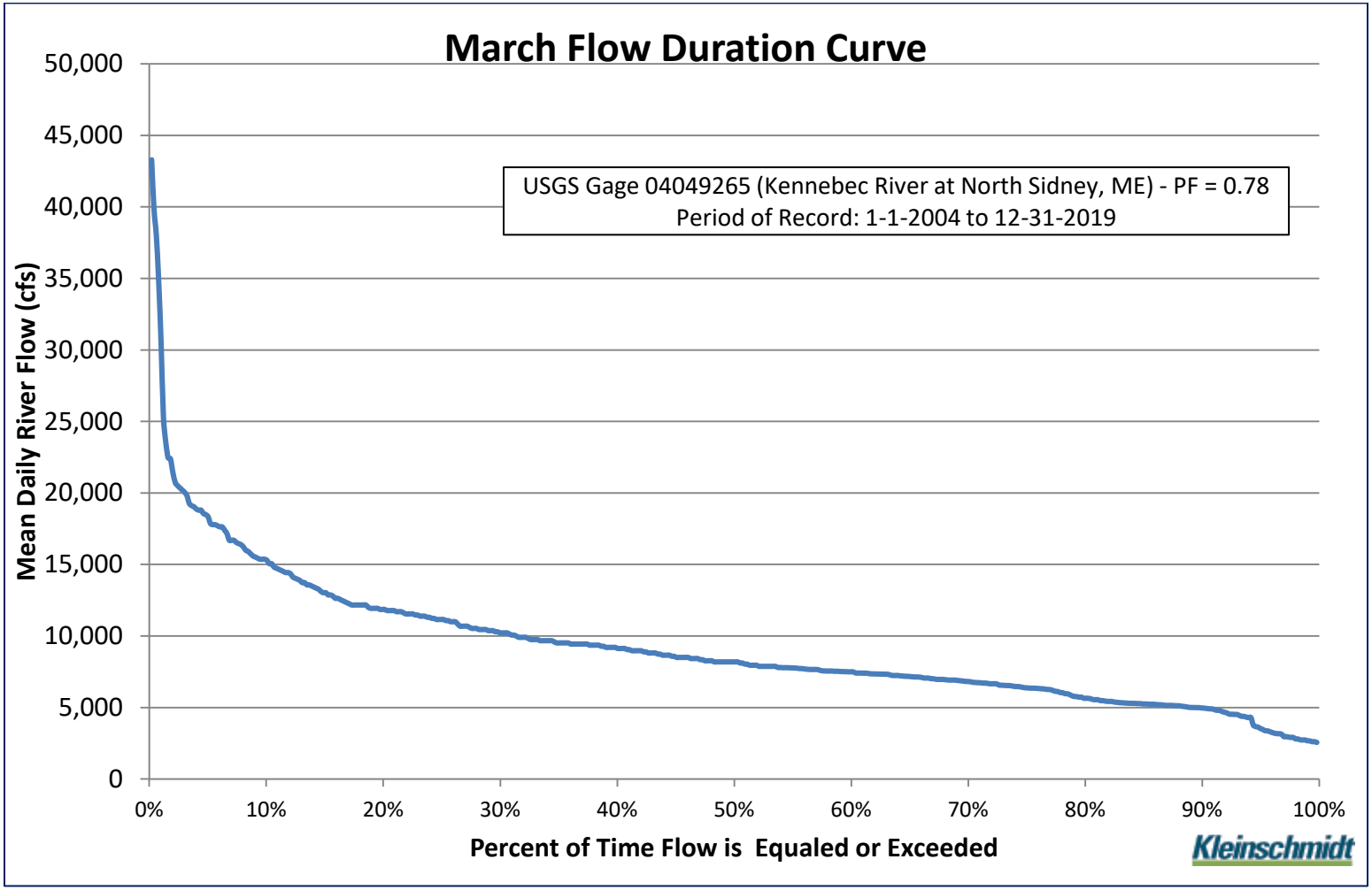

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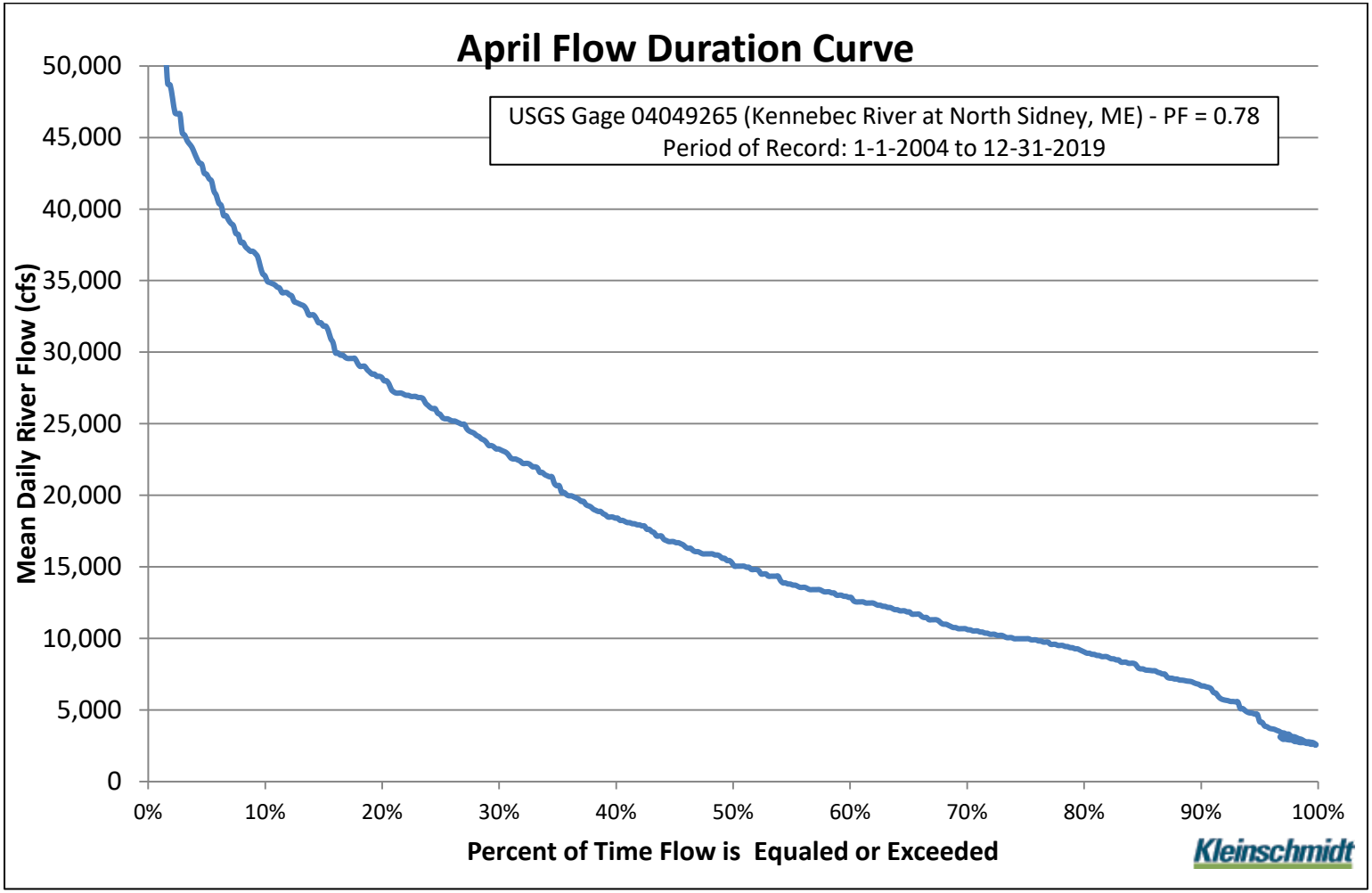

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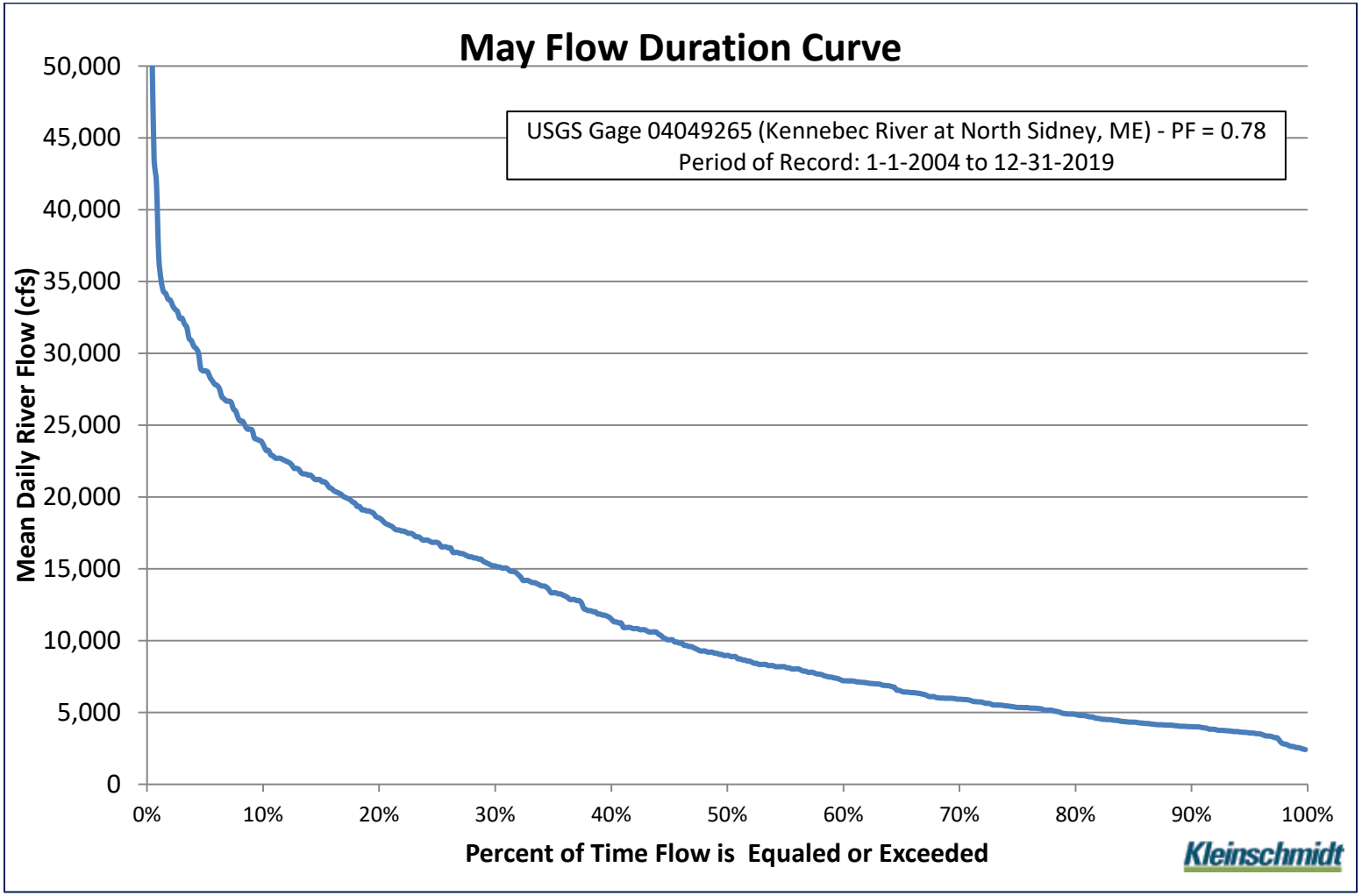

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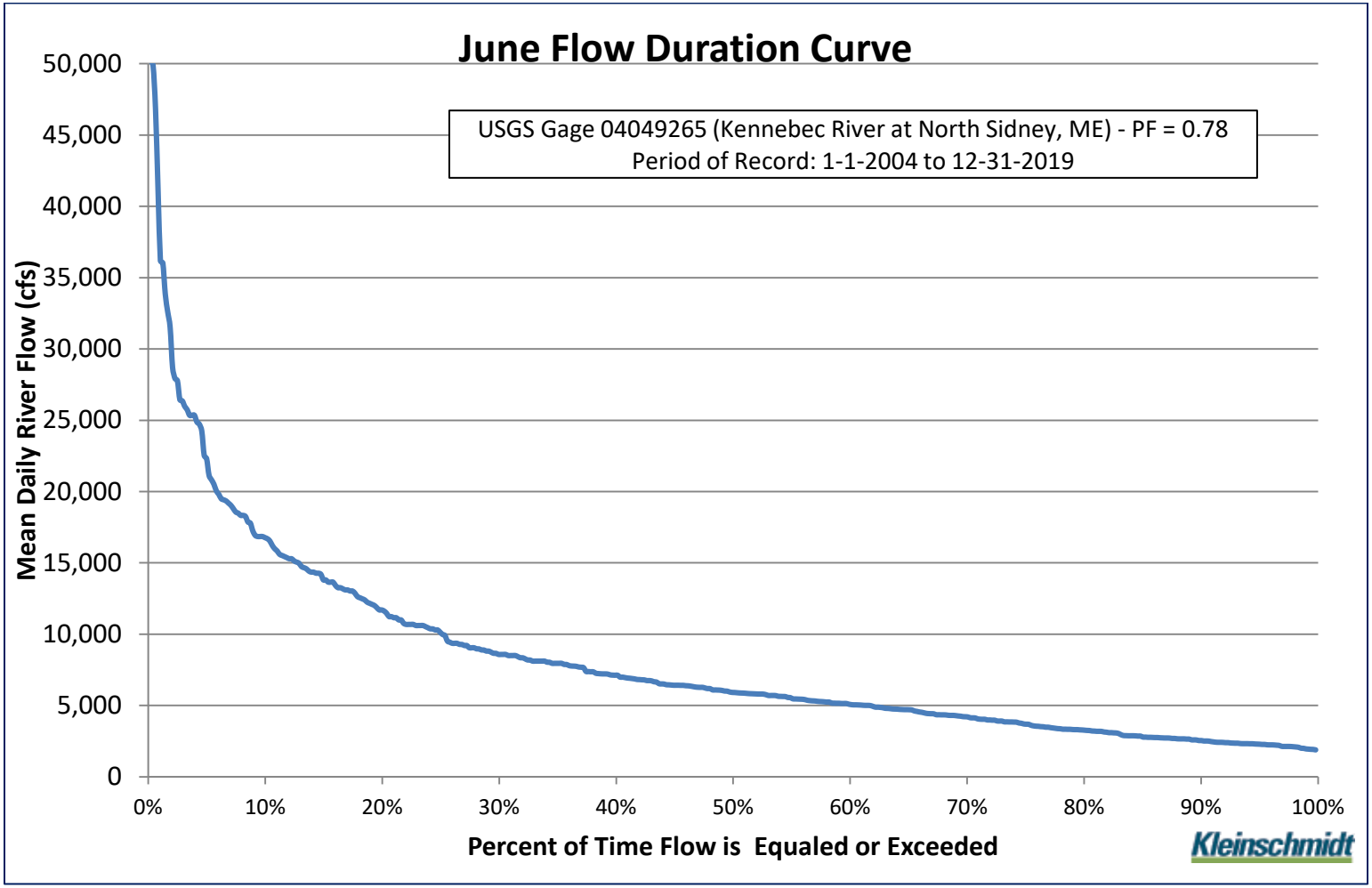

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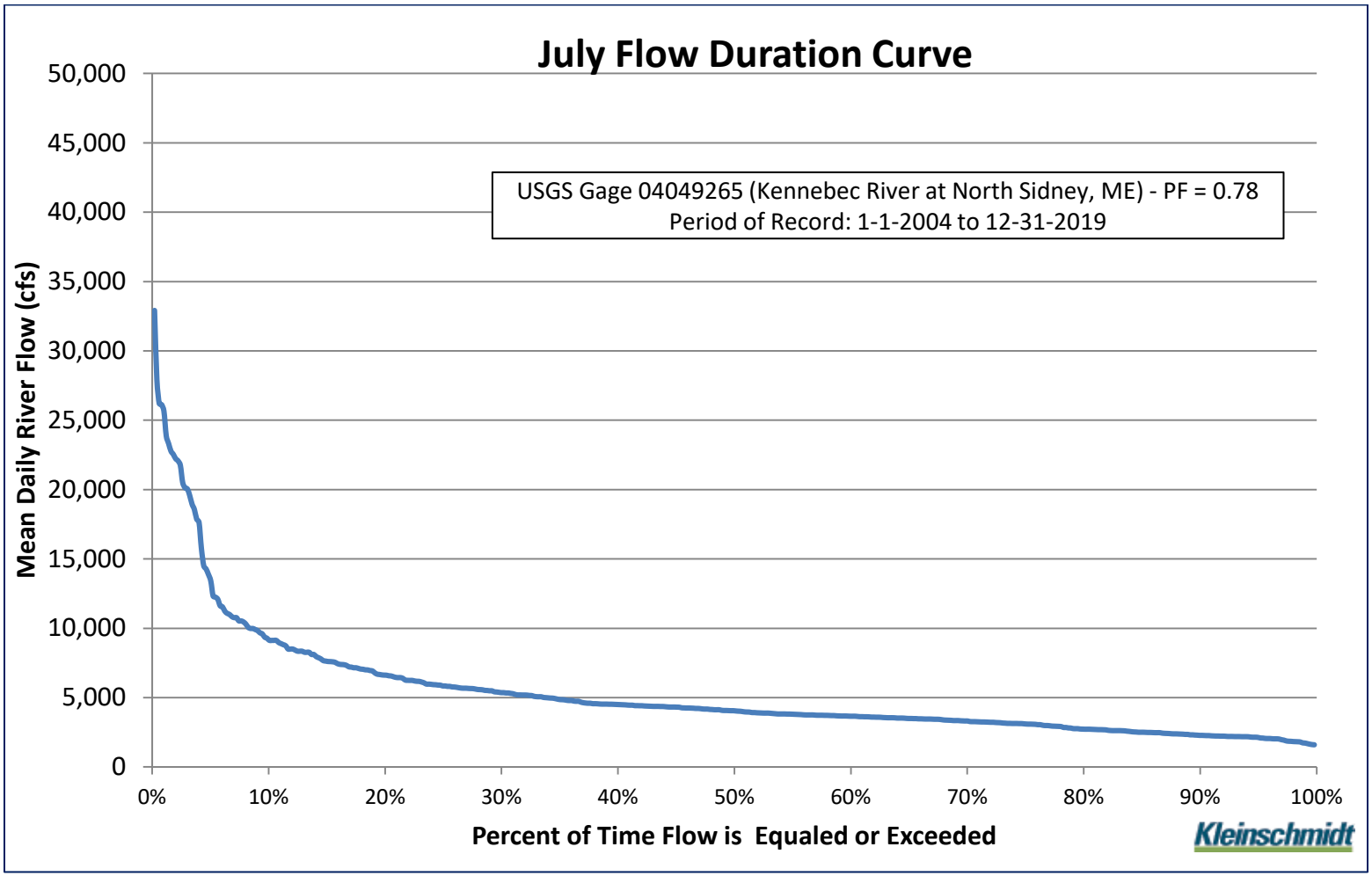

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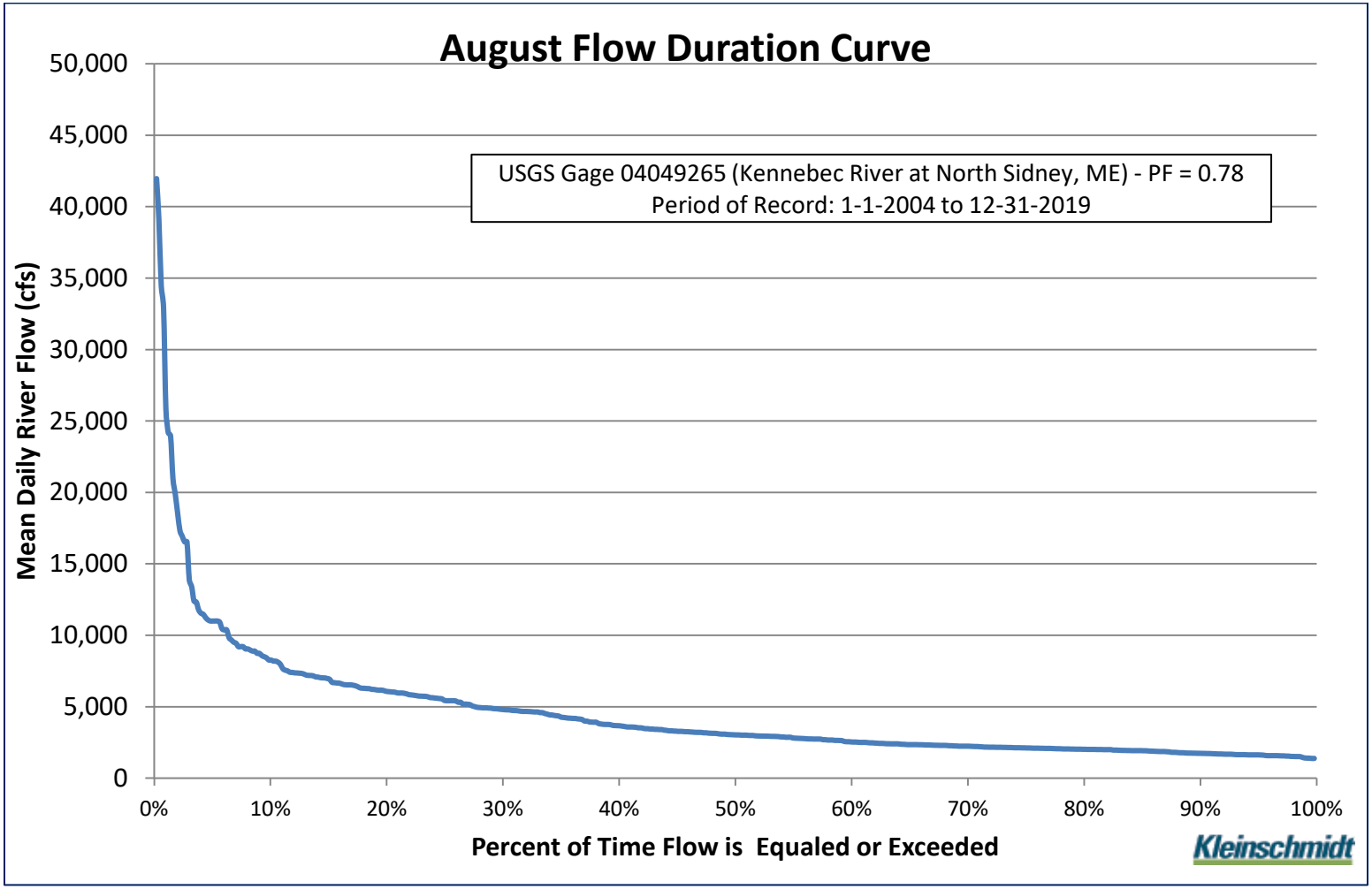

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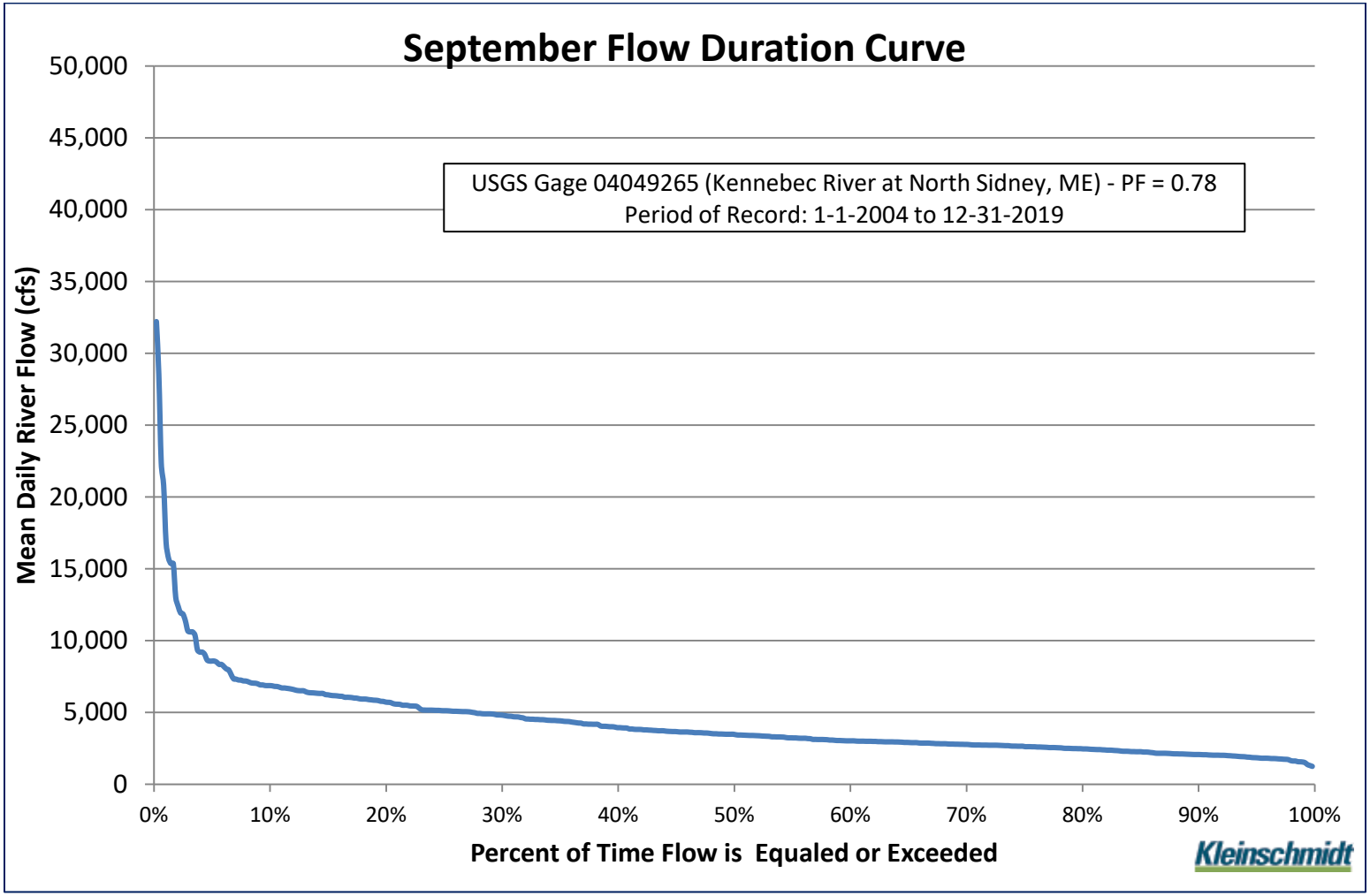

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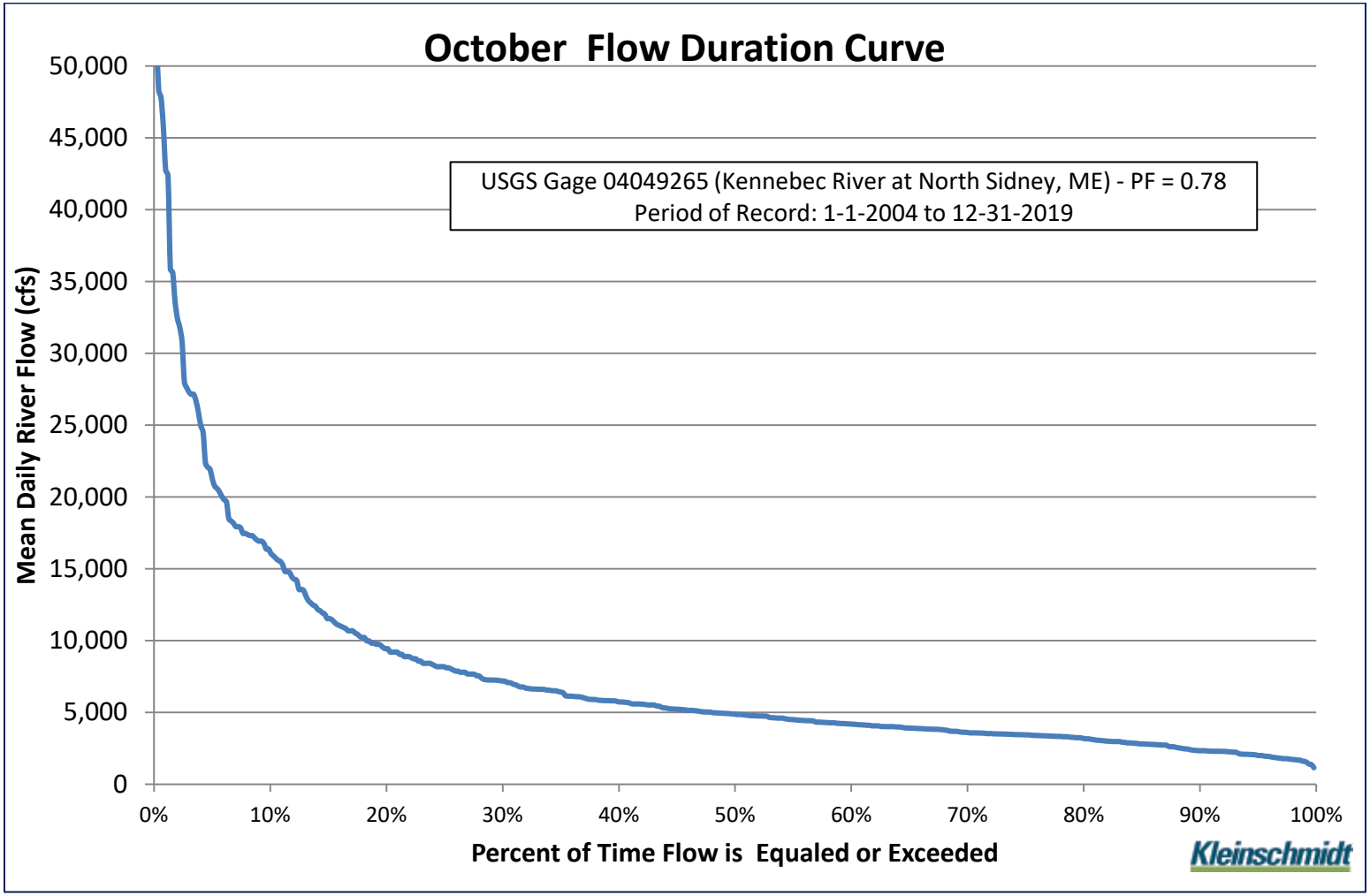

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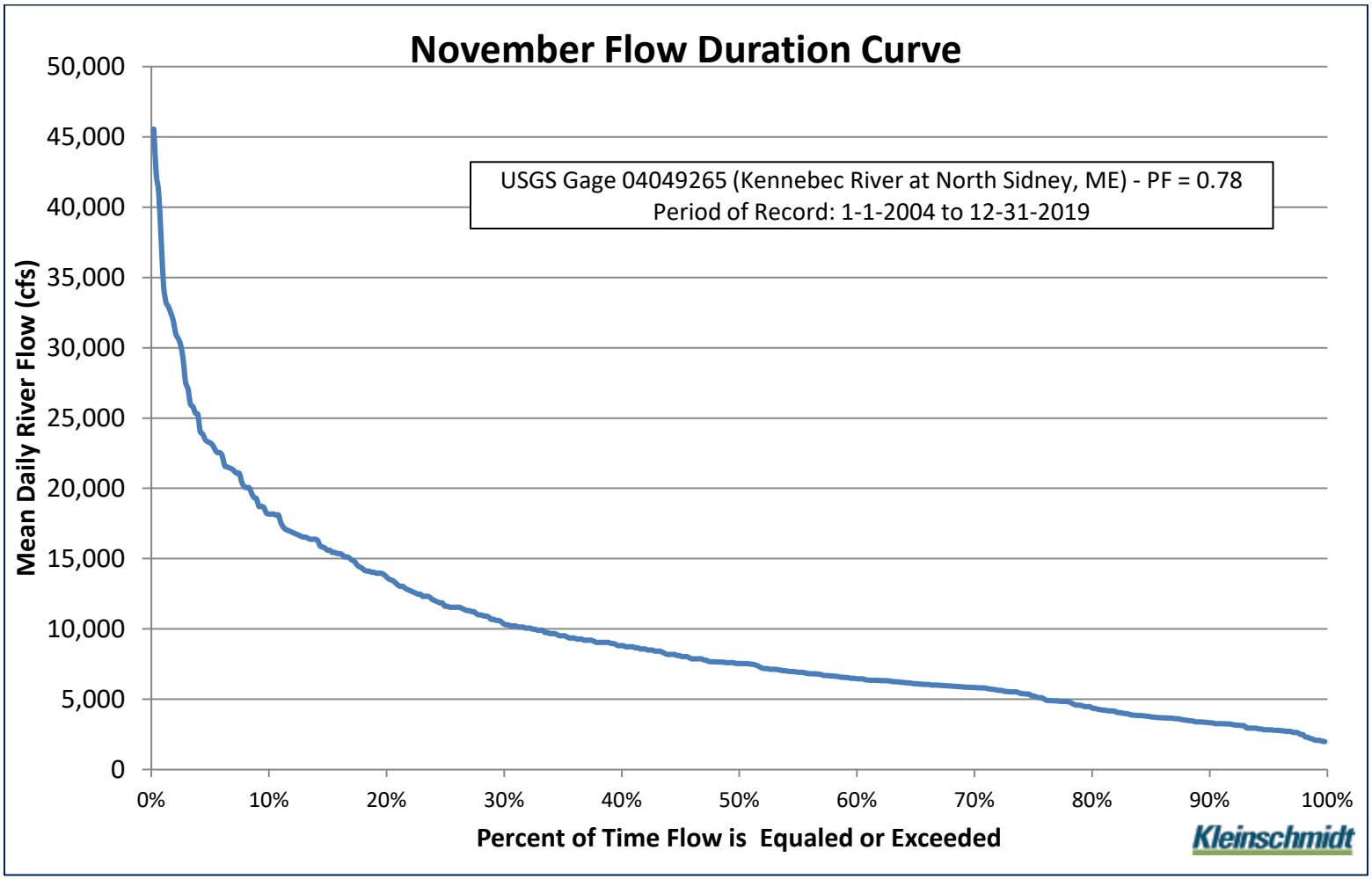

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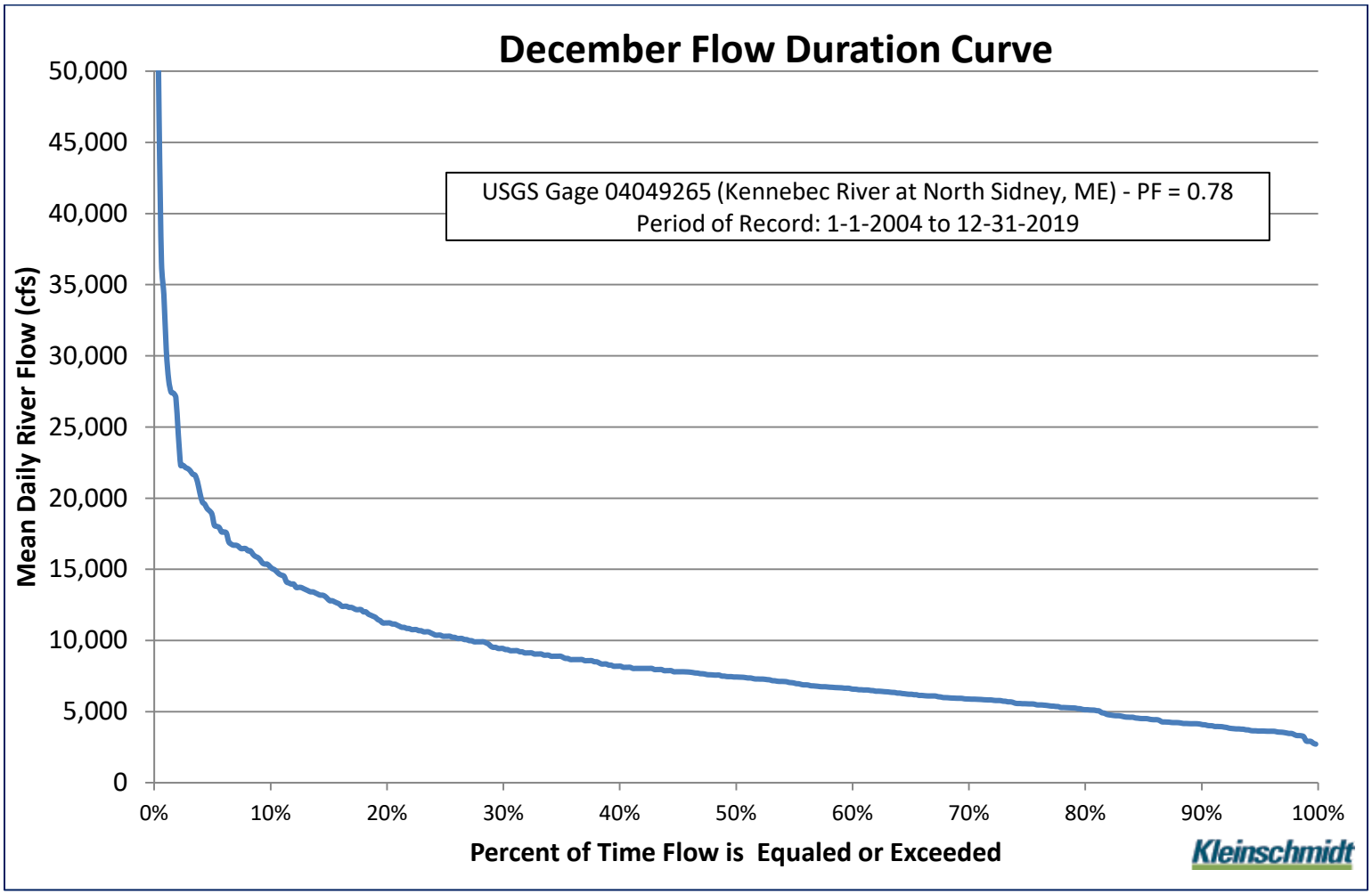

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EXHIBIT C
CONSTRUCTION HISTORY

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SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

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SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT C
CONSTRUCTION HISTORY

1.0 CONSTRUCTION HISTORY

1.1 Original Construction

The site of the current Shawmut Hydroelectric Project (Project), in the towns of Skowhegan, Fairfield, Clinton, and Benton, Maine was originally developed for hydroelectric power in 1912 and included a powerhouse structure with the potential to house up to six generating units. Units 1, 2 began generating in 1913, unit 4 in 1915, unit 5 in 1918, and unit 6 in 1921. In 1981, an additional powerhouse was constructed with two additional generating units. Units 7 and 8 became operational in 1982.

1.2 Modification or Additions to the Existing Project

In 2008-2009, the pin-supported flashboards were replaced with a 730-foot-long inflatable rubber bladder dam composed of three sections, each 4.46-feet-high when fully inflated.

The supervisory control equipment was updated in 2013; the station is operated remotely from Marlboro, Massachussetts.

There are no new structures being proposed in this application; however, new upstream fish passage measures will be implemented at the Project in 2020 and 2021 under the current license. Future fish passage measures for the Project will be governed by the terms of any Commission approved Species Protection Plan (filed separately with the Commission on December 31, 2019).

2.0 PROJECT SCHEDULE OF NEW DEVELOPMENT

White Pine Hydro is not proposing any new development (e.g., additional generating units) at the Project in the application for a new license.

EXHIBIT D

STATEMENT OF COSTS AND FINANCING

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SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

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STATEMENT OF COSTS AND FINANCING

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SHAWMUT HYDROELECTRIC PROJECT
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APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT D
STATEMENT OF COSTS AND FINANCING

1.0 ORIGINAL COST OF EXISTING UNLICENSED FACILITIES

This section is not applicable to the Shawmut Hydroelectric Project (Shawmut Project or Project) because Brookfield White Pine Hydro LLC (White Pine Hydro or Licensee) is not applying for an initial (original) license.

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

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

2.1 Fair Value

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

2.2 Net Investment

The net book investment for the Shawmut Project is approximately $17,870,000 as of the end of 2019. Table 2-1 provides original costs, accumulated depreciation, and net investment.

Table 2-1 Data Used to Determine Net Investment in the Shawmut Project[1]

	Original Cost ($)	Accumulated Depreciation	Net Investment
Production Plant [2]	$20,640,000	$3,540,000	$17,100,000
Relicensing Costs to Date	$770,000	N/A	$770,000
Total including Relicense Costs	$21,410,000	$3,540,000	$17,870,000

[1] The Shawmut Hydroelectric Project was purchased as part of the White Pine Hydro LLC portfolio of assets; individual assets were not assigned individual costs at the time of purchase. The costs herein are prorated from the total portfolio costs and are approximations.
[2] The cost to construct a new fishway in 2020 and 2021 are not included.

2.3 Severance Damages

Severance damages are determined either by the cost of replacing (retiring) equipment that is "dependent for its usefulness upon the continuance of the License" (Section 14, FPA), or the cost of obtaining an amount of power equivalent to that generated by the Project from the least expensive alternative source, plus the capital cost of constructing any facilities that would be needed to transmit the power to the grid, minus the cost savings that would be realized by not operating the Project. These values would be calculated based on power values and license conditions at the time of Project takeover.

3.0 ESTIMATED COST OF NEW DEVELOPMENT

3.1 Land and Water Rights

The Licensee is proposing no expansion of its land or water rights as a consequence of this license application. As described in Exhibit E, the Licensee is proposing a modest change in the Project boundary to remove two small parcels of land that are not needed for project purposes. The Licensee has no plans to modify its property rights with respect to those parcels.

3.2 Cost of New Facilities

The Licensee is not proposing any capacity-related developments at the Shawmut Project at this time.

4.0 ESTIMATED AVERAGE ANNUAL COST OF THE PROJECT[1]

This section describes the approximate annual costs of the Project. The estimated average annual operation and maintenance cost of the Project over the period 2017-2019 was $790,000. This estimate includes costs associated with existing project operations and maintenance[2], as well as local property and real estate taxes, but excludes income taxes, depreciation, and costs of financing.

4.1 Capital Costs

Actual capital costs are based on a combination of funding mechanisms that includes stock issues, debt issues, revolving credit lines, and cash from operations.

4.2 Taxes

Property taxes for 2019 were approximately $295,000. Income taxes for the Project are incorporated into costs of the White Pine Hydro LLC's consolidated business and are not separated out for the Project.

4.3 Depreciation and Amortization

The annualized composite rate of depreciation for the Project is approximately 2.45%.

4.4 Operation and Maintenance Expenses

The estimated annual operation and maintenance expense at the Project for 2019 was approximately $770,000 including corporate support costs.

[1] The Shawmut Hydroelectric Project is a member of the White Pine Hydro LLC portfolio of assets and costs are assigned to the overall portfolio; the costs herein are prorated from the total portfolio costs and are approximations.

[2] Including major maintenance costs

4.5 Cost to Develop the License Application

The approximate cost to date to prepare the application for new license for the Project is $770,000 (included in the above cost of net investment).

4.6 Costs of Proposed Environmental Measures

The Licensee is proposing the following environmental measures in this application:

- Continue the current run-of-river mode of operation during the term of the new Project license, with a formal condition to maintain the pond elevation within one foot of the normal pond elevation of 112.0' during normal operations. Temporary and minor fluctuations while managing the pond level may occur while turning units on and off, opening gates, and inflating/deflating the rubber dam segments.
- Implement a Project Operations Monitoring Plan for the Shawmut Project.
- Modify the Shawmut Project boundary to remove two small parcels of land from the Project. The parcels are located at the upper end of the impoundment and serve no project purposes as they are not necessary for operation, maintenance, or recreational purposes.
- Continue to provide for public access and use of Project lands and waters as appropriate and consistent with project purposes and safety. Continue to provide and maintain the existing two Project recreation sites (Hinckley boat launch, canoe portage trail).
- Implement a Recreation Facilities Management Plan (RMP) for the Project, which will address management of project recreation sites over the term of a new license.
- Implement an Historic Properties Management Plan (HPMP) to provide for appropriate management of historic properties throughout the term of the license

In addition, White Pine Hydro is proposing to implement certain measures specifically related to the Shawmut Project that are included in the Species Protection Plan (SPP), and which are summarized as follows:

- Continue to operate the new upstream fish lift (expected to be installed by May 2021) in accordance with agency approved operational plan.
- Install a fish guidance boom (e.g., Worthington boom) in the forebay (in front of units 7 and 8) to direct downstream migrants to the bypass gate(s).
- Continue to operate the existing downstream fish passage facility and maintain the forebay fish guidance boom.
- Conduct up to 3 years of additional downstream passage studies to reevaluate smolt passage and station survival.

- Conduct up to 2 years of adult salmon studies to evaluate the performance of the Shawmut fish lift.
- Revise and implement a site-specific Fish Passage Operations and Maintenance Plan.

The costs to develop and implement the above measures are summarized in Exhibit E Section 6.0 Developmental Analysis.

5.0 ESTIMATED ANNUAL VALUE OF PROJECT POWER

Power generated by the Shawmut Project is sold through Independent System Operator (ISO) New England at prevailing market rates. The Licensee estimates gross annual energy production of approximately 51,058 megawatt-hours. The average market clearing price for energy can be estimated based on the ISO New England website.

6.0 SOURCES AND EXTENT OF FINANCING

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

EXHIBIT E

ENVIRONMENTAL REPORT

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SHAWMUT HYDROELECTRIC PROJECT
FERC PROJECT NO. 2322

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

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SHAWMUT HYDROELECTRIC PROJECT
FERC PROJECT NO. 2322

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT E
ENVIRONMENTAL REPORT

1.0 INTRODUCTION

Brookfield White Pine Hydro LLC (White Pine Hydro or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the Shawmut Hydroelectric Project (Shawmut Project or Project) (FERC No. 2322). The 8.650 megawatt (MW) Shawmut Project is located on the Kennebec River in south-central Maine in Kennebec and Somerset counties at river mile (RM) 66. The Project is located in the towns of Skowhegan, Fairfield, Clinton, and Benton. The Kennebec River basin above the Shawmut Dam has a drainage area of approximately 4,200-square-miles and is one of ten FERC licensed hydropower and storage projects on the mainstem of the Kennebec River. There are an additional 12 licensed or exempt hydropower projects on tributaries to the Kennebec River. The impoundment extends approximately 12 miles upstream from the Shawmut Dam. The Project does not occupy any federal lands.

1.1 Application

FERC issued a new license to Central Maine Power Company (CMP) on January 5, 1981 to operate the Shawmut Project. The license was transferred from CMP to FPL Energy Maine Hydro LLC on December 28, 1998. The name was changed to Brookfield White Pine Hydro LLC on July 29, 2013. January 31, 2021 was the initial expiration date for the Project. On August 1, 2018, White Pine Hydro filed an amendment application to extend the license expiration by one year, to January 31, 2022 to accommodate a study of potential fish passage and generation improvements for its lower Kennebec River projects, including the Shawmut Project. On December 11, 2018, FERC issued an order to White Pine Hydro extending the license term by one year until January 31, 2022. On September 4, 2018, White Pine Hydro filed a draft

License Application (DLA) for the Project. Comments on the DLA were received from state and federal agencies and other stakeholders, and are provided in Appendix E-1.

As required under the Federal Power Act (FPA), and consistent with the one-year extension of the existing license term granted by FERC, White Pine Hydro must file with the Commission its application for a new license for the Project on or before January 31, 2020.

White Pine Hydro has conducted the relicensing of the Shawmut Project in accordance with FERC's Integrated Licensing Process (ILP), pursuant to the ILP process and schedule requirements (Code of Federal Regulations [CFR] Chapter 18, Part 5). Accordingly, the Licensee is filing this Final License Application (FLA) with the Commission and other interested parties, including federal and state agencies, tribal organizations, non-governmental organizations (NGOs), local governments, and the public.

As required, this FLA 1) describes the existing and proposed Project facilities, Project lands, and waters; 2) describes the existing and proposed project operations and maintenance; and 3) provides an analysis of the effects of the proposed relicensing on each environmental resource identified during scoping, including protection, mitigation, and enhancement (PME) measures as appropriate for each resource area potentially affected by the relicensing, including an analysis of cumulative effects. White Pine Hydro used the following guidelines provided by the Commission in preparing this Exhibit E:

- Scoping Document 2 (Issued August 9, 2016),
- 18 CFR § 5.18[b] (content requirements for an Exhibit E), and
- Preparing Environmental Documents: Guideline for Applicants, Contractors, and Staff (FERC 2008).

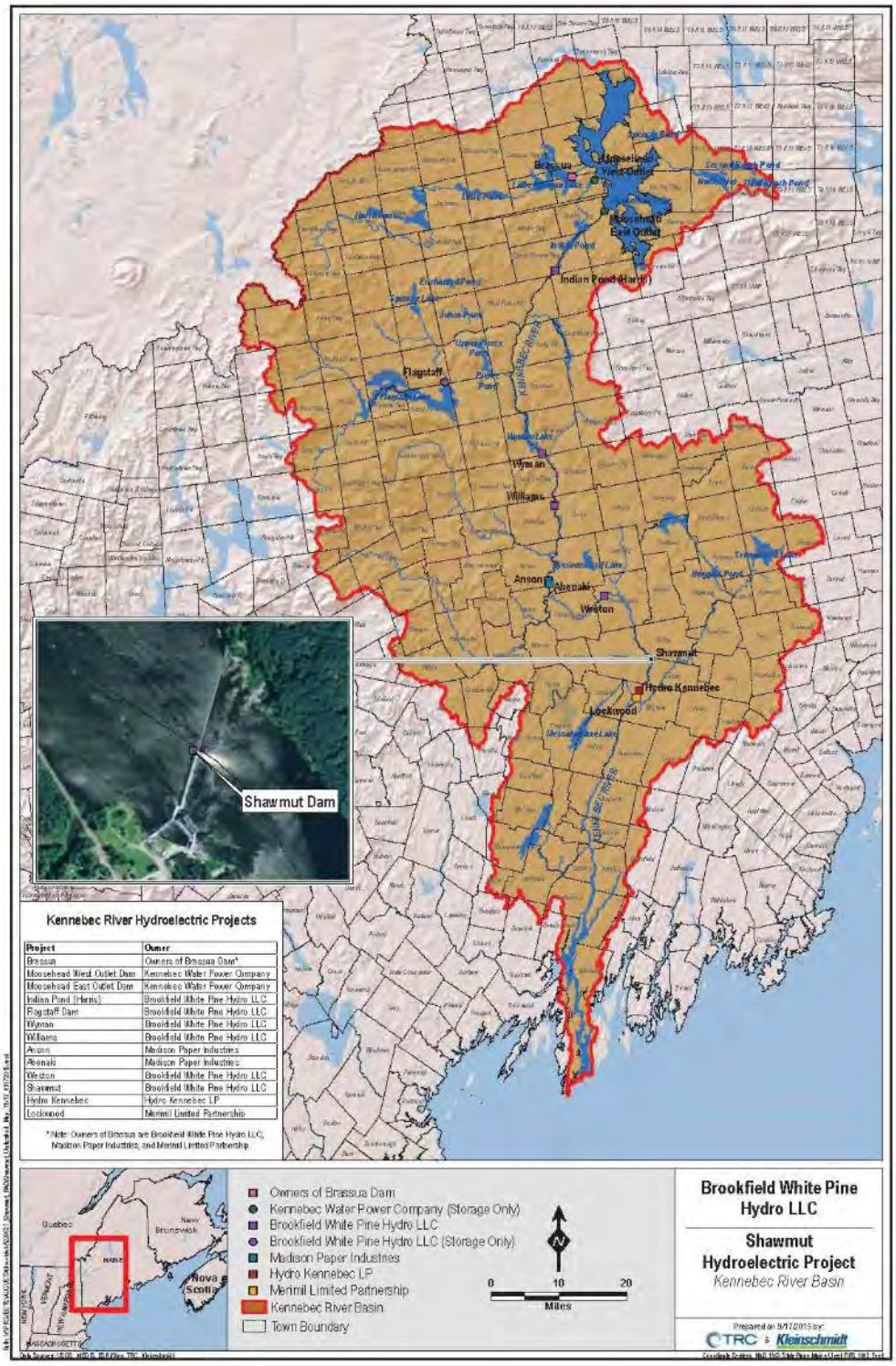


Figure 1-1 Kennebec River Watershed

1.2 Public Review and Consultation

1.2.1 Scoping

The Commission requires that an applicant for a new license consult with the appropriate resource agencies, tribes, and other entities before filing the application. The Licensee initiated the relicensing and stakeholder consultation process by submitting 1) a Notice of Intent (NOI) to relicense the Shawmut Project and 2) a Pre-Application Document (PAD) to the Commission and to state and federal agencies, tribes, NGOs, and other interested parties on September 21, 2015. On November 20, 2015, the Commission began the public scoping process by issuing Scoping Document 1 (SD1) to identify pertinent resource issues related to the relicensing. FERC also used SD1 to solicit comments and suggestions on its preliminary list of resource issues and alternatives to be addressed in the environmental analysis and requested that the stakeholders identify studies needed to provide pertinent information about the resources potentially affected by the relicensing. The Commission held public scoping meetings and a site visit on February 9, 2016, to receive input on the scope of the environmental analysis; Scoping Document 2 (SD2) was issued on August 9, 2016. In SD2, the Commission identified the potential resource issues to be evaluated during the environmental analysis of the relicensing pursuant to the National Environmental Policy Act (NEPA) (Section 4.2).

1.2.2 Studies

White Pine Hydro responded to comments on the PAD and study plans as well as requests for additional studies. Based on these comments, the Proposed Study Plan (PSP) was developed, which served to address and respond to all comments and requests received. White Pine Hydro filed the PSP with FERC on March 4, 2016 with FERC and stakeholders. Subsequent to the PSP filing, White Pine Hydro held a PSP meeting on March 31, 2016. The purpose of the PSP meeting was to provide information regarding the FERC process and schedule, provide additional information on project operations, and review the specific study plans contained in the PSP and to provide an opportunity for attendees to ask questions related to the proposed studies.

Based on comments received on the PSP, White Pine Hydro filed a Revised Study Plan (RSP) with FERC on July 1, 2016. On July 28, 2016, FERC issued a Study Plan Determination approving the following studies:

- Baseline Water Quality and Impoundment Trophic State Study
- Benthic Macroinvertebrate Survey
- Fish Assemblage Survey
- Brown Trout Telemetry Study
- Impoundment Tributary Access Survey
- Wildlife Resources Survey
- Botanical Resources Survey
- Recreational Facilities Inventory and Public Recreation Use Assessment
- Historic Architectural Survey
- Historic (Post-Contact) Archaeological Survey
- Precontact Period Archaeological Survey

Study updates and progress reports were filed on November 30, 2016 and March 29, 2017. White Pine Hydro filed the Initial Study Report (ISR) on August 1, 2017. In accordance with the ILP, the ISR meeting was held on August 15, 2017. Written comments on the ISR were received from the Maine Department of Environmental Protection (MDEP) and the Maine Historic Preservation Commission (MHPC). The ISR contained a status report of studies scheduled for completion later, which included a fish assemblage study, brown trout telemetry study, impoundment tributary access survey, recreation facilities inventory and use assessment, historic archaeology phase 1 survey, and prehistoric archaeology phase 1b survey. Additional progress reports were submitted on October 30, 2017 and March 29, 2018. The Updated Study Report (USR) was filed by White Pine Hydro on August 1, 2018 and the USR meeting was held on August 16, 2018. No comments on the USR were received; a USR meeting summary was filed with the Commission and provided to stakeholders.

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

Table 1-1 List of Shawmut Project Relicensing Consulted Parties

Federal Agencies	
ACHP	Advisory Council on Historic Preservation
USACE	U.S. Army Corps of Engineers
Commission or FERC	Federal Energy Regulatory Commission
NPS	U.S. Department of the Interior National Park Service
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
NMFS	National Oceanic & Atmospheric Administration - National Marine Fisheries Service
BIA	U.S. Department of Interior, Bureau of Indian Affairs
State Agencies	
MDACF	Maine Department of Agriculture, Conservation, and Forestry
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDEP	Maine Department of Environmental Protection
MDMR	Maine Department of Marine Resources
MHPC	Maine Historic Preservation Commission
LUPC	Maine Land Use Planning Commission
Tribes	
	Aroostook Band of Micmacs
	Penobscot Indian Nation
	Passamoquoddy Tribe
	Houlton Band of Maliseet
Local Governments	
Somerset	County of Somerset, Maine
Kennebec	County of Kennebec, Maine
Skowhegan	Town of Skowhegan, Maine
Fairfield	Town of Fairfield, Maine
Clinton	Town of Clinton, Maine
Benton	Town of Benton, Maine
Non-governmental Organizations	
AMC	Appalachian Mountain Club
American Rivers	American Rivers, Northeast Field Office
AW	American Whitewater
ASF	Atlantic Salmon Federation
Kennebec Chapter TU	Kennebec Chapter of Trout Unlimited
Maine Council of TU	Maine Council of Trout Unlimited
TU	Trout Unlimited

Section 4.0 of this Exhibit E summarizes the results of the studies and provides an analysis of the effects of the proposed relicensing on resources and issues that the stakeholders identified during scoping.

The fish assemblage study requested by Maine Department of Inland Fisheries and Wildlife (MDIFW) was undertaken in 2019; results of that study are provided herein and the full study report is attached as Appendix E-3. In addition, two of the first-year cultural resources studies, the Historic Archaeological Phase 1 Survey and the Pre-contact Period Archaeological Survey Phase Ia Study, recommended additional study work, which were undertaken in 2019. The results of the additional cultural resources studies are provided in Appendix E-7 and E-8, and are being filed in a separate volume (Volume II) as Privileged.

1.2.3 Comments on the Draft License Application

On September 4, 2018, the DLA was provided to the participating federal and state agencies, tribes, NGOs, local governments, and members of the public shown in Table 1-1. Comments on the DLA were received from MDEP; National Marine Fisheries Service (NMFS); the U.S. Fish and Wildlife Service (USFWS), the Kennebec Coalition (KC), and FERC. The Licensee has addressed, to the extent possible, the comments received on the DLA in this FLA. In addition, White Pine Hydro has developed a DLA comment and response summary which is provided in Appendix E-1.

1.3 References

FERC, 2008. Preparing Environmental Documents Guidelines for Applicants, Contractors and Staff. [Online] URL: https://www.ferc.gov/industries/hydropower/gen-info/guidelines/eaguide.pdf

2.0 STATUTORY AND REGULATORY REQUIREMENTS

White Pine Hydro, as Licensee, is subject to the requirements of the FPA as well as other applicable statutes. The major regulatory and statutory requirements are summarized below.

2.1 Clean Water Act – Section 401

The Licensee is subject to Water Quality Certification requirements under Section 401(a)(1) of the federal Clean Water Act of 1977. The MDEP establishes water quality standards consistent with Maine statute 38 MRSA § 464-70. The Shawmut Project is subject to a current water quality certification which was issued on October 14, 1980 and amended on July 31, 1998.

White Pine Hydro will file an application for a 401 Water Quality Certification for this relicensing within 60 days of the Commission's Notice of Ready for Environmental Analysis, as required under Commission regulations.

2.2 Endangered Species Act

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

According to the USFWS Information for Planning and Consultation (IPaC) Report the Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon and northern long eared bat are the only federally protected species that occur, or may occur, in the vicinity of the Project (USFWS 2019). Northern long eared bats are not documented in the Project area. Atlantic

salmon occur in the Project area and Atlantic salmon critical habitat has been designated in the lower Kennebec River, including project waters and extending upstream to the Sandy River to the vicinity of Madison, Maine.

On September 21, 2015, with the filing of the NOI, White Pine Hydro requested that FERC designate it as the non-federal representative for purposes of consultation under ESA Section 7. On January 21, 2016, FERC granted this request. Section 4.8 of this exhibit provides information regarding rare, threatened, and endangered species at the Shawmut Project and outlines White Pine Hydro's proposed actions for the protection of Atlantic salmon, consistent with the lower Kennebec Species Protection Plan (SPP), filed on December 31, 2019 (, including the Shawmut Project. Pursuant to ESA Section 7, as part of the SPP filing, White Pine Hydro developed a draft biological assessment (BA) to analyze the potential effects of the SPP on federally protected Atlantic salmon, which was filed concurrently with the SPP on December 31, 2019 (BWPH 2019a). The purpose of the SPP was to identify certain measures to be undertaken by the Licensee at the Shawmut Project and the other three Kennebec River hydropower projects covered under the SPP to avoid and minimize any adverse effects to Atlantic salmon related to the continued operation of the projects, and to protect the listed species and habitat. Issuance of the new project license for the Shawmut Project that incorporates the applicable portions of the SPP would 1) protect the listed species and critical habitat in the Project area, and 2) allow NMFS to develop an Incidental Take Statement (ITS) to account for any unavoidable "take" of Atlantic salmon at the Project. The SPP is intended to be valid for the term of the new Project license. The SPP proposed measures for Atlantic salmon at the Shawmut Project, including the modification, operation and evaluation of fishways, are intended to fulfill any Section 18 fishway prescriptions that have been or will be issued by the Services over the term of the Shawmut Project license.

2.3 Coastal Zone Management Act

Pursuant to Section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C. Section 1456(3)(A), the Commission must receive concurrence from the state CZMA agency that the Project is either not within or not affecting the state's coastal zone prior to issuing a license for the Project.

The Shawmut Project is located on the Kennebec River in south-central Maine in Kennebec and Somerset counties at RM 66. The Project is located in the towns of Skowhegan, Fairfield, Clinton, and Benton, Maine. The Project is located more than 50 miles above the head-of-tide in the Kennebec River basin and outside of Maine's designated coastal zone (MDMR 2018). The Licensee will submit a request to the Maine Department of Maine Resources (MDMR) seeking a determination that a consistency review of the license application is not required because the Shawmut Project is not located in Maine's designated coastal area.

2.4 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) (Section 106) requires federal agencies to consider the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such actions. Historic properties include significant sites, building, structures, districts, and individual objects that are listed in or eligible for inclusion in the National Register of Historic Places (NRHP) (National Register). FERC's issuance of a new license for the Project is considered an undertaking subject to the regulations and requirement of Section 106 and its implementing regulations at 36 C.F.R. Part 800. In accordance with 36 CFR § 800.14(b), FERC typically fulfills its responsibilities pursuant to Section 106 by entering into a Programmatic Agreement (PA) with the appropriate State and or Tribal Historic Preservation Officers (SHPO/THPO), and in some cases the ACHP. FERC typically requires Licensees to develop and implement an Historic Properties Management Plan (HPMP) as a license condition which requires consideration and management of effects on historic properties for the license term.

On January 21, 2016, FERC designated White Pine Hydro as the non-federal representative for purposes of initiating day-to-day consultation pursuant to Section 106. White Pine Hydro consulted with the SHPO throughout the relicensing process and conducted several archaeological and historic investigations of resources within and adjacent to the Project area including a Phase 1a and 1b Pre-contact and Post-contact archaeological surveys and an historic architectural survey. A draft HPMP (Appendix E-9) has been developed which contains specific steps to be taken by White Pine Hydro to protect and preserve the historic properties identified at the Project over the term of the new license.

2.5 Magnuson-Stevens Fishery Conservation and Management Act

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

In 1998, NMFS designated 11 rivers in Maine, including the Kennebec River, as EFH for Atlantic salmon eggs, larvae, juveniles, and adults. Before a federal agency proceeds with an activity that may adversely affect a designated EFH, the agency must 1) consult with NMFS and, if requested, the appropriate council for the recommended measures to conserve EFH, and 2) reply within 30 days of receiving EFH recommendations. The agency's response must include proposed measures to avoid or minimize adverse effects on the habitat or an explanation if the agency cannot adhere to NMFS' recommendation. As discussed above, White Pine Hydro's evaluation of the proposed action, outlined herein and as included in the Kennebec SPP, on Atlantic salmon habitat in the Project area is discussed in the Kennebec BA filed concurrently with the SPP on December 31, 2019.

2.6 Wild and Scenic Rivers and Wilderness Acts

Congress created the National Wild and Scenic Rivers System in 1968 (16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. Rivers are classified as either wild, scenic, or recreational. No nationally designated wild and scenic rivers or wilderness areas are located within the Shawmut Project boundary or in the vicinity of the Shawmut Project (WSR 2014; NWPS 2014). The only designated wild and scenic waterway in Maine is a 92.5 mile reach of the Allagash River (WSR 2014). The Wilderness Act of 1964 [Public Law 88-577 (16 U.S.C. 1131-1136)] was enacted to establish a National Wilderness Preservation System for

the permanent good of the whole people and for other purposes. None of the three wilderness areas in Maine is within the Kennebec River basin (WSR 2018).

2.7 Federal Lands

There are no federal lands located within the Shawmut Project boundary.

2.8 References

Brookfield White Pine Hydro LLC (BWPH). 2019a. Species Protection Plan for Atlantic Salmon, Atlantic Sturgeon and Shortnose Sturgeon at the Lockwood, Hydro Kennebec, Shawmut, and Weston Projects on the Kennebec River, Maine. December 2019.

Brookfield White Pine Hydro LLC. 2019b. Draft Biological Assessment for Atlantic Salmon, Atlantic Sturgeon and Shortnose Sturgeon at the Lockwood, Hydro Kennebec, Shawmut, and Weston Projects on the Kennebec River, Maine. December 2019.

Maine Department of Marine Resources (MDMR). 2018. Coastal Zone Map. https://www.maine.gov/dmr/mcp/about/coastal-zone-map.htm

National Wilderness Preservation System (NWPS). 2014. Wilderness.net. http://www.wilderness.net/map.

United States Fish & Wildlife Service (USFWS) Information for Planning and Consultation (IPaC). 2019. https://ecos.fws.gov/ipac/. Accessed December 19, 2019.

Wild and Scenic Rivers (WSR) 2014. Wild & Scenic Rivers July 10, 2014. Wild and Scenic Rivers Source: www.rivers.gov.

Wild and Scenic Rivers (WSR). 2018. National Wild and Scenic Rivers System – Maine. Available online URL: http://www.rivers.gov/maine.php.

3.0 PROPOSED ACTION AND ALTERNATIVES

3.1 No-Action Alternative

The no-action alternative is the baseline from which to compare the proposed action and all action alternatives that are assessed within this document. Under the no-action alternative, the Shawmut Project would continue to operate under the terms and conditions of the current license, including maintaining the current Project boundary, facilities, operation and maintenance procedures, and provisions of the SPP for fish passage enhancements and measures. No new environmental protection, mitigation, or enhancement measures would be implemented. FERC uses this alternative to establish baseline environmental conditions for comparison with other alternatives.

3.2 Existing Project Description

The 8.650 MW run-of-river Shawmut Project is located on the Kennebec River in south-central Maine at RM 66. The Project is located in the towns of Skowhegan, Fairfield, Clinton, and Benton in the counties of Kennebec and Somerset. The Kennebec River basin above the Shawmut Dam has a drainage area of approximately 4,200 square miles. The Project is one of ten FERC licensed hydropower and storage projects on the mainstem of the Kennebec River. The Project impoundment extends approximately 12 miles upstream from the dam.

3.2.1 Existing Project Facilities

Existing structures at the Shawmut Project consist of a concrete gravity dam with inflatable rubber bladders and hinged boards on portions of the spillway, an enclosed forebay, an intake and headworks section, two powerhouses, a tailrace, an interconnection with the non-project transmission system, and appurtenant facilities. An overview of Project facilities is shown in Figure 3-1. Exhibit A, *Project Description* provides details about the existing Project facilities.

As authorized by the May 2016 Order Amending License approving the Interim Species Protection Plan (ISPP) for the Project, White Pine Hydro is in the process of designing and

constructing a fishway[1] for upstream passage. The upstream fishway is currently scheduled to be constructed in 2020 with a target operational date of May 2021.

3.2.2 Existing Project Operation

The Shawmut Project operates as a run-of-river facility and the impoundment experiences little fluctuation during noral operaitons, maintining the pond level within 1 foot of the normal full pond elevation of 112.0'. The maximum hydraulic capacity of the turbines is 6,690[2] cubic feet per second (cfs). After maximum flow to the turbines has been achieved, excess water is spilled through the existing sluice. When flows exceed the capacity of the sluice (1,840 cfs), sections of the rubber dam are deflated and/or the hinged flashboards are dropped, to pass additional water. The Project units and spillway can pass approximately 40,000 cfs while maintaining a pond level of approximately 112.0'.

As a run-of-river project, outflow generally approximates inflow. However, total Project outflow may vary to a limited extent as units, gates, and spillway mechanisms (i.e., flashboards and rubber bladder sections) are raised and lowered to manage pond levels within a run-of-river mode. The bladder sections can only be operated in a fully inflated position or a fully deflated position; each section is capable of passing up to approximately 7,000 cfs when deflated at elevation 112.0'. The top elevation of the rubber bladders is 112.5' to allow a 6-inch freeboard above the normal full pool elevation of the impoundment. As is typical of operational conditions at any hydropower project, impoundment levels generally fluctuate within a limited range as the facilities (i.e., units, gates, hinged flashboards and rubber bladders) are operated to manage water levels and flows, as well as to manage variable inflows. Impoundment levels generally fluctuate within 1 foot of the normal impoundment elevation of 112.0' during normal operations to manage impoundment levels. Historic data on reservoir levels to describe the daily, monthly, and annual elevations and fluctuations while operating under run-of-river operations was provided by Licensee in the Additional Information Request response dated March 22, 2016.

[1] The upstream fishway at Shawmut will be comprised of a fish lift adjacent to the Unit 1-6 powerhouse and a fish bypass to provide egress between the Unit 7-8 powerhouse and the fish lift entrance, as shown in the final design drawings filed with FERC December 31, 2019.[2] Based on 1982, 1984, and 1988 index testing, summarized in Licensee's *Additional Information Filing* dated March 22, 2016.
[2] Based on 1982, 1984, and 1988 index testing, summarized in Licensee's *Additional Information Filing* dated March 22, 2016.

Figure 3-1 Overview of Shawmut Project Facilities

3.2.3 Existing Project Boundary

The existing FERC Project boundary for the Shawmut Project extends approximately 12.3 miles upstream of the dam, and approximately 4,000-feet downstream of the dam. Above the dam, the Project boundary generally follows elevation 113.0' or 114.0', and in addition, includes two small parcels of land on the east and west bank in the upper portion of the boundary. The existing and proposed Project boundary are shown in Figure 3-2.

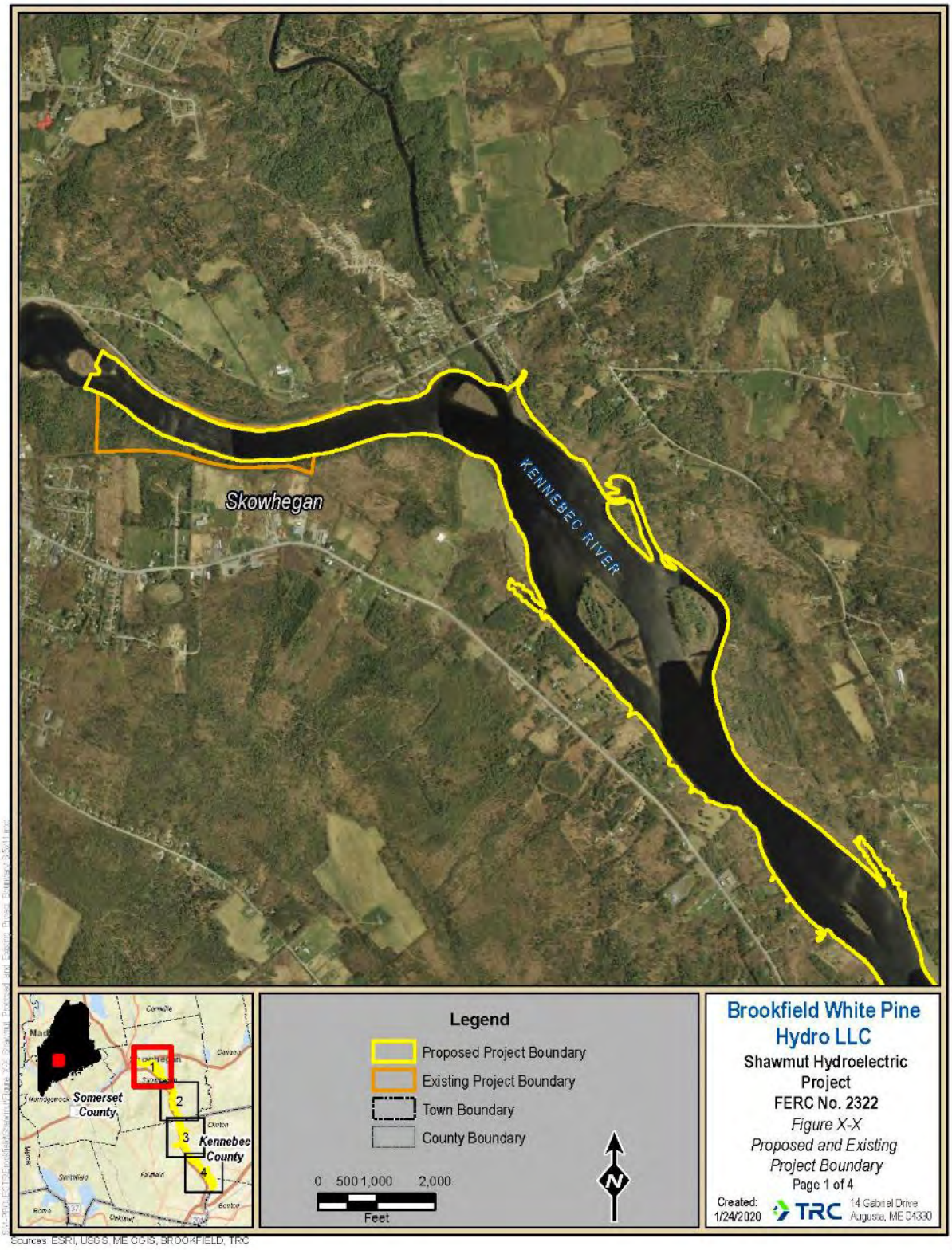


Figure 3-2 Shawmut Project Existing and Proposed Project Boundary Map 1

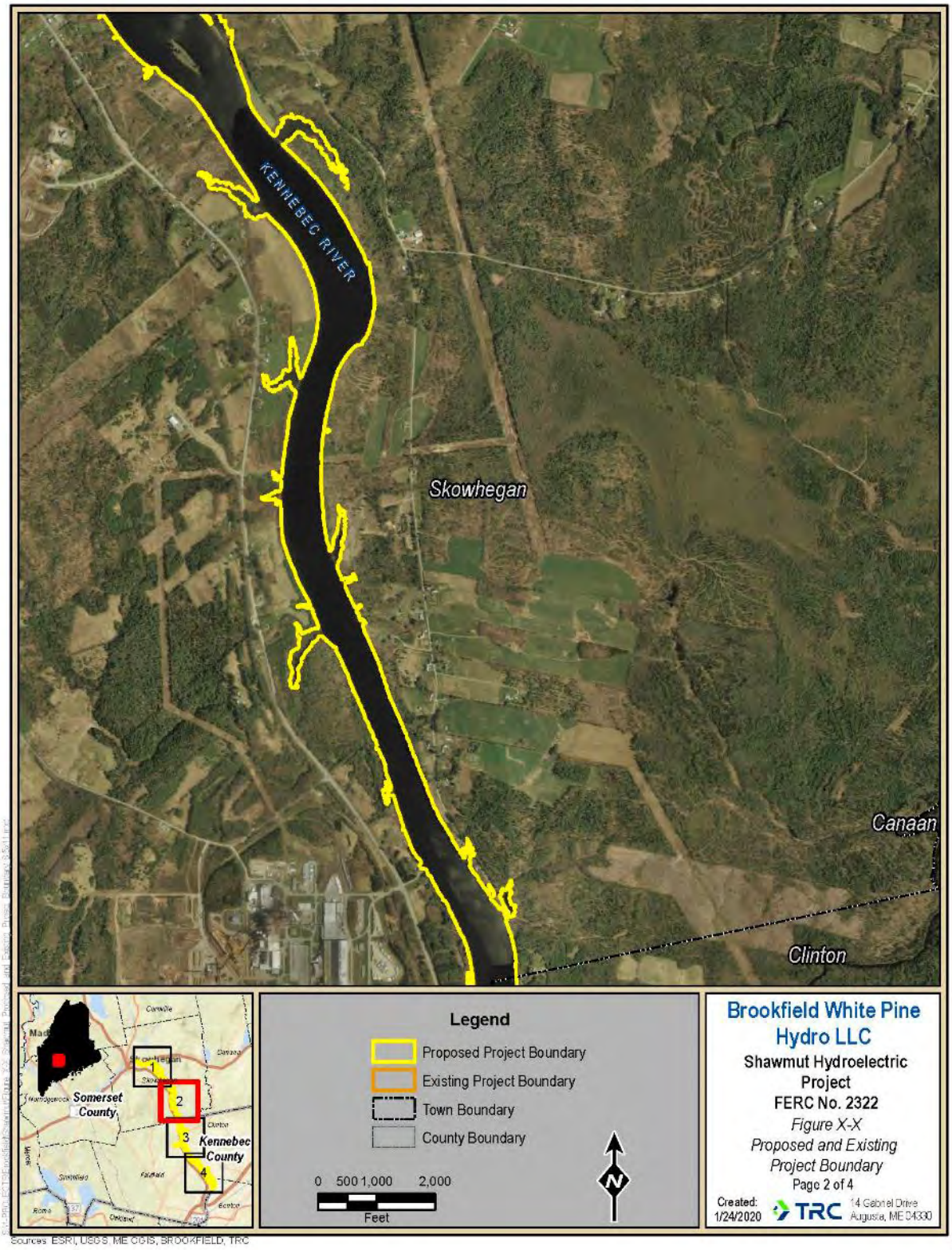


Figure 3-3 Shawmut Project Existing and Proposed Project Boundary Map 2

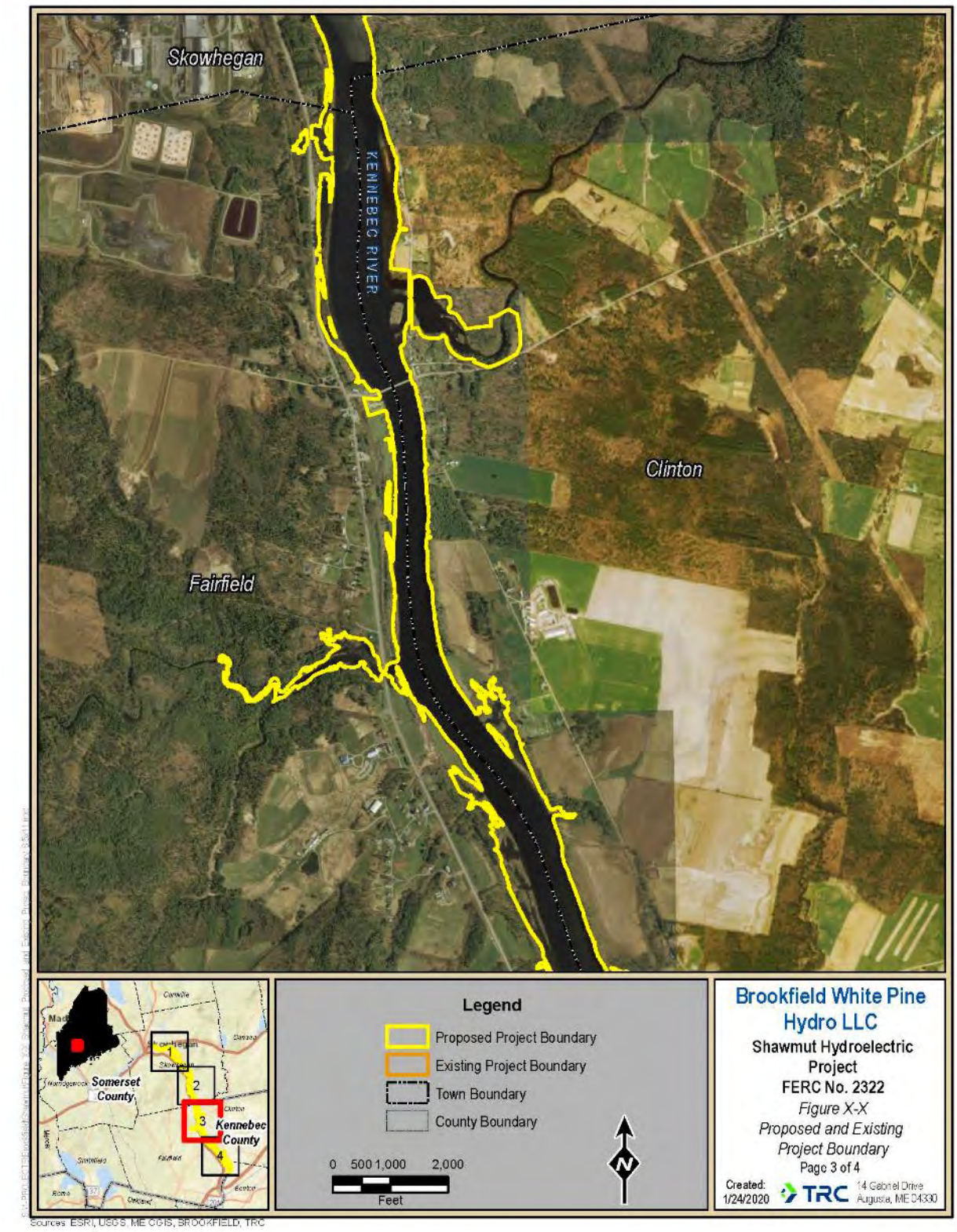


Figure 3-4 Shawmut Project Existing and Proposed Project Boundary Map 3

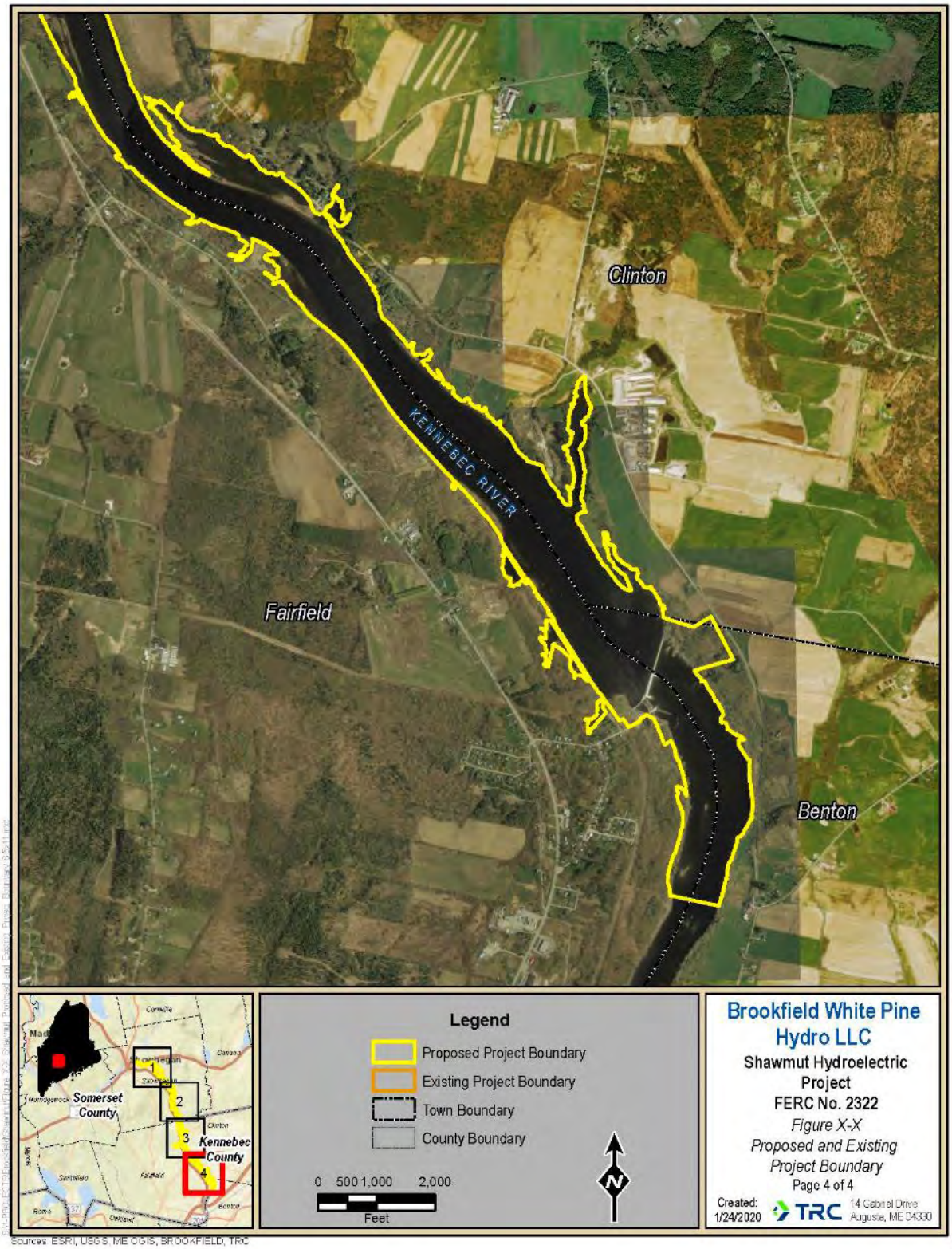


Figure 3-5 Shawmut Project Existing and Proposed Project Boundary Map 4

3.2.4 Existing Environmental Measures

White Pine Hydro currently implements the following environmental measures at the Project:

- Operates the Project in a run-of-river mode, such that outflows approximate inflows, on a daily basis, and the pond level is maintained within 1 foot of the full pool elevation of 112' during normal project operations, to protect water resources.
- Provides public access and use of Project lands and waters; and provides for and maintains the existing Project recreation sites; the Hinckley boat launch and canoe portage sites.
- Provides upstream passage for American eel via an upstream eel passage facility located adjacent to the 1912 powerhouse.
- Provides downstream American eel passage at the Project by opening a Tainter gate and turning off units 7 and 8 for an 8-hour period at night for a 6-week period between September 15 and November 15 each year.
- Provides interim upstream passage for Atlantic salmon, American shad, and other anadromous fish species past the Project via the fish lift and transport system at the downstream Lockwood Dam. White Pine Hydro will continue to use the Lockwood fish lift to provide upstream passage at Shawmut, while a new fishway is constructed at Shawmut pursuant to the requirements of the ISPP and the May 2016 FERC Order Amending License. The Shawmut fishway is anticipated to be completed and operational by May 2021.
- Provides downstream passage for anadromous fish at the Project either through spillage, an existing Tainter gate, hinge gates, or passage through the units.

The Licensee is in the process of designing and constructing an upstream fishway at the Project that was previously authorized by FERC and that will be operational in May 2021. Once complete, operation of the new fishway will be in accordance with the Fish Passage Operations and Maintenance Plan filed with FERC on December 31, 2019.

3.2.5 Project Safety

The Project is exempt from the Commission's Emergency Action Plan (EAP) requirements because it is classified as a Low Hazard facility. The Licensee, however, maintains a Low Hazard EAP and Notification Flowchart and conducts an annual field reconnaissance upstream and downstream of the Project to verify that no changes have occurred that would reasonably be expected to adversely affect public health, safety, or property in the event of a dam failure. White Pine Hydro's dam safety and operations staff conduct an inspection annually, and perform

routine repairs as needed. Exhibit H provides additional detail regarding the Licensee's safety programs.

3.3 Proposed Action

White Pine Hydro proposes to continue to operate the Shawmut Project in its current run-of-river mode and to implement, or continue to implement, certain environmental measures, including operation of upstream and downstream fish passage, as described in this application.

3.3.1 Proposed Project Facilities

White Pine Hydro is proposing no modifications of the primary Shawmut Project facilities. The existing dam, powerhouses, and appurtenant features are all well maintained and in good working order. No changes of these existing Project facilities that are outside normal maintenance practices or the Commission's safety requirements are required or proposed.

Under the current license that was amended by the Commission December 11, 2018, White Pine Hydro is constructing a new upstream fishway. Final designs for the fishway were filed with FERC December 31, 2019, and the fishway is planned to be constructed in 2020-2021 and operational by May 2021.

Under the proposed action, the Licensee is proposing to implement additional measures to enhance downstream passage at the Shawmut Project as described in the SPP filed with FERC December 31, 2019. Specifically, White Pine Hydro is proposing to install a fish guidance boom upstream of the Unit 7 and 8 powerhouse intake to provide screening, guidance and sweeping flows to the existing downstream fish bypass, located between the Unit 7-8 and Unit 1–6 powerhouses, as discussed in Section 4.6.1.2.

3.3.2 Proposed Project Operation

White Pine Hydro proposes no changes in the way the Shawmut Project is currently operated and will continue to operate the Shawmut Project as run-of-river such that Project outflows generally equal inflows, on a daily basis. To ensure run-of-river operation, White Pine Hydro proposes to maintain the impoundment level within 1 foot of the normal pond elevation of 112.0’ during normal operations. Temporary and minor fluctuations while managing the pond level may occur

while turning units on and off, opening gates, and inflating/deflating the rubber dam segments. The effects of the proposed project operation are discussed in this Exhibit E, Section 4.0. A proposed license condition for the new Project license with respect to run-of-river operation is as follows:

> *Except as temporarily modified by (1) approved maintenance activities, (2) extreme hydrologic conditions, as defined below, (3) emergency electrical system conditions, as defined below, or (4) agreement between the Licensee, the MDEP, and appropriate state and/or federal agencies, the Licensee shall operate the Project as run of river facility between elevations 112.0' (normal full pond) and 111.0', during normal operations.*
>
> *"Extreme Hydrologic Conditions" means 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.*
>
> *"Emergency Electrical System Conditions" means 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 temporary abnormal operating conditions, 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.*

Exhibit B, Project Operations, provides additional detail about existing Project operations that would be continued under the proposed action.

To enhance upstream and downstream passage of fish, White Pine Hydro proposes to operate the Project in accordance with the SPP and the Fish Passage Operations and Maintenance Plan which were filed with FERC December 31, 2019, as discussed in Section 4.6.1.2.

3.3.3 Proposed Project Boundary

White Pine Hydro is proposing to remove two small parcels of Project lands that are not needed for Project purposes. The current Project boundary extends approximately 12.3 miles upstream of the dam, and approximately 4,000 feet downstream of the dam. Above the dam, the existing boundary generally follows elevation 113.0' or 114.0', and includes two parcels of land on the east and west bank in the upper portion of the boundary. These two parcels serve no Project purposes as they are not necessary for operation, maintenance, recreational or resource protection purposes. Therefore, the Licensee is proposing to remove the parcels from the Project boundary. The parcel on the east shore is approximately 2.2 acres and the parcel on the west shore is approximately 26.4 acres. The location of the proposed change in the Project boundary is shown on Figure 3-6. The proposed Project boundary is also shown on the Exhibit G maps.

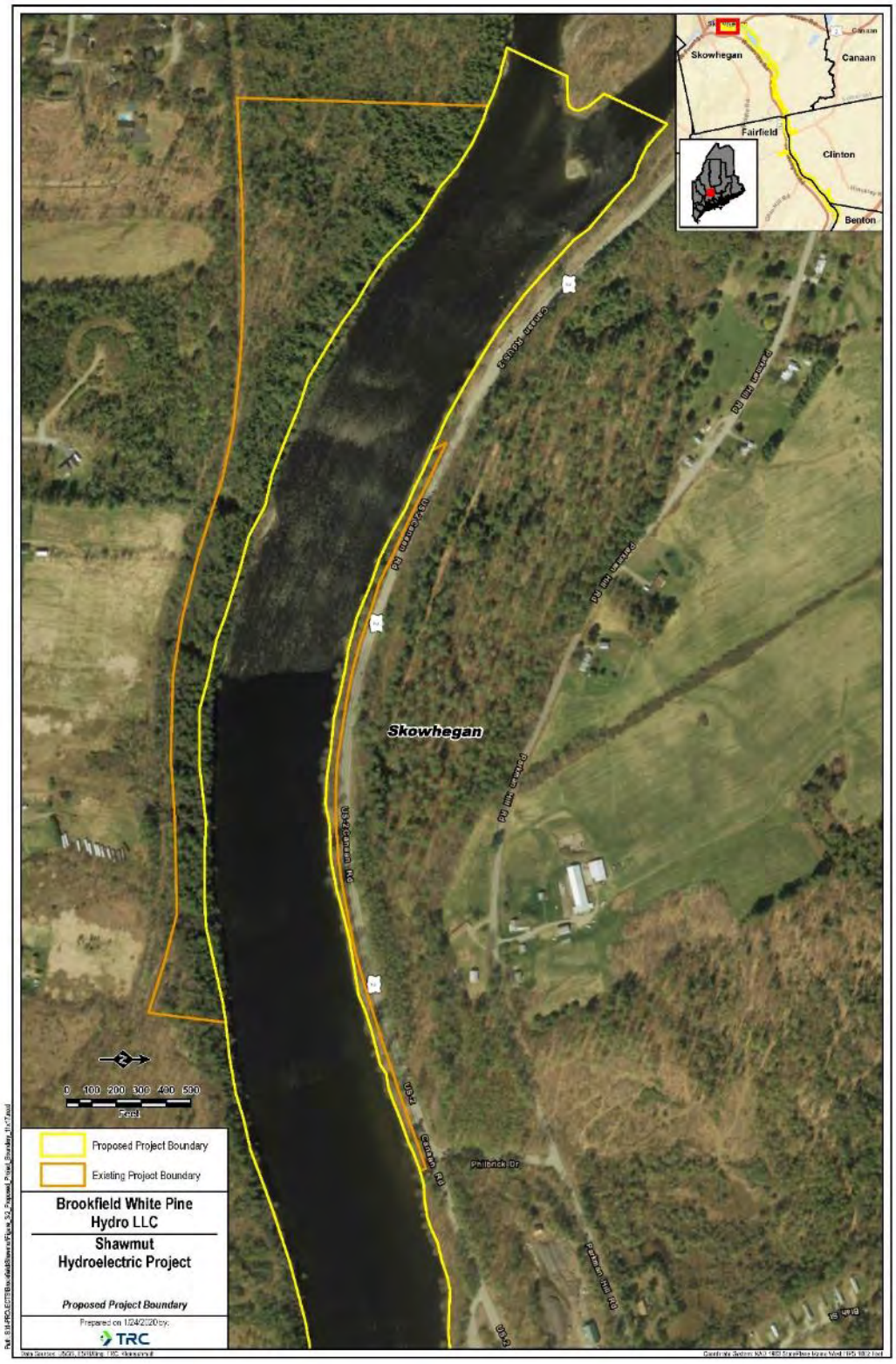


Figure 3-6 Proposed Change to the Project Boundary

3.3.4 Proposed Environmental Measures

The Licensee is proposing the following PME measures for the benefit of Project related resources:

- Continue the current run-of-river mode of operation during the term of the new Project license, with a formal condition to maintain a pond level within one foot of the normal pond elevation of 112.0' in order to manage pond levels in a manner that outflow generally matches inflow to the Project. Temporary and minor fluctuations while managing the pond level may occur while turning units on and off, opening gates and/or inflating or deflating the rubber dam segments.
- Implement a Project Operations Monitoring Plan for the Shawmut Project.
- Continue to provide for public access and use of Project lands and waters as appropriate and consistent with Project purposes. Continue to provide and maintain the existing two Project recreation sites (Hinckley Boat Launch, Canoe Portage Trail).
- Implement a Recreation Facilities Management Plan (RFMP) for the Project, which will address management of Project recreation sites over the term of a new license.
- Implement an Historic Properties Management Plan (HPMP) to provide for appropriate management of historic properties throughout the term of the license.

In addition to these proposals, White Pine Hydro is proposing to continue to implement the SPP and to undertake the fish passage measures contained therein, including:

- Continue to operate the new upstream fish lift (expected to be installed by May 2021) in accordance with agency approved operational plan.
- Install a fish guidance boom (e.g., Worthington boom) in the forebay (in front of Units 7 and 8) to direct downstream migrants to the existing downstream bypass.
- Continue to operate the existing downstream fish passage facility and maintain the forebay fish guidance boom
- Conduct up to three years of additional downstream passage studies to reevaluate smolt passage and station survival.
- Conduct up to two years of adult salmon studies to evaluate the performance of the Shawmut fish lift.
- Revise and implement a site-specific Fish Passage Operations and Maintenance Plan.

Section 4.0 discusses the effects of the proposed relicensing action, including the proposed PME measures.

3.4 Alternatives Considered but Eliminated from Detailed Analysis

3.4.1 Federal Government Takeover of Project Facilities

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

FERC indicated in Scoping Document 2 (SD2) that it did not consider federal takeover to be a reasonable alternative. Federal takeover of the Project would require congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence showing that federal takeover should be recommended by Congress. No party has suggested that federal takeover would be appropriate, and no federal agency has expressed interest in operating the Project.

3.4.2 Issuance of Non-Power License

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

FERC indicated in SD2 that no governmental agency has suggested a willingness or ability to take over the Project. No party has sought a non-power license, and FERC has no basis for concluding that the Shawmut Project should no longer be used to produce power. Therefore, FERC does not consider a non-power license a reasonable alternative to relicensing the Project (FERC 2016).

3.4.3 Decommissioning

During scoping, some stakeholders requested that the Commission consider Project decommissioning and removal of the Shawmut Dam as an alternative to relicensing the Project.

FERC addressed the issue of decommissioning in SD2 as follows:

> "*Decommissioning could include retiring the project with or without removal of project facilities, including the Shawmut Dam. Either alternative would involve denial of the relicense application and surrender or termination of the existing license with appropriate conditions. However, there would be significant costs involved with project*

retirement and/or removing project facilities. Moreover, as currently licensed, the project provides a viable, safe, and clean renewable source of power to the region. No agency has recommended removal of the Shawmut Dam, nor do any fish passage restoration plans for the Kennebec River stipulate that removal of Shawmut dam is necessary to achieve restoration goals, Rather, White Pine Hydro is required to provide upstream fish passage at Shawmut Dam by 2018, which addresses fish passage needs at the project. Therefore, we do not consider project retirement to be a reasonable alternative to relicensing the Shawmut Project, at this time. However, based on the concerns raised during the scoping process, we will not eliminate such an alternative from detailed study until we can further evaluate project effects on resources and interests in the EA."

Brookfield Renewable Partners (Brookfield), through White Pine Hydro and other affiliates, owns and operates several hydroelectric projects on the lower mainstem Kennebec River both upstream and downstream of the Shawmut Project. These include the downstream Lockwood (FERC No. 2574), and Hydro-Kennebec (FERC No. 2611) projects, as well as the upstream Weston (FERC No. 2325) Project, which are all located on the lower Kennebec River mainstem. Because Brookfield affiliates operate these four projects, which collectively comprise the first four dams on the Kennebec River mainstem, and because efforts to restore diadromous fish to the Kennebec River basin has long been a priority for both the dam owner(s) and agencies, planning for and implementing effective fish passage that best supports restoration efforts for several anadromous species has been a priority of Brookfield.

In 2018, Brookfield, in cooperation with the fishery resource agencies, undertook a comprehensive study ("Feasibility Study") to examine the feasibility of various alternatives for providing fish passage at the Weston, Shawmut and Lockwood projects, including decommissioning and the fish passage facilities currently authorized by the respective project licenses (BWHP 2019c). The study did not evaluate the Hydro-Kennebec Project because a state-of-the-art fish lift was installed at that Project in 2017. The resulting Feasibility Study examined many fish passage alternatives, including decommissioning and the potential removal or partial removal of the project dams as a means of providing fish passage, and opportunities to recover lost generation associated with decommissioning.[3] The Feasibility Study considered the capital and regulatory costs, lost generation and identification of the potential environment

[3] The Feasibility Study was filed with FERC on July 1, 2019.

effects of each option[4]. Ultimately, the fishways currently authorized for construction, including the fish lift at the Shawmut Project, were determined to be the best fish passage alternatives.

Decommissioning of the Shawmut Project is not a reasonable alternative since the Project, as it exists today, provides a viable, safe, and clean renewable source of power to the region with a requirement for upstream fish passage to be implemented prior to the current license expiration. The Shawmut Project also provides the public with recreational access and opportunities. If the Shawmut Project were decommissioned and the dam removed, its contribution to renewable, carbon-free, electric generation resources would end and the public would no longer have access to the Shawmut Project recreation facilities and non-project recreational facilities could be adversely affected. Removal of project facilities may potentially adversely affect municipal and industrial uses within the impoundment. Decommissioning is not a reasonable alternative to relicensing with continuing and proposed PME measures, and has not been considered in detail in this analysis.

3.5 References

Brookfield White Pine Hydro LLC (BWPH). 2019c. Energy Enhancements and Lower Kennebec Fish Passage Improvements Study. Prepared by Kleinschmidt. October 2018.

Federal Energy Regulatory Commission (FERC). 2016. Scoping Document 2 for the Shawmut Hydroelectric Project (FERC No. 2322-060). Issued August 9, 2016.

[4] Because the Feasibility Study was drafted to inform discussion about alternative fish passage options at the three subject hydropower projects, including Shawmut, White Pine Hydro requested a one-year extension of the Shawmut FERC license to allow time for the study to be completed, and the results of the study to be used to consider appropriate fish passage proposals for inclusion in the SPP.

4.0 ENVIRONMENTAL ANALYSIS

This section of Exhibit E (1) provides a general description of the Kennebec River basin, (2) identifies resources that have the potential to be cumulatively affected and identifies the geographic and temporal scope of the cumulative effects analysis, (3) provides a description of the environment for resources that have the potential to be affected by the proposed action, (4) provides an environmental analysis of the effects (positive or negative) of the proposed action and proposed PME measures, and (5) describes any unavoidable adverse effects that may still remain after implementation of PME measures. The Commission defines unavoidable adverse effects as "any adverse environmental effects that cannot be avoided should the proposal be implemented, including effects of protection, mitigation, and enhancement measures" (FERC 2008).

The Licensee has completed 11 individual comprehensive studies that were developed in consultation with the stakeholders to address specific resource issues and to collect up-to-date baseline information on resources in the Shawmut Project area. In addition to updating baseline resource information, the Licensee performed the studies to aid in evaluating the effects, if any, of continued Project operation and maintenance on the human and natural environment. The resource descriptions in the following sections summarize the existing conditions and results of the studies. The environmental analysis is based largely on the information that the Licensee collected through the studies conducted between 2015 and 2019. The ISR and USR, which are available on the Commission's eLibrary[5], provide the complete study reports. Three additional studies that were conducted in 2019 including the fish assemblage study and the Phase 1B Pre-contact and historic archaeology studies, are provided in Appendices to Exhibit E. The fish assemblage study is included in Appendix E-3. The two cultural resource studies are provided in Volume II (Privileged) as Appendices E-7 and E-8.

4.1 Cumulative Effects

According to the Council on Environmental Quality's (CEQ) regulations for implementing NEPA (40 CFR 1508.7), an action may cause cumulative effects if its effects overlap in space

[5] The Commission's electronic Library (http://www.ferc.gov/docs-filing/elibrary.asp) contains copies of licensing and compliance documents that applicants and commenter's submit or file with the Commission.

and or time with the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

4.1.1 Resources that could be Cumulatively Affected

In SD2, the Commission identified migratory fish, including Atlantic salmon, American shad, alewife and blueback herring, American eel, as well as recreation resources, as resources that could be cumulatively affected by the continued operation and maintenance of the Shawmut Project in combination with other hydroelectric projects and other activities in the Kennebec River basin. The effects analyses for the resources identified as having the potential to be cumulatively affected appear in the applicable resource sections.

4.1.2 Geographic Scope of Cumulative Effects Analysis

The geographic scope of the analysis for cumulatively affected resources is defined by the physical limits or boundaries of 1) the effect of the proposed action on the resources, and 2) contributing effects from other hydropower and non-hydropower activities within the Kennebec River basin. In SD2, FERC identified the geographic scope for migratory fish to include the Kennebec River basin, from the upstream Brassua Hydroelectric Project (FERC Project No. 2615) on the Moose River to the mouth of the Kennebec River at Merrymeeting Bay and the Atlantic Ocean, including mainstem Kennebec River dams and impoundments. Activities within this basin that may cumulatively affect these migratory fish species include the construction and operation of dams within the river basin, which have resulted in migratory barriers and loss of spawning habitat. In addition, for recreation resources, SD2 identified the geographic scope of analysis of cumulative effects is the Kennebec River, as bounded by the Project from the tailrace of the upstream Weston Project downstream to the lower end of the Hydro-Kennebec Project impoundment. FERC chose this geographic scope because the construction and operation of hydropower dams on the Kennebec River have the potential to cumulatively affect recreation resources in the river basin.

4.1.3 Temporal Scope of Cumulative Effects Analysis

The temporal scope of the environmental analysis includes the past, present, and reasonably foreseeable future actions and their effects on migratory fish and recreation resources. Based on the potential term of a new license for the Shawmut Project, the temporal scope looks 40 to 50 years into the future[6], concentrating on effects on resources of reasonably foreseeable future actions. The historical discussion is, by necessity, limited to the amount of available information for each resource.

4.2 Resource Issues

FERC identified a list of environmental issues to be addressed in the Environmental Assessment (EA) in the SD2. This list is not intended to be exhaustive or final, but contains those issues raised to date that could have substantial effects.

4.2.1 Geologic and Soils Resources

- None

4.2.2 Aquatic Resources

- Effects of continued project operation on dissolved oxygen (DO) and water temperature in the Project impoundment and in the Kennebec River immediately downstream from Shawmut Dam, including water quality effects on the existing brown trout fishery.
- Effects of continued project operation on fish and aquatic habitat in the Project impoundment, and in the Kennebec River downstream from Shawmut Dam, including the existing brown trout fishery.
- Effects of continued project operation on upstream and downstream diadromous fish movement and access to habitat in the Kennebec River and its tributaries, including an evaluation of the Shawmut Project impoundment, along with other impoundments, to act as a barrier to fish movement in the river.
- Effects of turbine entrainment on fish in the Project area, including Atlantic salmon, American shad, American eel, brown trout, and smallmouth bass.
- Effects of continued project operation and maintenance on Maine species of special concern, including brook floater, tidewater mucket, and yellow lamp mussel.

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

4.2.3 Terrestrial Resources

- Effects of continued project operation on riparian, littoral, and wetland habitat and associated wildlife.
- Effects of continued project operation and maintenance on the introduction and persistence of non-native invasive plants.
- Effects of continued project operation and maintenance on Maine state threatened Tomah mayfly, and species of special concern, including little brown myotis, silver-haired bat, bald eagle, Canada warbler, olive-sided flycatcher, wood thrush, eastern ribbon snake, mink frog, northern leopard frog, blue spotted and spring salamanders, wood turtle, and long-leaved bluet (discussed under Threatened and Endangered Species).

4.2.4 Threatened and Endangered Species

- Effects of continued project operation and maintenance on federally threatened or endangered species and their habitat in the Project area, including Atlantic salmon and northern long-eared bat (NLEB).

4.2.5 Recreation and Land Use

- Effects of continued project operation on recreational use on the Kennebec River.
- Effects of continued project operation on recreation resources from the tailrace of the upstream Weston Project downstream to the lower end of the Hydro-Kennebec Project impoundment.
- Adequacy of existing public access and recreational facilities in the Project boundary to meet current and future recreation needs, including the need for public, non-motorized trails along the Shawmut Project impoundment.

4.2.6 Cultural Resources

- Effects of continued project operation and maintenance on historic and archeological resources that are within the area of potential effects (APE) and listed, or eligible for inclusion, in the NRHPs.
- Effects of continued project operation and maintenance on properties of traditional religious and cultural importance to an Indian tribe.
- Effects of Project-induced recreation on cultural resources.

4.2.7 Development Resources

- Effects of the proposed Project and alternatives, including any recommended PME measures, on project generation and economics.

4.3 General Description of the River Basin

4.3.1 Kennebec River Basin

The Kennebec River originates at the outlet of Moosehead Lake in northwestern Maine and flows south for approximately 145 river miles, where it joins the Androscoggin River and four other smaller rivers to form Merrymeeting Bay. Merrymeeting Bay drains into the Atlantic Ocean through the Lower Kennebec River, a long saltwater tidal channel. The Lower Kennebec River and Merrymeeting Bay are known collectively as the Kennebec Estuary. Tidal processes extend upstream as far as Augusta, which is considered head-of-tide (MDACF 2007).

The Kennebec River basin has a total drainage area of approximately 5,890 square miles. The two largest lakes in the watershed are Moosehead Lake and Flagstaff Lake, located on the Dead River, a major tributary entering near The Forks, Maine (see Figure 1-1). Other major lakes and rivers within the watershed include Brassua Lake, Sebasticook Lake, the Belgrade Lakes, China Lake, Cobbosseecontee Lake, and the Moose, Dead, Carrabassett, Sandy, and Sebasticook rivers. The Carrabassett and Sandy rivers are considered to be major contributors to river flow in the Kennebec River; both are "flashy," and rapid increases and decreases in river flow are common (MDACF 2007). Combined, both tributaries contribute approximately 40 percent of the peak discharge of the Kennebec River watershed during floods (MDACF 2007).

Major flooding may occur within the Kennebec River basin as a result of snowmelt, rain-on-snow events, or major precipitation. Several impoundments in the basin provide benefits to, in addition to hydropower purposes, flood management, including Moosehead Lake, Flagstaff Lake, and the Brassua reservoir. These projects provide significant benefits downstream for flood management by attenuating peak flows, so they do not coincide with the peak downstream uncontrolled inflows (MDACF 2007). Springtime is generally the period of most concern for flooding, when rain and snow melt combine to produce high water conditions. The reservoirs are generally operated so that the maximum drawdown is just before spring break-up (usually around late March), providing storage capacity to hold a portion of the spring flows, filling the reservoirs by early June.

Flows from the Kennebec River headwater storage dams, including those of the Moosehead (FERC No. 2671), Flagstaff (FERC No. 2612), and Brassua (FERC No. 2615) projects are

generally coordinated to provide an average target river flow of 3,600 cfs at Madison, Maine. The determination of how much water to actually release from each of the storage reservoirs is made primarily based on natural flows, local minimum and recreational flow requirements, target reservoir levels and drawdown limits, snowpack, and weather forecast. The regulated flow target at Madison is based on a long history of agreements among many parties on the Kennebec River, and the operations of downstream projects, such as Shawmut, have been premised on this historical operation.

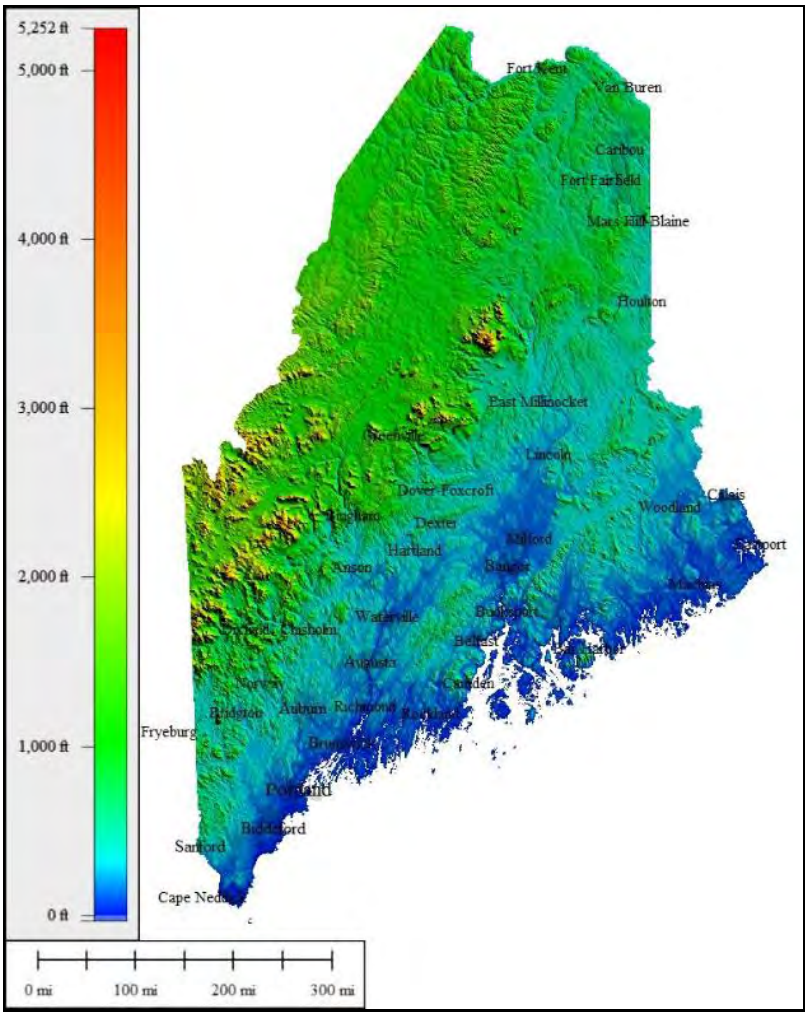
The largest recorded flood in the Kennebec River occurred in 1987, when the USGS recorded a river flow of more than 230,000 cfs at North Sidney, Maine (USGS 2019). Even with the headwater storage projects retaining water in the upper drainage area, the 1987 flood resulted in total estimated damages in the Kennebec River basin of $34 million (ca.1987 dollars) to communities from Anson to Gardiner, Maine. The U.S. Army Corps of Engineers (USACE) developed a report after the 1987 flood and concluded that the Kennebec River is "subject to frequent and major flooding … had it not been for the availability of the upper basin reservoir storage, the devastating flood of 1987 would have been considerably worse" (USGS 1994). Annual peak river flow in the Kennebec River has ranged from 60,000 to 102,000 cfs over 10 years (2004-2013) at the North Sidney gauge (USGS 2019).

Based on USACE's recommendations after the 1987 flood, a winter drawdown target to 27 percent of the gross storage capacity of the entire Kennebec water storage system was implemented. As a result, 73 percent of the basin's storage capacity is made available for managing spring inflows. This target was established for two principal reasons. First, if runoff and precipitation are near the historical averages, the probability is good that the reservoirs will refill, allowing the storage cycle to begin for another year. Second, the 27-percent-of-full target provides significant flood control benefits while ensuring the flexibility to draw more water from the system to maintain downstream uses in the event that spring runoff begins later than average.

4.3.2 Topography

The upper two-thirds of the river basin above Waterville are hilly and mountainous; the lower third of the basin is characterized by rolling coastal plains (MDACF 2007; CMP 1986). The Kennebec River flows almost due south from its headwaters to Merrymeeting Bay, except for a

large S-shaped meander between Anson and Skowhegan. Just to the west and north of the Project, the mountainous upper Kennebec River basin begins with relief ranging from of 1,000 to 3,000 feet (CMP 1986). Figure 4-1 depicts the general topography surrounding the Project.



Source: TopoCreator, 2009.

Figure 4-1 General Topography Surrounding Project

4.3.3 Climate

The Project region experiences mild, relatively humid summers and cold winters with moderate snowfall in the lower elevations. Average July air temperatures in the Project vicinity range from a daily average maximum of 80° Fahrenheit (F) to a daily average minimum of 58° F. The daily average maximum air temperature for January is approximately 28° F while the daily average

minimum air temperature for January is 7° F. The average annual total precipitation is 42.75 inches (US Climate Data 2015).

4.3.4 Major Land Uses

The upper portion of the Kennebec River basin is characterized by Maine's western mountains, scenic vistas, and large tracts of spruce-fir forests which constitute approximately 90 percent of the upper Kennebec River basin area. This area is sparsely populated and contains predominantly unorganized townships. Timber harvesting and season recreation constitute the major land and water uses in this remote region (MPI 2002).

The Project is located along the lower portion of the Kennebec River basin. The lands immediately adjacent to the Project boundary primarily consist of agricultural areas, undeveloped woodlands and a few residential areas. Developed lands in the Project vicinity are mostly concentrated within the town of Skowhegan upstream of the Project. Additionally, there is a small amount of industrial land, as well as a few private residences adjacent to the Project boundary.

The Project dam and powerhouses are located in the towns of Skowhegan, Fairfield, Clinton, and Benton, which contain populations of approximately 2,638 and 2,732 residents respectively (City Data 2015a,b).

4.3.5 References

Central Maine Power (CMP). 1986. Amended Application for the Williams Project on the Kennebec River in Bingham, Concord, Embden, and Solon Maine. Volume II – Exhibit E.

City Data. 2015a. Fairfield, Maine. City Data.com. [Online] URL: http://www.citydata.com/city/Fairfield-Maine.html.

City Data. 2015b. Benton, Maine. City Data.com. [Online] URL: http://www.citydata.com/city/Benton-Maine.html.

FERC, 2008. Preparing Environmental Documents Guidelines for Applicants, Contractors and Staff. [Online] URL: https://www.ferc.gov/industries/hydropower/gen-info/guidelines/eaguide.pdf

Madison Paper Industries (MPI). 2002. Applicant Prepared Environmental Assessment. Anson and Abenaki Hydroelectric Projects (FER No. P-2365 and P-2364). April 2002. Prepared by Kleinschmidt Associates.

Maine Department of Agriculture, Conservation and Forestry (MDACF). 2007 Maine River Basin Report, Kennebec River – Watershed Description. [Online] URL: http://www.maine.gov/dacf/flood/publications.shtml.

U.S. Climate Data. 2015. Climate Data, Waterville, Maine. [Online] URL: http://www.usclimatedata.com/climate/waterville/maine/united-states/usme0852.

U.S. Geological Survey (USGS). 2019. Peak streamflow for Maine. USGS Gage 01049265, North Sidney, Maine.

TopoCreater. 2009. State maps and elevation data: Maine (ME). [Online] URL http://countytopos.com/download_city_a.php.

4.4 Geology and Soils

4.4.1 Affected Environment

The Shawmut Project is located in the Central Maine Embayment ecoregion, a sub-region of the Acadian Plains and Hills ecoregion. The Central Maine Embayment ecoregion is a transitional area located between foothills to the west and the lowlands to the east. The region is characterized by rolling plains and hills and a diversity of flora and fauna. Soils are mainly Spodosols. Topographic relief is moderate, and elevations are typically less than 500 feet. Bedrock structure is complex and is mainly comprised of metasedimentary and metavolcanic rocks (Griffith et al. 2009).

4.4.1.1 Existing Geological Features

Geologic structure underlying the Project vicinity generally consists of large areas of stratified rocks characteristic of the late Ordovician-Devonian sedimentary basin, including metamorphosed pelite, sandstone, limestone/dolostone, with some granitic intrusives of the Carboniferous age (Griffith et al. 2009). Bedrock outcroppings are present immediately downstream of the Project dam. Glacial deposits cover many of the flatter, lower elevations within the Project vicinity. River valleys, such as the Kennebec, are characterized by alluvial deposits (Griffith et al. 2009).

Soils surrounding the Project have developed from parent materials of the Wisconsin Glaciation, or more recent activity. Glaciofluvial deposits have resulted in stratified sandy, loamy, or gravelly material (NRCS 2009). Elevation and drainage further define the varying soil types in the Project vicinity. The immediate Project area is dominated by loamy sands and silt loams with slopes generally below 10 percent. Adams loamy sand (AaB/C/D) and Hadley silt loams (Ha) are the most prevalent soil series along project shorelines, as depicted in soil survey maps (Figure 4-2 - Figure 4-5) (NRCS 2015). The Adams series is described as very deep, somewhat excessively drained soils formed in sandy glaciofluvial deposits. Soils of the Hadley series are deep, well drained and nearly level. Hadley silt loams were formed by alluvium and are prevalent within floodplains. These soils are typified by moderate permeability and full pond capacity. Additionally, Windsor loamy sand (WmB/C/D) and Walpole fine sandy loam (Wa) commonly occur along Project shorelines (NRCS 2015).

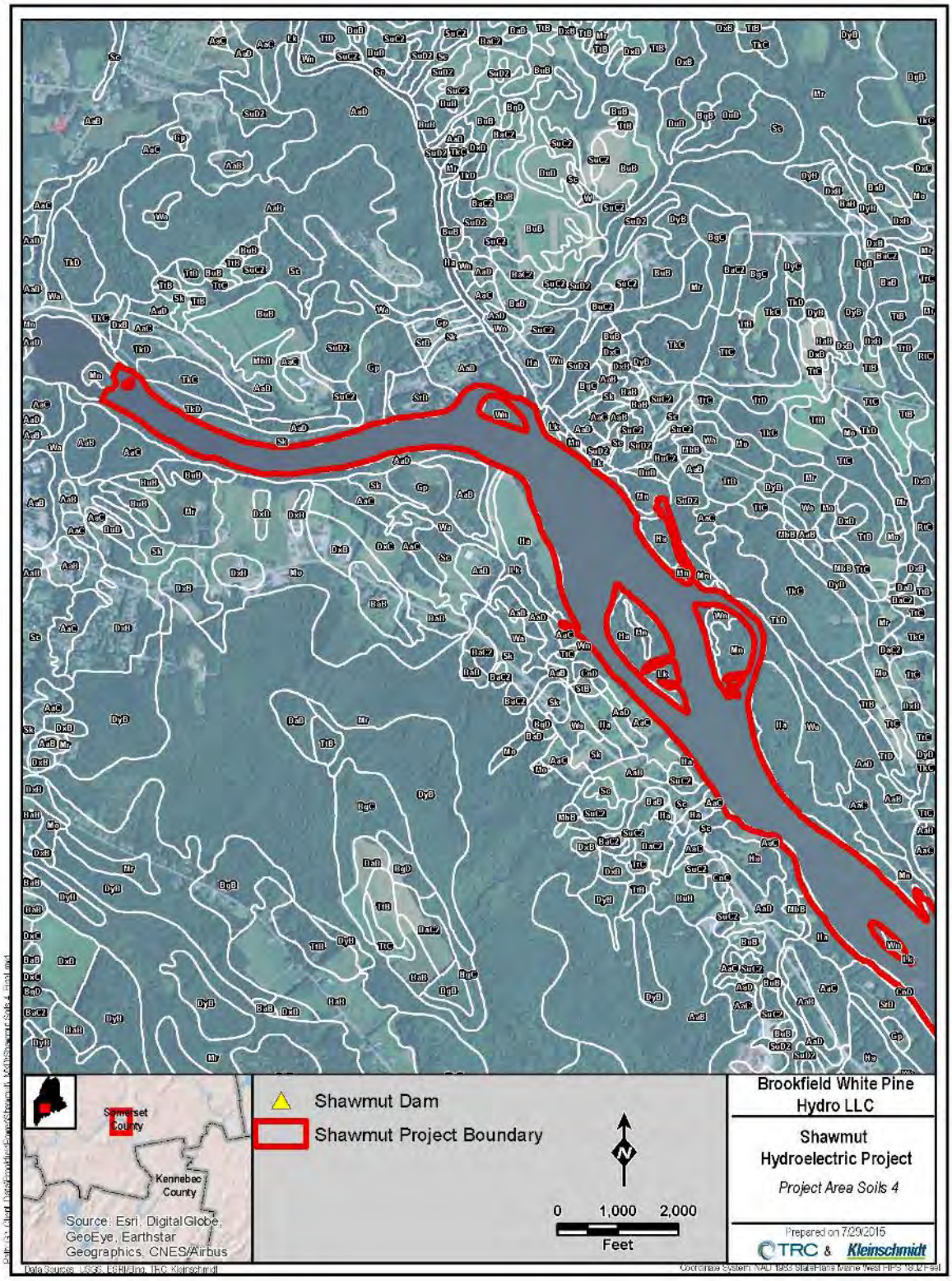


Figure 4-2 Soil Survey Map 1

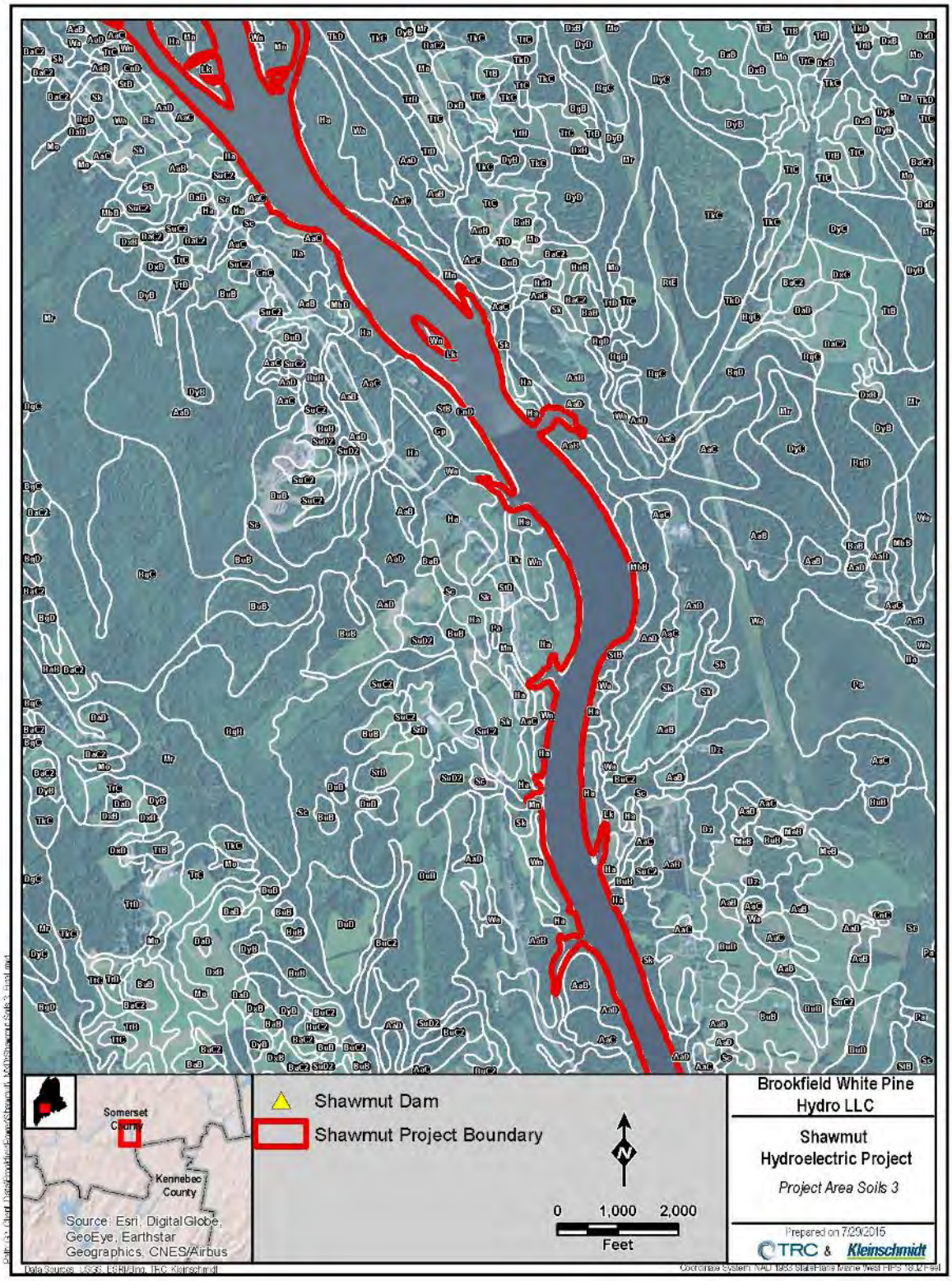


Figure 4-3 Soil Survey Map 2

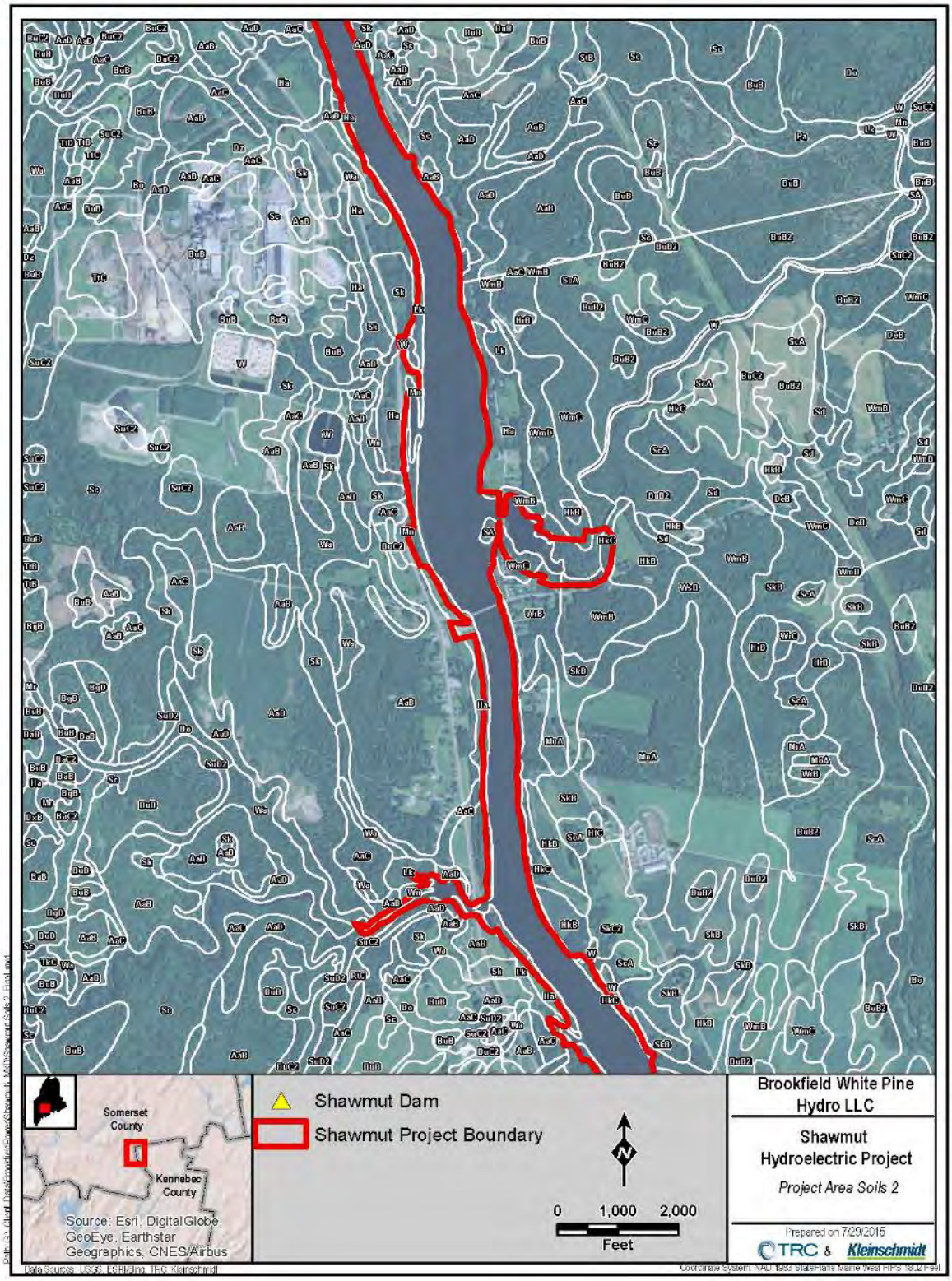


Figure 4-4 Soil Survey Map 3

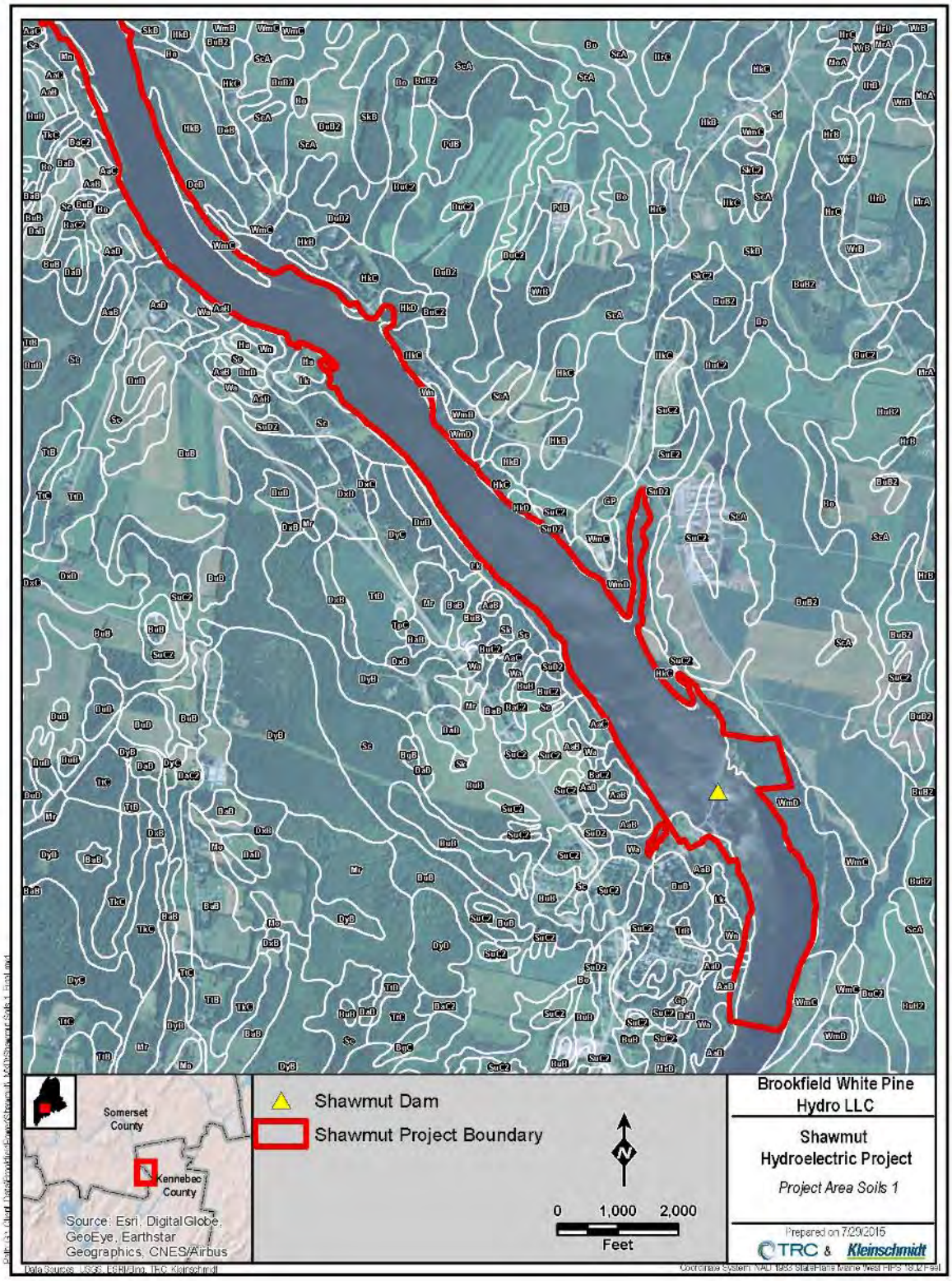


Figure 4-5 Soil Survey Map 4

Table 4-1 Soil Survey Map Unit Symbols

MAP UNIT SYMBOL	MAP UNIT NAME
AaB	AaB Adams loamy sand, 0 to 8 percent slopes
AaC	AaC Adams loamy sand, 8 to 15 percent slopes
AaD	AaD Adams loamy sand, 15 to 25 percent slopes
BaB	Bangor silt loam, 3 to 8 percent slopes
BaC2	Bangor silt loam, 8 to 15 percent slopes, eroded
Bo	Biddeford mucky peat, 0 to 3 percent slopes
BuB	Buxton silt loam, 0 to 8 percent slopes
BuC2	Buxton silt loam, 8 to 15 percent slopes, eroded
CnD	Colton gravelly sandy loam, 15 to 25% slopes
DeB	Deerfield loamy fine sand, 0 to 8 percent slopes
DxB	Dixmont silt loam, 3 to 8 percent slopes
Gp	Poorly graded gravels
Ha	Hadley silt loam
HkB	Hinckley gravelly sandy loam, 3 to 8 percent slopes
HkC	Hinckley gravelly sandy loam, 8 to 15 percent slopes
HkD	Hinckley gravelly sandy loam, 15 to 30 percent slopes
Lk	Charles silt loam, 0 to 2 percent slopes, occasionally flooded
MbB	Marlow fine sandy loam, 3 to 8 percent
Mn	Mixed alluvial land
Mo	Silt
Sc	Scantic silt loam, 0 to 3 percent slopes
Sk	Skowhegan loamy fine sand
Skb	Scio very fine sandy loam, 3 to 8 percent slopes
Stb	Sheepscot fine sandy loam, 0 to 8 percent
SuC2	Suffield silt loam, 8 to 15 percent slopes, eroded
SuD2	Suffield silt loam, 15 to 25 percent slopes, eroded
TkC	Thorndike very rocky silt loam, 3 to 15 percent slopes
TkD	Thorndike very rocky silt loam, 15 to 25 percent slopes
TpC	Thorndike-Plaisted loams, 8 to 15 percent slopes
TtB	Thorndike-Bangor silt loams, 0 to 8 percent slopes
TtC	Thorndike-Bangor silt loams, 8 to 15 percent slopes
W	Water

Source: NRCS 2015a

As part of the Phase I Historic Archaeological Survey conducted by Gray & Paper in 2019, obvious areas of erosion were documented. Gray & Pape (2019) reports that little evidence of active erosion was identified on either riverbank in the Project area. Erosion on the upstream sides of two channel islands was observed that may be influenced by water levels but it was not concluded that erosion is caused by day-to-day operation of the Project.

4.4.2 Environmental Effects

In SD1 and SD2, FERC did not identify any issues related to geology or soil resources. As noted, no significant active erosion was documented along the riverbanks. Most of the Kennebec River shoreline consists of coarse substrate (e.g., cobbles and bedrock) that limits the potential for erosion. Limited erosion on the upstream end of two of the channel islands and along some of the riverbanks suggests that periodic high river flows and ice movements are most likely to be the cause of erosion, as opposed to day-to-day project operations.

4.4.3 Unavoidable Adverse Effects

Some small amounts of shoreline erosion and sediment transport or deposition may occur within the Shawmut Project boundary or in downstream reaches as a result of the normal river flows.

4.4.4 References

Gray & Pape, 2019. Phase I Post-Contact Period Archaeological Sensitivity Assessment for the Shawmut Hydroelectric Project Relicensing. July. 2018.

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Natural Resource Conservation Service (NRCS). 2009. Soil Survey of Somerset County Area and Parts of Franklin and Oxford Counties, Maine. [Online] URL: http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/maine/somersetoxfordfranklinME2009/somerset_area.pdf.

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4.5 Water Resources and Water Quality

4.5.1 Affected Environment

4.5.1.1 Water Quantity

The Shawmut Project impoundment, extends approximately 12 miles upstream of the dam and has a surface are of approximately 1,320 acres. The drainage area for the Project is approximately 4,200 square miles. The impoundment has a volume of approximately 4,960 acre-feet, however as the Project is operated as run-of-river there is no usable storage capacity under normal operating conditions. Daily inflow to the Project impoundment varies seasonally based largely upon Kennebec River flows, the operation of upstream storage facilities and hydroelectric projects, and unregulated tributary inflow. The maximum hydraulic capacity of the Project is approximately 6,690 cfs.

The Shawmut Project is operated as run-of-river with the impoundment managed to maintain elevations within 1 foot of the normal full pool elevation of the impoundment (112.0') during normal operations, such that Project outflow generally equals inflow. As at all hydropower projects, there can be minor, temporary changes to downstream flow as a result of 1) opening/closing gates or lowering the rubber dam sections and/or flashboards to manage variable river flows as needed to maintain the impoundment level; 2) Project maintenance; and 3) the protection of environmental resources (e.g. nightly shutdowns of Units 7 and 8 for a 6-week period each fall to facilitate the downstream passage of American eel).

The calculated mean annual daily inflow for the Project is 8,582 cfs for the period January 2004 through December 2019, as prorated from USGS gage 01049265 at the Kennebec River at North Sidney Maine (USGS 2018). USGS gage 01049265 is located at Latitude 44°28'20", Longitude 69°41'02", approximately 12.9 RMs below the Shawmut Dam. The drainage area at the gage is 5,403 square miles. The data for the North Sidney gage generally needs to be prorated by a factor of 0.78 to reflect the difference in drainage areas between the gage and the Shawmut station. This gage is located below the confluences of Messalonskee Stream (ungaged) and the Sebasticook River (gaged), both of which are affected by a degree of flow modification at large upstream lakes.

Annual and monthly flow duration curves based on daily flow records for the gage are provided in Exhibit B (Appendix B-1). The drainage area at the gage is 5,403-square-miles. Table 4-2 provides a monthly summary of the USGS gage data, prorated to the Project, for the period 2004 to 2019.

Table 4-2 2004 to 2019 Minimum, Average and Maximum Daily Streamflow Data at North Sydney[1] US GEOLOGICAL GAGE NO. 01049265

MONTH	MINIMUM (CFS)	AVERAGE (CFS)	MAXIMUM (CFS)
January	3,385	7,897	33,696
February	2,980	7,137	26,754
March	2,558	9,286	43,290
April	2,590	18,668	68,406
May	2,418	11,952	59,358
June	1,888	8,199	50,232
July	1,599	5,357	32,916
August	1,381	4,509	41,964
September	1,248	4,301	32,214
October	1,154	7,370	52,182
November	1,989	9,557	45,552
December	2,714	8,830	61,620
Annual	1,154	8,582	68,406

[1] Note: Prorated drainage area (DA) factor of 0.78

Water Withdrawals and Discharges

The Skowhegan wastewater treatment plan discharges treated water to the river immediately upstream of the Project boundary. SD Warren's Somerset Operations mill (doing business as SAPPI Fine Paper) withdraws process water and discharges secondary treated waste waters to the Kennebec River at approximately the mid-point of the Shawmut impoundment.

4.5.1.2 Water Quality

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

Water Quality Standards

The State of Maine established a water quality classification system which allows the State to manage its surface waters to protect water quality. The classification system (Maine Statute 38 MRSA §464-470) establishes Maine's classification system of surface waters. The Kennebec River from the upper reach of the Shawmut impoundment to the Fairfield-Skowhegan town boundary (approximately midway along the Shawmut impoundment) is designated as a Class B water. The Kennebec River from the Fairfield-Skowhegan town boundary to the Shawmut dam is designated as a Class C water. The Kennebec River downstream of the Shawmut dam is designated as a Class B water (MDEP 2019).

Class B and C waters must be of such quality that they are suitable for the designate use of drinking water after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation; navigation; and as habitat for fish and other aquatic life. The state of Maine has established Class B and Class C water quality standards for DO, iron, and chloride, and has developed draft criteria for total phosphorous, chlorophyll-a, pH, water transparency (i.e., Secchi disk depth), and aluminum (Table 4-3).

Table 4-3 Established and Proposed Maine Water Quality Standards for Select Parameters

PARAMETER	WATER CLASSIFICATION	CRITERIA
Dissolved Oxygen[a]	Class B	≥7 mg/L or 75% saturation[b]
	Class C	>5 mg/L or 60% saturation; 30-day average of 6.5 mg/L in salmonid spawning areas
Iron[c]	Statewide	1000 µg/L or 1 mg/L
Chloride[c]	Statewide	230,000 µg/L or 230 mg/L
Aluminum[c]	Statewide	87 µg/L or 0.087 mg/L
	Class B	≤ 30 µg/L (0.030 mg/L)

PARAMETER	WATER CLASSIFICATION	CRITERIA
Total Phosphorus (impounded)[c]	Class C	≤ 33 µg/L(0.033 mg/L)
Water Column Chlorophyll-a (impounded)[d]	Class B and Class C	Spatial mean ≤ 8 µg/L (0.008 mg/L), no value > 10.0 µg/L (0.01 mg/L)
Secchi Disk Depth[d]	Class B and Class C	≥ 2.0 m
pH[d]	Class B and Class C	6.0 – 8.5

[a] Maine Legislature 1989
[b] To ensure spawning and egg incubation of indigenous fish species, the 7-day mean DO concentration may not be less than 9.5 mg/L and the 1-day minimum DO concentration may not be less than 8.0 mg/L in identified fish spawning areas from October 1st to May 14th
[c] MDEP 2012a
[d] MDEP 2012b

Existing Water Quality Conditions

MDEP Monitoring

The MDEP Biological Monitoring Program (BMP) assess the quality of rivers and streams by monitoring the composition of algal and macroinvertebrate communities. Several physical and chemical properties of the water are also monitored during deployment and retrieval of macroinvertebrate samplers and during algae sampling. The results of sampling conducted for the BMP upstream and downstream of the Shawmut dam was provided in the PAD. Table 4-4 summarizes the results of sampling conducted under the BMP.

Table 4-4 Measurements from MDEP Biological Monitoring Program in the Shawmut Project Area from 2000-2014.

Site	Date	Water Temperature (ºC)	DO (mg/L)	Specific Conductance (uS/cm)	pH	Total Phosphorus (mg/L)	DOC (mg/L)	Total Alkalinity (mg/L)
Upstream								
S-461	5/23/2000	19.4	-	19.3	-	-	-	-
S-24	9/4/2002	23.2	7.8	60	7.66	-	-	-
S-24	9/13/2004	19.3	8.6	42	-	-	-	-
S-784	8/13/2004	23.3	7.6	86.4	-	-	-	-

Site	Date	Water Temperature (°C)	DO (mg/L)	Specific Conductance (uS/cm)	pH	Total Phosphorus (mg/L)	DOC (mg/L)	Total Alkalinity (mg/L)
S-195	7/20/2004	21	7.7	-	-	-	-	-
S-195	9/13/2004	19.9	8.6	59	-	-	-	-
Downstream								
S-196	7/17/2007	22.3	9	74	6.87	-	-	-
S-196	8/14/2007	21.7	7.8	47	6.77	0.033	6	
S-196	7/16/2012	27.8	9.1	78	7.41	-	-	-
S-196	7/20/2012	24.3	8	75	7.26	0.021		15
S-196	8/14/2012	24.7	7.4	73	7.2	0.027	5.1	
S-196	6/30/2014		9.1	-	6.8	0.016	-	11
S-196	7/14/2014	21	8.7	55	7.11	-	-	-
S-196	8/11/2014	22.5	8.1	58	6.61	0.012	4.5	-

Source: MDEP 2015

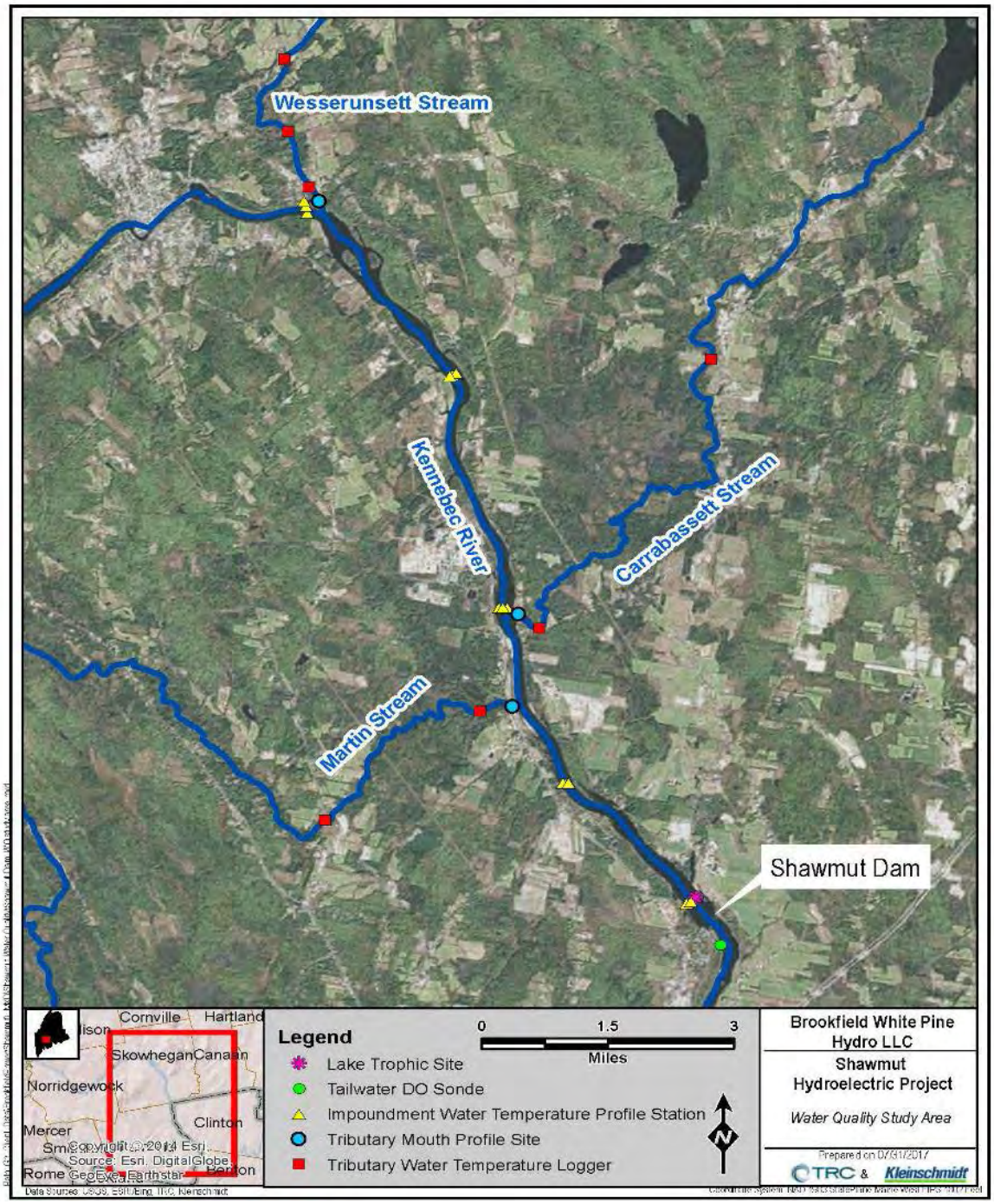
2016 Water Quality Monitoring Study

Pursuant to the RSP, White Pine Hydro conducted lake trophic, riverine water quality, and benthic macroinvertebrate sampling from June to October 2016 to collect baseline water quality information and to assess attainment of water quality standards at the Shawmut Project. White Pine Hydro completed the lake trophic and riverine water quality monitoring in accordance with MDEP's Sampling Protocol for Hydropower Studies (MDEP 2014) from June to October 2016.

The objectives of the water quality study were to (1) update baseline water quality information, (2) evaluate the trophic state of the impoundment, (3) document water temperature and DO upstream and downstream of the Shawmut dam, and (4) obtain information on baseline water temperatures throughout the Shawmut impoundment and in three tributaries to the impoundment (Martin Stream, Carrabassett Stream, and Wesserunsett Stream).

Figure 4-6 provides the sampling locations for the lake trophic state, riverine water quality and temperature sampling.

Environmental conditions were suitable for monitoring in accordance with MDEP protocols (e.g., low flow, high temperature conditions). Measurements of chlorophyll-a, total phosphorus, and Secchi disk transparency suggested that the impoundment is mesotrophic (i.e., moderately productive). The total phosphorus, chlorophyll-a, and Secchi disk transparency satisfied state standards, with the exception of one chlorophyll-a sample collected on September 22, 2016. At the lake trophic sample site, DO exceeded the state standard of 5 mg/L or 60 percent saturation for Class C waters except for two measurements at 7 meters and 8 meters on June 30, 2016 (Brookfield 2017). Table 4-5 shows epilimnetic core sample results from the Shawmut impoundment.



Source: White Pine Hydro 2017

Figure 4-6 Water Quality Study Area

Table 4-5 Epilimnetic Core Sample Results for the Shawmut Impoundment

Sample Date	Sample Time	Epilimnetic Core Sample Depth (m)	Total Phosphorous (mg/L)	Total Alkalinity (mg/L)	Color (Pcu)	pH	Secchi Disk (m)
6/2/2016	16:30	8	0.019	15	29	6.6	3.5
6/21/2016	15:20	6	0.018	18	36	7	2.6
7/14/2016	14:30	8	0.012	14	26	6.4	3.9
7/27/2014	15:30	6	0.015	16	31	6.8	3.9
8/9/2016	14:20	8	0.021	21	36	6.8	3.8
8/25/2016	13:00	8	0.015	17	26	6.5	3.4
9/8/2016	15:30	8	0.015	21	28	6.7	3.9
9/22/2016	14:45	9	0.016	17	31	6.5	4.3
10/5/2016	14:30	8	0.018	20	32	6.7	4.4
10/18/2016	15:30	8	0.011	13	18	6.7	4.1
		Average	0.016	17.2	29.3	6.7	3.8
		Median	0.016	17	30	6.7	3.9
		Minimum	0.011	13	18	6.4	2.6
		Maximum	0.021	21	16	7	4.4

Source: Brookfield 2017

Downstream of Shawmut dam, the DO concentration exceeded the state standard of 7 mg/L for Class B waters during the majority of the low-flow, high temperature period (only 1.2 percent of hourly measurements were below the standard overnight on August 9-11, 2016). The DO percent saturation was above the state standard (75 percent) for Class B waters during the entire monitoring period. While DO was not continuously monitored from October 1 to May 14, 2016, the DO concentration in the impoundment was 8.8 to 9.1 mg/L on October 5, 2016 and 9.5 to 9.7 mg/L on October 18, 2016; thus, it is expected that the DO concentration through May will exceed the standards of the 7-day mean being above 9.5 mg/L and the 1-day minimum exceeding 8.0 mg/L in identified fish spawning areas (Brookfield 2017). Table 4-6 provides monthly water temperature, DO concentration and DO percent saturation statistics from hourly measurements downstream of Shawmut dam.

Table 4-6 Monthly Water Temperature, DO Concentration, and DO Percent Saturation Statistics from Hourly Measurements Downstream of the Shawmut Dam

	JUNE 2016	JULY 2016	AUGUST 2016
	Water Temperature (ºC)		
Average	18.9	23.0	24.2
Median	18.2	22.9	24.1
Minimum	15.8	20.7	22.9
Maximum	23.6	25.8	26.1
	Water Temperature (ºF)		
Average	66.0	73.3	75.5
Median	64.7	73.2	75.5
Minimum	60.4	69.3	73.2
Maximum	74.4	78.5	79.1
	DO (mg/L)		
Average	8.9	8.0	7.6
Median	9.0	8.0	7.6
Minimum	7.7	7.5	6.8
Maximum	9.6	8.9	8.5
	DO (%)		
Average	95.8	93.8	90.5
Median	95.7	93.2	90.2
Minimum	86.4	88.0	81.3
Maximum	110.3	104.4	101.6

Source Brookfield 2017

Over the 5-month monitoring period, the water temperature at the five transects (15 separate stations) located throughout the approximately 12-mile-long impoundment varied by approximately 1ºC to 3ºC, excluding water at the bottom of the water column (7 or 8 meters) at Stations 11, 12, and 15. This suggests that the water temperature throughout the impoundment is relatively uniform (Brookfield 2017). The impoundment temperature results are shown in Table 4-7.

Table 4-7 Minimum and Maximum Water Temperature at 1 M Intervals June to October 2016*.

DEPTH (M)		SURFACE**	1	2	3	4	5	6	7	8	9
	Min	20.5	20.4	20.4	20.6	20.4	20	19.4	17.7	16.8	18.1
21-Jun	Max	23.1	22	21.8	21.2	20.9	20.8	20	19.3	18.9	18.5
	Min	22.5	22.2	22	21.9	21.7	21.7	21.6	19	16.8	17
30-Jun	Max	25.3	23.3	23	22.9	22.7	22.5	22.2	22.2	22.1	17
	Min	22.1	22	21.7	20.7	20.8	20.6	20.6	20.6	20.6	-
14-Jul	Max	23.1	23	22.7	22.1	22	22	21	20.9	20.9	-
	Min	23.9	23.8	23.7	23.6	23.6	23.6	23.9	23.3	22.2	-
27-Jul	Max	28.4	25.7	24.6	24.4	24.3	24.2	24.1	23.8	22.6	-
	Min	24	24	23.8	24	23.9	23.9	24.2	24.2	23.8	21.4
9-Aug	Max	26	25.4	25.1	24.7	24.4	24.3	24.3	24.3	24.1	21.4
	Min	22.6	22.5	22.5	22.8	22.8	22.7	23.1	23.1	23.1	23.2
23-Aug	Max	25.2	24.5	24	23.8	23.5	23.3	23.3	23.2	23.2	23.2
	Min	22.2	22.2	22.2	22.5	22.4	22.4	22.3	22.2	22.1	22.5
8-Sep	Max	23.9	23.9	23.8	23	22.8	22.8	22.8	22.7	22.6	22.6
	Min	16.5	16.3	16.5	16.5	16.4	16.4	16.4	16.6	16.6	16.9
22-Sep	Max	18.3	17.8	17.1	17	17	17	16.9	16.9	16.9	16.9
	Min	16.5	16.3	16.5	16.5	16.4	16.4	16.4	16.6	16.6	16.9
5-Oct	Max	18.3	17.8	17.1	17	17	17	16.9	16.9	16.9	16.9
	Min	13.5	13.5	13.7	13.7	13.8	13.7	13.7	13.7	13.7	13.7
18-Oct	Max	14.1	14.1	14.1	14.1	14.2	14.1	13.9	13.8	13.8	13.8

*Each profile sample day for all 15 stations were combined from June through October 2016.
**sample from 3 inches below surface.
Source Brookfield 2017

Monitoring at 15 stations throughout the impoundment demonstrates that water temperature exhibited the same general seasonal pattern of increasing water temperatures from early June through the middle to end of July, reaching peak values in late July and remaining at those

temperatures through early to mid-August, followed by decreasing temperatures through October. The average water throughout the water column for the monitoring period ranged from 13.9ºC on October 18, 2016 to 24.5ºC on July 27, 2016 (Table 4-8).

Overall, results of the 2016 water quality monitoring demonstrates that the Project impoundment meets Class B and Class C water quality standards, and that the Project tailwater meets Class B water quality standards.[7]

Table 4-8 Average Water Temperature (ºC) at 1 Meter Intervals on Each Profile Sample Day for all 15 Stations

Depth (m)	June 21	June 30	July 14	July 27	Aug 9	Aug 23	Sept 8	Sept 22	Oct 5	Oct 18
surface*	22.0	23.8	22.6	26.3	25.0	24.0	23.1	21.7	17.6	13.8
1	21.4	22.8	22.5	24.8	24.7	23.7	23.0	21.3	17.0	13.9
2	21.1	22.5	22.3	24.2	24.4	23.4	22.9	21.1	16.8	13.9
3	20.8	22.4	21.7	24.1	24.3	23.3	22.7	21.0	16.8	13.9
4	20.6	22.2	21.3	24.0	24.2	23.2	22.6	20.9	16.7	14.0
5	20.4	22.1	21.1	24.0	24.2	23.2	22.5	20.8	16.7	13.9
6	19.6	22.0	20.9	24.0	24.3	23.2	22.6	20.8	16.7	13.8
7	18.7	21.1	20.8	23.5	24.3	23.2	22.5	20.8	16.8	13.8
8	18.2	20.3	20.8	22.5	23.9	23.2	22.4	20.7	16.8	13.8
9	18.3	17.0	-	-	21.4	23.2	22.6	20.6	16.9	13.8
Average	**20.8**	**22.5**	**21.9**	**24.5**	**24.4**	**23.4**	**22.8**	**21.1**	**16.8**	**13.9**

*sample from 3 inches below surface.

2016 Benthic Macroinvertebrate Study

The purpose of the benthic macroinvertebrate study was to gather site-specific information about the macroinvertebrate community present within the Project area downstream of the dam and to determine whether current instream flow releases and project operations are affecting attainment of classification standards for habitat and aquatic life.

White Pine Hydro conducted macroinvertebrate community sampling downstream of the Project in accordance with the RSP and MDEP protocols from August to September 2016. Sampling was conducted in two locations located within representative benthic macroinvertebrate habitat

[7] In a letter dated December 3, 2018 the Maine Department of Environmental Protection concluded that the Shawmut Project impoundment and tailwaters meet applicable water quality standards.

approximately 1,000 feet downstream of the Shawmut dam. Sampling locations are shown in Figure 4-7.

The results of the benthic macroinvertebrate study were presented in the ISR and are briefly summarized here. Macroinvertebrate samples collected at both sample locations yielded adequate number of sensitive taxa indicating that under the current operational regime there are no detrimental impacts to the macroinvertebrate community. MDEP provided Classification Attainment Reports for both sites. The final determinations indicated that the macroinvertebrate community at Site 1 met Class A water quality standards and that Site 2 met Class B water quality standards (Brookfield 2017). The Kennebec River downstream of the Shawmut dam is designated as a Class B water. Therefore, the macroinvertebrate community sampled met the applicable Class B aquatic life standards.[8]

[8] In a letter dated December 3, 2018 the Maine Department of Environmental Protection concluded that the benthic macroinvertebrate community in the Kennebec River below the Shawmut dam meets Class B aquatic life standards under current and proposed minimum flow conditions.

Figure 4-7 2016 Benthic Macroinvertebrate Sampling Locations

4.5.2 Environmental Effects

The Licensee completed water quality sampling from June to October 2016 (low flow, high temperature conditions) throughout the Shawmut Project area in accordance with the approved study plan and MDEP protocols to determine attainment of water quality standards for Class B (upstream impoundment and tailrace) and Class C (lower impoundment) waters. In the impoundment, total phosphorus, chlorophyll-a, and Secchi disk transparency were within state standards, with the exception of one chlorophyll-a sample collected on September 22, 2016. At the lake trophic sample site, DO exceeded the state standard of 5 mg/L or 60 percent saturation for Class C waters excluding two measurements at 7 and 8 meters on June 30, 2016. Downstream of Shawmut dam, the DO concentration exceeded the state standard of 7 mg/L for Class B waters during the majority of the low-flow, high temperature period. The DO percent saturation was above the state standard (75 percent) for Class B waters during the entire monitoring period.

After reviewing the water quality study results the MDEP concluded that the Project impoundment and tailwaters meet applicable water quality standards.

The Licensee completed macroinvertebrate sampling in August and September of 2016. Analysis of the sampling results, including analysis using MDEP's linear discriminate model. After review of the study results, the MDEP concluded that Class B aquatic life standards were met.

The Licensee's site-specific studies have demonstrated that operation of the Shawmut Project does not adversely affect water resources; therefore, the proposed relicensing and continued operation and maintenance of the Shawmut Project will not adversely affect water quality, quantity, or the designated uses of the waterway.

4.5.3 Proposed Environmental Measures

The Licensee has demonstrated that operation of the Shawmut Project does not adversely affect water resources and meets all water quality standards. Therefore, the Licensee is proposing no PME measures specific to water quality other than continuing run-of-river operation. However, the Licensee is proposing to implement an Operations Monitoring Plan describing how the Licensee plans to monitor and report on the provision to maintain the impoundment level within

1 foot of normal pond elevation of 112.0' during normal operations. A draft of the Operations Monitoring Plan is provided in Appendix E-6.

4.5.4 Unavoidable Adverse Effects

The Licensee may manage water levels in the Shawmut impoundment or downstream flows from time to time to perform routine maintenance or repairs. The Draft Operations Monitoring Plan includes protocols for agency consultation and scheduling and performing routine or emergency modifications of operations to minimize the effects of these maintenance activities on water resources.

4.5.5 References

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4.6 Fish And Aquatic Resources

4.6.1 Affected Environment

4.6.1.1 Fishery Resources

The Kennebec River supports approximately 50 species of freshwater and diadromous fish species, including cold and warm water angling opportunities for wild and stocked brook trout, landlocked salmon, brown trout, rainbow trout, and smallmouth bass.

Resident Species

The Kennebec River in the vicinity of the Shawmut Project is managed by MDIFW as both a cool and cold water fishery. Common resident species include smallmouth bass, largemouth bass, sunfish and perch. In 2002, the Midwest Biodiversity Institute (MBI) collected 1,506 fish representing 17 species from the three sampling stations near the Shawmut Project as part of a survey of Maine's large river systems (Yoder et al. 2006) (Table 4-9). Sampling areas near the Shawmut Project included:

- The upper Shawmut impoundment (RM 32.1);
- Upstream of Shawmut dam near the SAPPI paper mill (RM 25.1); and,
- Downstream of Shawmut dam (riverine habitat at RM 23.9).[9]

Species and relative abundance of fish from the three sampling sites are shown in Tables 4-10 through 4-12. As shown, the fish assemblage was dominated by resident species including smallmouth bass (20.7 percent), largemouth bass (15.3 percent), redbreast sunfish (12.4 percent), and yellow perch (10 percent). Coldwater salmonids comprised a small percentage of the fish community during the 2002 survey; MBI collected 8 brown trout and 1 rainbow trout downstream of the Shawmut dam. Migratory fish (sea-run alewives and American eels) were collected at all three locations (Yoder et al. 2006).

[9] Distance is relative to head of tide in Augusta, Maine; the Shawmut dam is located at RM 24.7.

Table 4-9 Total Number of Fish and Species Collected within the Shawmut Project Area in 2002.

Species	No. Collected	Relative Percent of Catch
Smallmouth bass	311	20.7%
Largemouth bass	231	15.3%
Redbreast sunfish	186	12.4%
Yellow perch	150	10.0%
Alewife	147	9.8%
Fallfish	120	8.0%
American eel	86	5.7%
White sucker	69	4.6%
Golden shiner	60	4.0%
Pumpkinseed	50	3.3%
Eastern banded killifish	33	2.2%
Black crappie	29	1.9%
White perch	15	1.0%
Common shiner	9	0.6%
Brown trout	8	0.5%
Chain pickerel	1	0.1%
Rainbow trout	1	0.1%
Total	**1,506**	**100.0%**

Source: Yoder et al. 2006.

Table 4-10 Species and Relative Abundance of Fish Collected Downstream of Shawmut Dam (RM 23.9) in 2002.

Species	No. Collected	Relative Percent of Catch
Smallmouth bass	121	33.6%
Fallfish	67	18.6%
American eel	60	16.7%
White sucker	42	11.7%
Redbreast sunfish	16	4.4%
Golden shiner	11	3.1%
Yellow perch	11	3.1%
Largemouth bass	10	2.8%
Brown trout	8	2.2%
Alewife	6	1.7%
Common shiner	4	1.1%
Pumpkinseed	2	0.6%
Rainbow trout	1	0.3%
Eastern banded killifish	1	0.3%

Species	No. Collected	Relative Percent of Catch
Total	**360**	**100.0%**

Source: Yoder et al. 2006.

Table 4-11 Species and Relative Abundance of Fish Collected Upstream of Shawmut Dam (RM 25.1) in 2002.

Species	No. Collected	Relative Percent of Catch
Largemouth bass	153	23.7%
Redbreast sunfish	129	20.0%
Smallmouth bass	87	13.5%
Yellow perch	85	13.2%
Alewife	82	12.7%
Pumpkinseed	36	5.6%
Black crappie	16	2.5%
Eastern banded killifish	15	2.3%
White sucker	14	2.2%
American eel	9	1.4%
Fallfish	8	1.2%
Golden shiner	5	0.8%
Common shiner	4	0.6%
White perch	3	0.5%
Total	**646**	**100.0%**

Source: Yoder et al. 2006.

Table 4-12 Species and Relative Abundance of Fish Collected from the Upper Shawmut Impoundment (RM 32.1) in 2002.

Species	No. Collected	Relative Percent of Catch
Smallmouth bass	103	20.6%
Largemouth bass	68	13.6%
Alewife	59	11.8%
Yellow perch	54	10.8%

Species	No. Collected	Relative Percent of Catch
Fallfish	45	9.0%
Golden shiner	44	8.8%
Redbreast sunfish	41	8.2%
American eel	17	3.4%
Eastern banded killifish	17	3.4%
White sucker	13	2.6%
Black crappie	13	2.6%
White perch	12	2.4%
Pumpkinseed	12	2.4%
Chain pickerel	1	0.2%
Common shiner	1	0.2%
Total	**500**	**100.0%**

Source: Yoder et al. 2006.

2019 Fish Assemblage Study

In accordance with the RSP, in 2019 White Pine Hydro conducted a baseline fish assemblage study to characterize the occurrence, distribution, and relative abundance of fish species within the Shawmut Project area. The 2019 survey involved two primary sampling locations; the Shawmut impoundment and the Shawmut tailwater downstream to a point approximately 4,000 feet below the dam.

The Shawmut impoundment fish assemblage was surveyed during the period September 16-18, 2019. Effort consisted of a total of 15 300-meter boat electrofish transects placed using a stratified-random design such that the upper, mid and lower third of the impounded area received equal sampling effort. A total of 798 fish representing thirteen species were collected from the fifteen sampling locations in the Shawmut impoundment. The fish assemblage was dominated largely by yellow perch (51.4 percent), largemouth bass (12.3 percent), golden shiner (10.4 percent), and alewife (5 percent) (Table 4-13). Greater than half the total catch was collected from transects located in the lower third of the Shawmut Impoundment. Catch rates were highest for yellow perch, alewife, and largemouth bass during sampling in the uppermost section, with

yellow perch, largemouth bass and pumpkinseed dominating the middle impoundment section, and yellow perch, golden shiner and black crappie in the lowermost section.

Table 4-13 Total catch (N) and percent composition (Pct.) for Shawmut impoundment boat electrofish transects sampled during September 16-18, 2019.

Common Name	Lower		Middle		Upper		Total	
	N	Pct.	N	Pct.	N	Pct.	N	Pct.
Alewife	6	1.5%	2	1.0%	32	16.7%	40	5.0%
American Eel	1	0.2%	3	1.5%	5	2.6%	9	1.1%
Banded Killifish					1	0.5%	1	0.1%
Black Crappie	39	9.5%		0.0%	2	1.0%	41	5.1%
Chain Pickerel	12	2.9%	5	2.6%	3	1.6%	20	2.5%
Fallfish					24	12.5%	24	3.0%
Golden Shiner	66	16.1%	8	4.1%	9	4.7%	83	10.4%
Largemouth Bass	26	6.3%	44	22.4%	28	14.6%	98	12.3%
Lepomis spp.	1	0.2%			3	1.6%	4	0.5%
Pumpkinseed	11	2.7%	13	6.6%	3	1.6%	27	3.4%
Redbreast Sunfish	5	1.2%	2	1.0%	1	0.5%	8	1.0%
Smallmouth Bass	10	2.4%	8	4.1%	5	2.6%	23	2.9%
White Sucker	3	0.7%	6	3.1%	1	0.5%	10	1.3%
Yellow Perch	230	56.1%	105	53.6%	75	39.1%	410	51.4%
Total	**410**		**196**		**192**		**798**	

Fish community data was collected from three 300-meter electrofish transects placed within the 4,000-foot section of the Kennebec River located immediately downstream of Shawmut dam during a single day sampling event on October 11, 2019. A total of 51 fish representing seven fish species were collected from three sampling locations within the downstream reach. The most abundant species in the fish assemblage were fallfish (54.9 percent), smallmouth bass (13.7 percent), American eel (9.8 percent) and white sucker (9.8 percent) (Table 4-14). Fallfish had the highest observed catch per unit effort (CPUE) for any species downstream of the dam. More than 65 percent of the total catch was collected from a transect located near the downstream end of the reach and parallel to the western shoreline.

Table 4-14 Total catch (N) and percent composition (Pct.) for Shawmut tailwater boat electrofish transects sampled during October 2019.

Common Name	Total	
	N	PCT.
Alewife	2	3.9%
American Eel	5	9.8%
Fallfish	28	54.9%
Redbreast Sunfish	2	3.9%
Smallmouth Bass	7	13.7%
White Sucker	5	9.8%
Yellow Perch	2	3.9%
Total	**51**	

MDIFW Trout Stocking

Brown trout are stocked above and below the Shawmut dam. MDIFW typically stocks between 1,000 and 2,000 spring-yearling brown trout; the Kennebec Valley Chapter of Trout Unlimited also stocked 1,000 to 2,000 rainbow trout between 1992 and 2007 (Trout Unlimited 2007). MDIFW also stocked brown trout fry, fall-yearlings, and adults infrequently below the Shawmut Project over this same period (MDIFW 2020). Although not stocked on an annual basis, rainbow trout and landlocked salmon may inhabit the Shawmut Project area periodically. MDIFW maintains a trout fishery in Wesserunsett Stream and Wesserunsett Lake. MDIFW stocks brook and brown trout regularly during the fall into Wesserunsett Lake and Wesserunsett Stream (MDIFW 2020). MDIFW also stocks spring yearling brook trout regularly in Carrabassett Stream (MDIFW 2020).

Table 4-15 Brown Trout and Rainbow Trout Stocking History Upstream of the Shawmut Project (Fairfield, Maine) (1983 – 2019).

Year	Brown trout		Rainbow trout
	Spring-Yearling	Other	Spring-Yearling
1983	2,000	-	0
1984	2,000	-	0
1985	2,000	-	0
1986	2,000	50,000 (FRY)	0
1987	2,000	-	0
1988	2,000	-	0

Year	Brown trout		Rainbow trout
	Spring-Yearling	Other	Spring-Yearling
1989	2,000	-	0
1990	2,000	-	0
1991	2,000	48,650 (FRY)	0
1992	2,000	-	1,000
1993	2,000	-	0
1994	2,000	-	1,000
1995	2,000	-	2,000
1996	1,756	-	2,000
1997	2,000	-	2,000
1998	2,000	-	2,000
1999	2,000	-	2,000
2000	2,000	-	2,000
2001	2,000	-	2,000
2002	2,000	-	2,000
2003	2,000	-	2,000
2004	2,000	-	2,000
2005	2,000	-	2,000
2006	2,000	1,000 (FRY), 10 (AD)	2,000
2007	1,000	-	1,000
2008	2,000	-	0
2009	2,000	-	0
2010	2,000	-	0
2011	2,000	-	0
2012	2,000	-	0
2013	2,000	-	0
2014	2,000	-	0
2015	2,000	-	0
2016	2,000	-	0
2017	2,000	-	0
2018	2,000	-	0
2019	2,000	-	0

Source: MDIFW 2020

Table 4-16 MDIFW Trout Stocking Records for Wesserunsett Lake and Wesserunsett Stream, 2010-2019.

Year	Location	Species	Stock Season	No. Released
2010	Wesserunsett Lake	Brook Trout	Fall	2,208
2010	Wesserunsett Lake	Brown Trout	Fall	1,950
2011	Wesserunsett Stream	Brown Trout	Spring	500
2011	Wesserunsett Lake	Brook Trout	Fall	4,443
2011	Wesserunsett Lake	Brown Trout	Fall	1,308
2012	Wesserunsett Stream	Brown Trout	Spring	500
2012	Wesserunsett Lake	Brook Trout	Fall	2,242
2012	Wesserunsett Lake	Brown Trout	Fall	2,230
2013	Wesserunsett Stream	Brown Trout	Spring	500
2013	Wesserunsett Lake	Brook Trout	Fall	3,133
2013	Wesserunsett Lake	Brown Trout	Fall	2,280
2014	Wesserunsett Stream	Brown Trout	Spring	500
2014	Wesserunsett Lake	Brook Trout	Fall	2,800
2014	Wesserunsett Lake	Brown Trout	Fall	2,280
2015	Wesserunsett Stream	Brown Trout	Spring	500
2015	Wesserunsett Lake	Brown Trout	Fall	2800
2015	Wessernunsett lake	Brown Trout	Fall	2280
2016	Wesserunsett Stream	Brown Trout	Spring	500
2016	Wesserunsett Lake	Brook Trout	Spring	250
2016	Wesserunsett Lake	Brook Trout	Fall	2748
2016	Wesserunsett Lake	Brown Trout	Spring	2200
2016	Wesserunsett Lake	Brown Trout	Fall	70
2017	Wesserunsett Stream	Brook Trout	Spring	500
2017	Wesserunsett Lake	Brook Trout	Spring	1000
2017	Wesserunsett Lake	Brook Trout	Fall	1241
2017	Wesserunsett Lake	Brown Trout	Spring	2200
2017	Wesserunsett Lake	Brown Trout	Fall	50
2018	Wesserunsett Stream	Brown Trout	Spring	500
2018	Wesserunsett Lake	Brook Trout	Fall	2200
2018	Wesserunsett Lake	Brown Trout	Fall	2270
2019	Wesserunsett Stream	Brown Trout	Spring	700
2019	Wesserunsett Lake	Brook Trout	Fall	2069
2019	Wesserunsett Lake	Brown Trout	Fall	2200

Source: MDIFW 2020

Table 4-17 MDIFW Trout Stocking Records for Carrabassett Stream, 2006-2019.

Year	Location	Species	Stock Season	No. Released
2006	Carrabassett Stream	Brook Trout	Spring	300
2007	Carrabassett Stream	Brown Trout	Spring	300
2008	Carrabassett Stream	Brown Trout	Spring	300
2009	Carrabassett Stream	Brook Trout	Spring	300
2010	Carrabassett Stream	Brown Trout	Spring	300
2011	Carrabassett Stream	Brown Trout	Spring	300
2012	Carrabassett Stream	Brook Trout	Spring	300
2013	Carrabassett Stream	Brown Trout	Spring	550
2014	Carrabassett Stream	Brown Trout	Spring	300
2015	Carrabassett Stream	Brook Trout	Spring	700
2016	Carrabassett Stream	Brook Trout	Spring	300
2017	Carrabassett Stream	Brook Trout	Spring	300
2018	Carrabassett Stream	Brook Trout	Spring	500
2019	Carrabassett Stream	Brook Trout	Spring	300

Source: MDIFW 2020

2017 Brown Trout Telemetry Study

In accordance with the RSP, White Pine Hydro completed a radio telemetry study in 2017 to provide information on the movements of stocked brown trout in the Shawmut Project area. The specific objectives of the study were to:

- Collect data to characterize brown trout population dynamics (if sufficient data are not collected during the fish assemblage study);
- Examine movements and behaviors of newly-stocked brown trout;
- Examine movements and behaviors of older-age brown trout;
- Examine effects of operations on the movement and behaviors of stocked brown trout;
- Provide fisheries managers with information related to the drop down of brown trout stocked in the Skowhegan section of the Kennebec River; and
- Aid fishery managers in determining the cause of the decline in the brown trout fishery in the Shawmut tailwater.

Fifty-five yearling brown trout were radio-tagged and released into the Kennebec River at the Wesserunsett Stream boat launch, located at the upper end of the Shawmut impoundment. MDIFW tagged 50 hatchery-reared individuals at the MDIFW rearing station in Palermo, Maine

and collected 5 adult hold-overs from the Kennebec River near Wesserunsett Stream via electrofishing and angling. Movements by radio-tagged trout were documented at six stationary receivers in the Kennebec River and through manual tracking events. Researchers classified movement patterns for the tagged brown trout into one of four general categories:

- **Upper Impoundment**: individuals which upon release were detected during one or more manual tracking events. Locations were primarily from the reach between the Wesserunsett Stream boat launch and the Weston tailrace (upstream). These individuals were never detected by any of the six stationary receivers at Shawmut dam or downstream;
- **Downstream Shawmut**: individuals which upon release passed downstream of the Shawmut dam; subsequent detections were confined to the reach between Shawmut dam and the Fairfield Pump Station (3.7 RM downstream);
- **Lower Kennebec**: individuals which upon release passed downstream of Shawmut dam and the Hydro Kennebec Project dam in Winslow. These individuals were further divided into those whose subsequent detections were limited to the reach between the Hydro Kennebec Project and Lockwood Project and those which passed downstream of the Lockwood Project in Waterville; and,
- **No Detection or Undefined**: individuals which upon release were not detected at any of the six stationary monitoring locations or during any of the manual tracking events. Included in this category are any individuals whose pattern of stationary and manual detections does not fit one of the previous three categories.

In summary, researchers documented that:

- Forty percent of hatchery-reared trout (20 of 50 individuals) and most of the in-river trout (4 of 5 individuals; 80 percent) were classified as “upper impoundment” individuals.
- Five individuals (4 hatchery-reared and 1 in-river trout) passed downstream of Shawmut Dam and were subsequently limited to receiver detections between the Shawmut tailrace and the Fairfield pump station.
- Fifty-two percent of the hatchery-reared trout (26 of 50 individuals) moved downstream past the Shawmut dam soon after release. Most of these individuals (22 of the 26) continued downstream past the Hydro Kennebec Project. Of that total, 86 percent (19 of the 22) passed the Lockwood Project prior to their detection 1.75 RMs below the Lockwood Project.
- Three hatchery-reared trout went undetected during the 6-month monitoring period. These individuals may have been predated, harvested, or moved into an area outside of stationary and manual tracking efforts.

Radio-tagged, hatchery-reared brown trout were released during river flow conditions of approximately 7,500 cfs and a water temperature of approximately 13ºC. River flow rose sharply on May 26, 2017 peaking at just over 22,000 cfs at midnight on May 27, 2017. Of the 26 radio-tagged, hatchery-reared individuals that moved downstream of Shawmut, 81 percent of those fish (21 of the 26) did so during the flow pulse occurring immediately following release. This group included 18 of the 19 individuals that also passed downstream of Hydro Kennebec and Lockwood. The median duration of time following initial detection immediately upstream of Shawmut until detection at Station 6 downstream of Lockwood for that subset of individuals was 12 hours. Radio-tagged, hatchery-reared trout passing downstream of the three projects spent a limited amount of time in the Shawmut tailrace following downstream passage at that location (median duration = 0.3 hours).

Five hatchery-reared individuals passed downstream of the Shawmut Project outside of the high-flow period immediately following release. Flows during those passage events ranged between 3,800 cfs and 6,900 cfs. Three of the five individuals were not detected downstream of Station 4, indicating they were resident in the section of river between Shawmut and Hydro Kennebec but not within the Shawmut tailrace. Time spent in the detection range of Station 3 (i.e., the area immediately downstream of the Shawmut spillway) was limited to less than 24 hours for these three fish following passage at the Shawmut dam.

Only two radio-tagged brown trout were detected in the tailrace area for an extended period: a hatchery-reared trout that was present from late-August through mid-September and again from late-September through mid-October and an older-age trout which passed downstream of Shawmut during late October and was present in the tailrace from mid-November through the end of the monitoring period. Kennebec River flows at the time of its downstream movement were over 19,000 cfs, indicating that it may have spilled.

Most hatchery-reared trout that did not pass downstream of the Shawmut Project (20 of 25 individuals) were found in the Kennebec River between the Weston tailrace and the release location at the Wesserunsett Stream boat launch. Although observations were limited, most in-river trout (4 of 5) were limited to the Big Eddy area where they were originally captured. Based on the limited downstream movements it appears that once established in that reach, out-

movement of holdover brown trout to downstream reaches may be limited to periods of uncommon conditions (i.e., high flow events).

Movement data for radio-tagged hatchery-reared and in-river brown trout suggests that the Shawmut tailwater does not provide a significant fishery for brown trout stocked upstream of the impoundment. Individuals are more likely to remain in the Big Eddy reach near the upper end of the Shawmut Project area or move downstream of the Shawmut, Hydro Kennebec, and Lockwood projects during high flow events; the Big Eddy reach provides shallow, riverine riffle and run habitat with cobble and boulder substrates.

Diadromous Species

The lower Kennebec River, including the Shawmut Project waters, supports runs of diadromous fish species, including American shad, blueback herring, alewives, Atlantic salmon, and American eel, as discussed below. Atlantic and shortnose sturgeon also occur in the lower Kennebec River, but no further upstream than the Lockwood Project; so, no sturgeon are found in the Shawmut Project area.

Upstream fish passage for Atlantic salmon, American shad, blueback herring, and sea-run alewife in the lower Kennebec River is currently provided through trap/sort/transfer operations at the Lockwood Project fish lift facility in Waterville, Maine, until such time as volitional upstream passage is completed at the Lockwood, Shawmut and Weston projects as required under the current licenses for those projects. Final designs for the Shawmut Project fishway were filed with FERC December 31, 2019, and the fishway is targeted for completion and operation by May 2021.

Atlantic Salmon

Historically, the Kennebec River fishery for Atlantic salmon extended to Caratunk Falls near Solon, Maine, which is approximately 42 RMs upstream of the Shawmut Project. The historical upstream barriers to Atlantic salmon on the Kennebec River are Grand Falls in Township 3 Range 4 on the Dead River and a set of falls known as “the Hulling Machine” (impounded by Indian Pond Dam) immediately above the Kennebec River Gorge in the town of Indian Stream Township (NMFS 2009).

NMFS listed the Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon in the Kennebec River as federally endangered in 2009 (NMFS 2009). On February 21, 2013, the Licensee filed its ISPP and draft BA with FERC. Under the proposed ISPP, the Licensee identified and conducted studies of existing downstream fish passage facilities at the Shawmut Project for Atlantic salmon with the goal of identifying potential enhancement measures to improve downstream fish passage facilities and conducted citing studies and Computational Fluid Dynamic (CFD) modeling to inform upstream passage design with a commitment to installing permanent upstream fish passage facilities at the Project. The NMFS reviewed the BA and ISPP and subsequently issued its Biological Opinion (BO) which provided "Reasonable and Prudent Measures" and "Terms and Conditions" pursuant to, as well as an incidental take statement for, the actions proposed as part of the ISPP. FERC authorized the ISPP and the BO and Incidental Take Statement (ITS) in its May 19, 2016 Order Amending License for the Lockwood, Shawmut and Weston projects.[10]

Post-spawn adult Atlantic salmon and Atlantic salmon smolts migrate from the Sandy River downstream through Shawmut Project waters to the Gulf of Maine. Under the ISPP, a number of studies of juvenile Atlantic salmon passage were conducted by White Pine Hydro at the Shawmut Project (and other lower Kennebec projects) and are discussed in detail below.

As an interim measure, until the Shawmut upstream fish passage facility authorized by the FERC May 2016 Order Amending License is operational, Atlantic salmon are captured at the downstream Lockwood facility and trucked to the Sandy River by the MDMR. A discussion of numbers of Atlantic salmon trapped and trucked on the Kennebec River is provided in Section 4.6.1.2.

On December 31, 2019, Brookfield, with consideration of the upcoming filing of this FLA, filed a final SPP for the lower Kennebec River hydroelectric projects, including the Shawmut Project. Measures proposed in this application for the benefit of Atlantic salmon include the operation of upstream fish passage facilities; enhancements and operation of downstream fish passage

[10] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14251994

facilities; performance standards for upstream and downstream passage of Atlantic salmon, and provisions for monitoring passage effectiveness, are consistent with the final SPP as filed.

American Shad and River Herring

The historic upstream migration limit for American shad and river herring (e.g., blueback herring and sea-run alewives) in the Kennebec River was Norridgewock Falls, which is upstream of the Shawmut Project area (within the existing Weston Project impoundment) (Squires 1988; MSPO 1993; USFWS 1951). Currently American shad and river herring are trucked by MDMR from the Lockwood fish lift and trap/sort/transport facilities. Some are released into the Shawmut impoundment and some are released in the mainstem of the Kennebec River below Shawmut dam (Table 4-18). Many alewife are truck and released into lakes and ponds that drain to the Kennebec River. Further information on river herring based on studies that have been conducted at the Project is provided in greater detail below.

American Eel

Juvenile and adult American eels are present within the Shawmut Project area. White Pine Hydro has studied and monitored both upstream and downstream passage of American eels at the Shawmut Project. The results of these studies are summarized below.

4.6.1.2 Fish Passage

Upstream Passage

Upstream fish passage for Atlantic salmon, river herring and American shad at the Shawmut Project is currently managed from the existing Lockwood fish lift and trap/sort/transport facilities until such time as volitional passage is provided at the Lockwood, Shawmut and Weston Project (volitional passage is currently installed at the Hydro-Kennebec Project). The Licensee installed a fish lift system at the Lockwood Project in 2006 that has operated annually to provide a capture and sorting facility for migratory fish species. Under the 1998 Kennebec Hydropower Developers Group (KHDG) Agreement, the Licensee was to rely on the Lockwood fish lift and transport system until American shad numbers reached established targets. A new timeline for upstream passage of anadromous fish species at the Shawmut Project was specified as part of the 2013 BO and ISPP issued by NMFS after Atlantic salmon were listed as an

endangered species. A fishway for the Shawmut Project is currently planned for installation as required under the existing license, and final designs were submitted for FERC approval on December 31, 2019. The Shawmut fishway is targeted for operation in May 2021.

The Licensee for the Lockwood Project has captured 346 Atlantic salmon and 1,599 American shad at the Lockwood fish lift since 2006 (Table 4-18). MDMR collects adult Atlantic salmon from the lift and sorting system and trucks them to the Sandy River where they are released into quality spawning habitat. The Sandy River is approximately 25 miles upstream of the Shawmut dam. American shad are stocked by MDMR into suitable habitat in the watershed including upstream and downstream of the Shawmut Dam.

Table 4-18 Number of Atlantic Salmon and American Shad Captured in the Fish Lift at Lockwood Dam in Waterville, Maine

Year	Atlantic Salmon	American Shad
2006	15	0
2007	16	18
2008	22	0
2009	32	0
2010	5	39
2011	60	17
2012	5	5
2013	7	0
2014	18	1
2015	31	26
2016	33	836
2017	35	213
2018	11	401
2019	56	43
Total	**346**	**1599**

Brookfield 2019 (personal communication)

River herring captured at the Lockwood fish lift are trucked by MDMR to locations within the Hydro Kennebec and Shawmut impoundments or to other suitable habitat in the watershed. Since 2008, river herring have been trucked from Lockwood to the Shawmut and Hydro Kennebec impoundments (Table 4-19).

Table 4-19 Number of Adult River Herring Captured in the Fish Lift at Lockwood Dam, Kennebec River, and Transported by MDMR to the Hydro Kennebec and Shawmut Headponds[11].

Year	Shawmut	Hydro Kennebec
2008	47,944	-
2009	12,947	180
2010	5,000	12,038
2011	8,078	4,000
2012	52,380	10,250
2013	16,470	4,500
2014	35,865	17,250
2015	42,300	15,301
2016	71700	56,671
2017	72,750	98,843
2018	87,837	94,544
2019	57,100	79,189

Source: Brookfield 2019 (personal communication)

In 2003, the Licensee installed an upstream eel passage system at the Shawmut Project. The upstream eelway at the Shawmut Project was originally located at the eastern end of the spillway. The eelway consisted of two sections connected by one turn pool. One section of the eelway channel ran parallel to the dam, and the other section ran up and over the flashboards.

In 2009, the Licensee installed the rubber dam on the spillway. Rubber dam installation sealed the leakage and eels were no longer attracted to this area. Therefore, beginning in 2010, the Licensee, with assistance from MDMR, installed a seasonal eelway in an eel migration location identified after numerous nighttime observations. The eelway consists of a 6-foot-long by 1-foot-wide angled wooden trough leading to a 5-gallon collection bucket. The trough is lined with textured substrate and attraction water for the eelway is provided via hoses connected to water drains at the non-overflow section of the dam and is located between the first section of the hinged flashboards and the unit 1 tailrace. After conducting nighttime observations in 2019, a

[11] KHDG annual reports since 2014 do not identify the number of herring transported to Shawmut and Hydro Kennebec. 2015-2019 figures obtained from Maine Department of Marine Resources; personal communication, Wippelhauser 12/2/2019.

second eelway[12] was installed adjacent to the forebay plunge pool. The second eelway consists of a 6-foot-long by 1-foot-wide angled aluminum trough leading to a 5-gallon collection bucket. The trough is lined with Enkamat mesh and attraction water for the eelway is provided via hoses connected to a submersible pump in the forebay. The seasonal upstream eel facilities are operated annually from June 15 to September 15, as river conditions allow.

The Licensee passed approximately 130,498 juvenile American eels upstream at the Shawmut Project from 2007-2019 (Table 4-20).

Table 4-20 Number of Juvenile American Eels Captured at the Shawmut Project 2007-2019.

Year	American Eels	Year	American Eels
2007	16	2014	39,266
2008	322	2015	17,697
2009	NA*	2016	750
2010	1,480	2017	2,857
2011	4,878	2018	1,774
2012	32,153	2019	14,145
2013	15,160	**Total**	**130,498**

*2009 – upstream eel passage was unavailable due to ongoing construction associated with the installation of the inflatable bladder spillway
Source: Brookfield 2019 (personal communication)

Upstream eel passage will continue to be monitored and evaluated upon completion of the new upstream fish lift being installed in 2021. Based on those assessments, a permanent location of the upstream eelway will be determined in consultation with the fishery agencies.

2016 Alewife Telemetry Study

In May-June 2016, the Licensee conducted a study to evaluate adult river herring behavior in the Kennebec River immediately downstream of the Shawmut Project. This study was not conducted as part of the relicensing process. Rather, the purpose of the study was to evaluate preferential use of the various Shawmut Project tailwater regions to aid in the placement, entrance location, and design of the permanent upstream fishway. For the study, 150 adult alewives were captured

[12] The current location of the eelway is considered interim pending construction of the new upstream fishway, after which a new eelway will be installed.

and radio-tagged, and released approximately 3.4 miles downstream of the Shawmut Project. Movements of the tagged fish were monitored through several receivers located between the release point and the Shawmut Project, as well as at numerous locations in the tailwater areas downstream of the powerhouses and gates, and along the face of the dam.

Of the 150 fish tagged and released, 79 percent moved upstream and were detected within one or more of the tailrace monitoring zones. Fish that were detected in the vicinity of the Shawmut Project were most frequently detected in the area downstream of the hinged flashboard spillway section of the dam. When examining potential fishway entrances, it was found that the time spent by the tagged fish was greatest in the area of the forebay Taintor gate located between the unit 1-6 and the unit 7-8 powerhouses. Fish were less frequently found in the unit 1-6 tailwater area. These results were utilized to develop the upstream fishway design that was filed with FERC in December 2019. The study results were discussed with the fishery agencies in a meeting held during the Fall of 2016.

Downstream Passage

Downstream passage at Shawmut is provided through a combination of a surface weir (sluice), Tainter gate, and opening the hinged flashboards. The sluice is located at the right side of the intake structure next to Unit 6 and is 4-feet-wide by 22-inches-deep; flow can be adjusted by adding or removing stoplogs. With all stoplogs removed, the sluice passes between 30 and 35 cfs which is discharged over the face of the dam into a 3-foot-deep plunge pool. The Tainter gate located next to the sluice measures 7-feet-high by 10-feet-wide and can pass up to 600 cfs.

The sluice and Tainter gate are operated for Atlantic salmon smolt and kelt passage typically from April 1 through June 15 and from November 1 through December 31, as river flow and ice conditions allow. Downstream passage is also provided along the Shawmut spillway during periods of excess river flow that results in spill. To provide additional passage, during the Atlantic salmon smolt migration season, the Licensee drops several sections of hinged flashboards. The four sections of hinged flashboards located immediately adjacent to the power

canal headworks are opened for the Atlantic salmon smolt migration season and provide approximately 560 cfs of spill flow.[13]

To provide safe and effective downstream passage for American eels, the Licensee opens a deep gate to pass approximately 425 cfs and turns off Units 7 and 8 for 8 hours during the night for a 6-week period between September 15 and November 15.

Atlantic Salmon Smolt Radio-Telemetry Studies

A number of radio-telemetry downstream smolt passage studies have been conducted at the four lower Kennebec River projects (including Shawmut), including most recently four years of study under the provisions of the project ISPPs (2012-2015). Atlantic salmon smolts were radio-tagged and released at Shawmut during the 2013, 2014, and 2015 studies. In 2013 and 2014, radio-tagged smolts were released upstream and downstream of the dam during May to facilitate the use of a paired release-recapture model for estimating whole station survival. In 2015, smolts were released upstream in May. Table 4-21 summarizes the Atlantic salmon smolt studies conducted by the project licensees during 2012-2015 at the Lockwood, Hydro-Kennebec, Shawmut and Weston projects. The results of the smolt studies relative to the Shawmut Project are summarized in Table 4-22 which provides the 3-year average whole station survival estimates as well as a robust estimate for passage route utilization and survival.

Table 4-21 Summary of Downstream Smolt Passage Studies Conducted on Kennebec Projects

Study Year	Study Report Name	Study Description
2012	*Downstream bypass effectiveness for the passage of Atlantic salmon smolts at the Weston, Shawmut, and Lockwood Projects, Kennebec River, Maine* (Normandeau 2012b)	Radio-tagged, hatchery-reared Atlantic salmon smolts were released into the Kennebec River upstream of the Weston and Lockwood projects during the spring 2012 out-migration period to evaluate the effectiveness of the existing downstream bypass structures at Weston, Shawmut and Lockwood.

[13] The hinged flashboard sections pass a flow of approximately 140 cfs per section. With three sections down, the flow is approximately 420 cfs; with four sections down the flow is approximately 560 cfs.

Study Year	Study Report Name	Study Description
2013	*Evaluation of Atlantic salmon passage at the Weston, Shawmut, Hydro Kennebec, and Lockwood Projects, Kennebec River and Brunswick Project, Androscoggin River, Maine, Spring 2013* (Normandeau 2013)	Smolt passage during the spring 2013 out-migration period was assessed using an array of stationary radio-telemetry receivers installed at the Weston, Shawmut, Hydro Kennebec, and Lockwood projects. Radio-tagged, hatchery-reared Atlantic salmon smolts were released upstream and downstream of each project to facilitate the use of a paired release-recapture model for estimation of dam passage survival.
2014	*Evaluation of Atlantic salmon passage at the Weston, Shawmut, Hydro Kennebec, and Lockwood Projects, Kennebec River and Brunswick Project, Androscoggin River, Maine, Spring 2014* (Normandeau 2014)	Smolt passage during the spring 2014 out-migration period was assessed using an array of stationary radio-telemetry receivers installed at the Weston, Shawmut, Hydro Kennebec, and Lockwood projects. Radio-tagged, hatchery-reared Atlantic salmon smolts were released upstream and downstream of each project to facilitate the use of a paired release-recapture model for estimation of dam passage survival.
2015	*Evaluation of Atlantic salmon passage at the Weston, Shawmut, and Lockwood Projects, Kennebec River and Pejepscot and Brunswick Projects, Androscoggin River, Maine, Spring 2015* (Normandeau 2015)	Smolt passage during the spring 2015 outmigration period was assessed using an array of stationary radio-telemetry receivers installed at the Weston, Shawmut, and Lockwood projects. Radio-tagged, hatchery-reared Atlantic salmon smolts were released upstream and downstream of each project to facilitate the use of a paired release-recapture model for estimation of dam passage survival.

Table 4-22 Current Downstream Smolt Passage Routes (percent utilization) and Whole Station Survival Rates at Shawmut (based on 3-years, 2012-2015).

Project	Route	% Utilization[3]	% Survival[1,2]
Shawmut (2013-2015)	Downstream bypass	38.7%	97.4%
	Powerhouses		
	Units 1-6	11.6%	92.1%
	Units 7-8	21.1%	93.1%
	Hinged board spill[4]	5.2%	86.7%
	Spillway[4]	21.4%	100.0%
	WHOLE STATION SURVIVAL	-	93.5%

Source: Brookfield 2019b
Notes:
[1] Route-specific percent (%) survival values are based on the full number of radio-tagged smolts determined to have utilized a particular route regardless of release location (i.e., values for Shawmut represent smolts released upstream and downstream of Weston as well as immediately upstream of Shawmut). These values are adjusted to account for background mortality in the section of river between the dam and first downstream receiver.
[2] Whole station survival values represent the three year average at each project location based upon the subset of smolts released immediately upstream of each dam and adjusted for background mortality using passage success of the concurrent subset of smolts released immediately downstream of each dam.
[3] The percent (%) utilization represents the percentage of smolts utilizing a particular route over the three-year study period. Note that totals do not sum to 100% as during some years individuals which approached the project may have failed to pass or did so undetected.
[4] Hinged board spill only available during final release of 2014 study and 2015 study year and refers to smolts passing via the three sections opened adjacent to the power canal. Spillway refers to smolts passing via the central log sluice or Obermeyer sections (not distinguished).

Due to the limited availability of adult salmon, downstream passage studies for kelts have not been conducted to date at the Shawmut Project or at any of the other lower Kennebec River hydropower projects.

While the primary objectives of the downstream passage studies were to determine passage routes and estimate whole station survival (i.e., all passage routes considered) for Atlantic salmon smolts, the study design also permitted collection of additional information related to travel times, residence times, and downstream bypass and spill effectiveness rates. Additional key findings from the 2013 - 2015 studies at the Shawmut Project include:

- Baseline whole station survival estimates for radio-tagged smolts was 96.3 percent (2013), 93.6 percent (2014) and 90.6 percent (2015).

- In 2013, smolts passed via spill (2 percent), downstream bypass (45 percent), Francis turbine units (18 percent), and propeller units (29 percent).
- In 2014, smolts passed via spill (53 percent), downstream bypass (14 percent), Francis turbine units (10 percent), and propeller units (20 percent).
- In 2015, smolts passed via spill (20 percent), downstream bypass (47 percent), Francis turbine units (5 percent), and propeller units (25 percent).
- Median residence time at the Shawmut Project was 0.7 hours (range = <0.1 to 118.5 hours) in 2013
- Median residence time at the Shawmut Project was 0.3 hours (range = <0.1 to 73.6 hours) in 2014.
- Median residence time at the Shawmut Project was 0.3 hours (range = <0.1 to 48.2 hours) in 2015.
- Downstream bypass effectiveness for smolts entering the forebay was 49 percent with 12 to 13 percent of total station flow passed through the bypass in 2013.
- Downstream bypass effectiveness for smolts entering the forebay was 32 percent with 12 to 13 percent of total station flow passed through the bypass in 2014.
- Downstream bypass effectiveness for smolts entering the forebay was 63 percent with 12 to 13 percent of total station flow passed through the bypass in 2014.
- In 2013, route-specific survival estimates were 96.7 percent for the downstream bypass, 100 percent for the propeller units, and 97.7 percent for the Francis units.
- In 2014, route-specific survival estimates were 97.9 percent for the spillway, 100 percent the downstream bypass, 91.5 percent for the propeller units, and 81.4 percent for the Francis units.
- In 2015, route-specific survival estimates were 88.7 percent for the spillway, 100 percent for the downstream bypass, 77.9 percent for the propeller units, and 84.3 percent for the Francis units.

Based on the whole station survival estimates developed for the Shawmut Project, and consistent with the adaptive management intent of the ISPP, White Pine Hydro, in consultation with the resource agencies, agreed to lower four hinged flashboard sections during the smolt migration period to increase the total flow via the downstream fish bypass from 420 cfs to 560 cfs. NMFS, by letter dated May 22, 2017, stated that those measures were expected to result in survival rates within the incidental take limit established for Shawmut.

Downstream Passage for American Eel

White Pine Hydro provides downstream American eel passage at the Shawmut Project by opening a Tainter gate and turning off Units 7 and 8 for an 8-hour period at night for a 6-week period between September 15 and November 15 annually.

In 2007, the Licensee conducted a radio-telemetry study to evaluate downstream passage of out-migrating silver American eels[14] at the Shawmut Project. The majority (93 percent) of radio-tagged silver eels released upstream of the Shawmut Project passed via turbine Units 7 and 8. Use of the downstream bypass was low, ranging between 0-8 percent. Immediate survival of adult eels through turbine Units 7 and 8 was estimated to be at 69 percent (Normandeau 2008). The Licensee completed a second radio-telemetry study in 2008 to evaluate the effectiveness of the deep gate located between the two powerhouses at various flows while altering nighttime operation of turbine Units 1-6 and restricting the nighttime use of Units 7 and 8. Opening the deep gate to 2.5 feet (approximately 425 cfs) and shutting off Units 7 and 8 increased use of the downstream bypass system to 83 percent and resulted in an immediate survival of 92 percent (Normandeau 2009). Based on the study results, the Licensee annually opens the deep gate 2.5 feet and turns off Units 7 and 8 during the night for a six-week period between September 15 and November 15 as a permanent means to pass adult eels downstream.

4.6.1.3 Aquatic Habitat

The Shawmut impoundment proper is approximately 12-miles-long, extending from near the confluence of Wesserunsett Stream downstream to the village of Shawmut, Maine. The riverbanks are steep-sided and bordered by rolling hills near Skowhegan. The river valley then becomes relatively flat with broad flood plans on the east bank and a few steep slopes on the west bank. The river flows generally southeast from Skowhegan to the village of Shawmut with an average width of approximately 750-feet and an average depth of approximately 20-feet; the impoundment is approximately 1,800-feet-wide and 30-feet-deep near the dam. The impoundment has a surface area of 1,310 acres at a normal full pond elevation of 112.0'. White

[14] The term "silver eel" refers to a migratory adult eel.

Pine Hydro operates the Shawmut Project as a run-of-river facility; therefore, the impoundment level fluctuations are limited during normal operations.

The impoundment is characterized by typical littoral and shoreline habitats such as mud flats, tributary deltas, islands, and submerged aquatic vegetation beds. The river above the upper end of the impoundment near Skowhegan is shallower, with average water depths less than 10-feet-deep. Substrates in this reach are primarily large gravels and cobbles with some interspersed fine sediment. The middle and lower reaches of the impoundment are deeper with average water depths between 20 and 30 feet; substrates in these reaches are more fine-grained (i.e., sands, silts, clay). In accordance with the RSP, White Pine Hydro inventoried botanical communities in the Project area, including shoreline aquatic habitats. Marsh and wetland communities that occur within the Shawmut Project area include waterlily and macrophyte beds, pickerelweed marsh, bulrush marsh and grassy shrub marsh (i.e., palustrine emergent wetland). Three small tributaries, Wesserunsett, Martin, and Carrabassett streams discharge into the Kennebec River within the Shawmut impoundment Figure 4-8.

The Kennebec River in the tailwater area immediately below the dam and in downstream reaches is approximately 1,000-feet-wide. The river is shallow with several bedrock shoals, cobble and boulder beds, and riffle habitat. The normal tailwater elevation is approximately 88.0’.

In 2002, MBI assessed riverine habitat using a Qualitative Habitat Evaluation Index (QHEI) during fish sampling (Yoder, et al. 2006). Free flowing riverine habitats exhibited the highest scores, generally in the 80-90 range, and impoundment habitats had values of 48 (upper Shawmut impoundment) to 50 (upstream of Shawmut dam). The sites upstream of the Shawmut dam had 4 to 6 modified habitat attributes; the site located downstream of the dam had no modified attributes and featured 9 of 10 “good” habitat attributes (Table 4-23).

Table 4-23 QHEI Matrix of Good and Modified Habitat Attributes for Individual Stations Upstream and Downstream of Shawmut Dam.

Aquatic Habitat Attributes	Site		
	IMPOUNDMENT (RM 32.1)	IMPOUNDMENT (RM 25.1)	TAILWATER (RM 23.9)
Good Habitat Attributes			
No Channelization/Recovered	-	-	X
Boulder, Cobble, Gravel Substrates	X	X	X
Silt Free Substrates	-	-	-
Good/Excellent Development	-	-	X
Five or More Substrate Types	X	X	X
Extensive-Moderate Cover	X	X	X
Fast Current/Eddies	-	-	X
Low-Normal Overall Embeddedness	-	X	X
Max Depth > 1m	X		X
Low-Normal Riffle/Run Embeddedness	-	-	X
Modified Attributes			
Impounded	X	X	-
Channelized or No Recovery	-	-	-
Silt/Muck Substrates	-	-	-
Sparse or No Cover	-	-	-
Max Depth < 70 cm	X	-	-
Recovering Channel	-	-	-
High/Moderate Silt Cover	-	-	-
Fair-Poor Development	X	X	-
Only 1-2 Cover Types	-	-	-
Slow or No Flow	X	X	-
High-Mod Overall Embeddedness	X	-	-
High-Mod Riffle-Run Embeddedness	-	-	-
No Riffle/Run	X	X	-

Source: Yoder et al. 2006

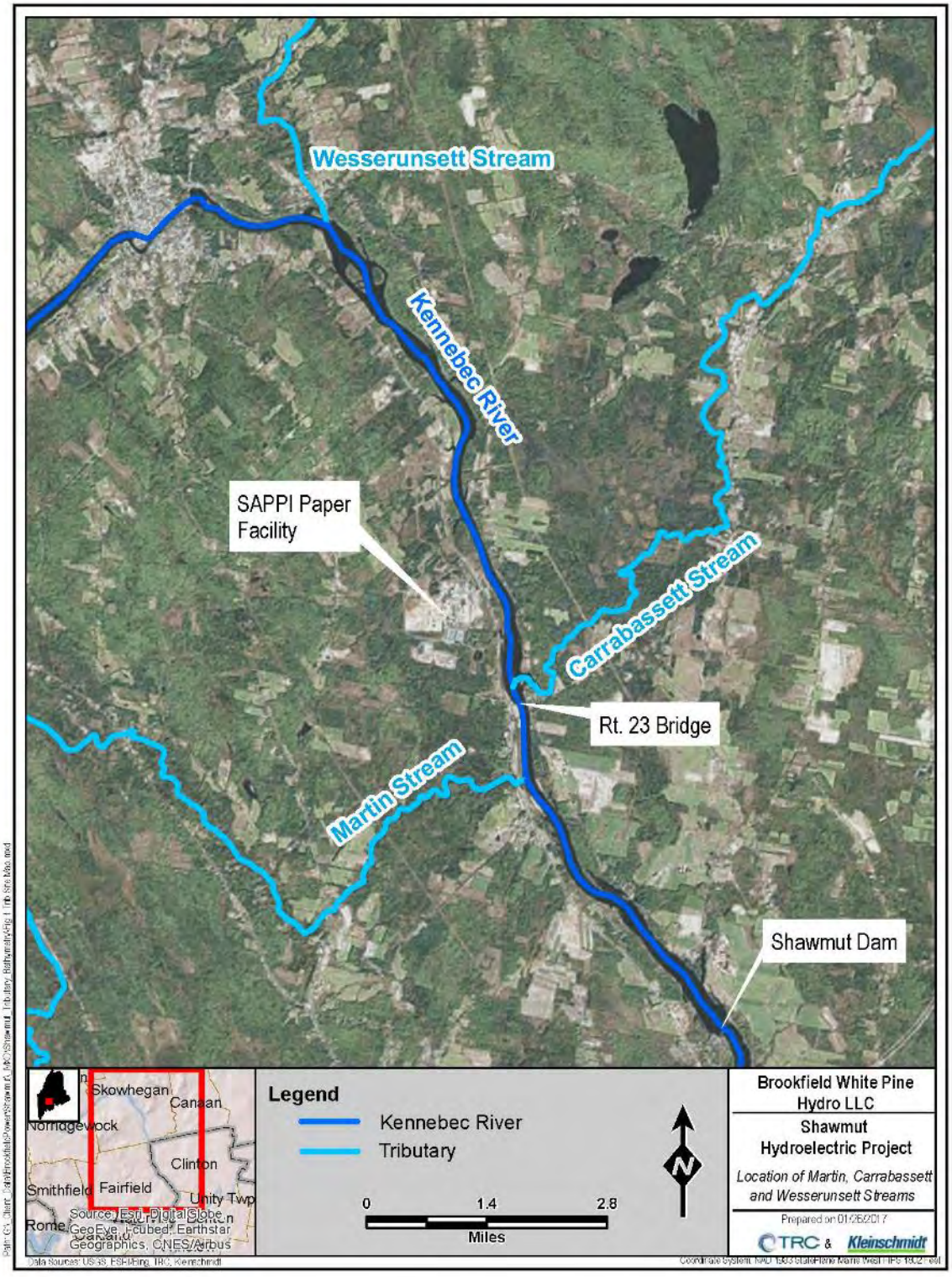


Figure 4-8 Primary Tributary Habitat in the Kennebec River Near the Shawmut Project.

Water Quality

As discussed in the Water Resources section and presented in the ISR, the Licensee monitored water temperature in the impoundment and tailwater in 2016. In summary, water temperature in the impoundment demonstrated that water temperature ranged from:

- 16.8ºC to 25.3ºC (62.2ºF to 77.5ºF) in June;
- 20.6ºC to 28.4ºC (69.1ºF to 83.1ºF) in July;
- 21.4ºC to 26.0ºC (70.5ºF to 78.8ºF) in August;
- 20.5ºC to 23.9ºC (68.9ºF to 75.0ºF) in September; and
- 13.7ºC to 18.3ºC (56.7ºF to 64.9ºF) in October.

Further, the monitoring demonstrated that:

- the highest water temperatures were recorded on July 27 (22.2ºC to 28.4ºC or 72.0ºF to 83.1ºF) and August 9 (21.4ºC to 26.0ºC or 70.5ºF to 78.8ºF);
- in general, the highest water temperatures were recorded just below the surface (i.e., at a depth of 3 inches) or at a depth of 1 meter; and
- below the surface, the temperature was relatively uniform throughout the water column and varied by only 1ºC to 3ºC (excluding the water near the bottom of the impoundment at 7 meters to 9 meters on June 21, June 30, July 27).

Hourly water temperature in the tailwater ranged from approximately 15.8 ºC to 26.1ºC (60.4ºF to 76.1ºF) throughout the monitoring period (June 2 – August 31, 2016). Hourly DO concentrations in the Kennebec River downstream of Shawmut dam ranged from 7.7 mg/L to 9.6 mg/L in June, from 7.5 mg/L to 8.9 mg/L in July, and from 6.8 to 8.5 mg/L in August. Hourly DO percent saturation ranged from 86.4 percent to 110.3 percent in June, from 88.0 percent to 104.4 percent in July, and from 81.3 to 101.6 percent in August. The highest values were observed on June 21 (9.6 mg/L and 110.3 percent), and the minimum values occurred on August 10 (6.8 mg/L and 81.3 percent). The DO concentration decreased below the Class B standard of 7 mg/L to 6.8 mg/L for three short periods of time: from 0200 to 0600 on August 9, from 2200 on August 9 to 0600 on August 10, and from 1900 on August 10 to 0700 on August 11. These low DO values represented 1.2 percent of all hourly measurements made from June 2 to August 31, 2016; 98.8 percent of all data was above the state standard of 7 mg/L for Class B waters. Although these measurements were below 7.0 mg/L, it is worth noting that the accuracy of the

instrument is 0.2 mg/L (for values up to 8 mg/L). The DO percent saturation was above the state standard (75 percent) throughout the monitoring period.

Additionally, White Pine Hydro collected DO data concurrently with the water temperature profiles. Sampling stations 1-6 were located within Class B waters and sampling stations 7-15 were within Class C waters. All DO measurements at sampling stations 1-6 were above the established Maine's standard of 7 mg/L or 75 percent saturation. Except for two measurements made at a depth of 9 meters just above the river bottom, at sampling stations 11 and 12, all DO measurements at sampling stations 7-15 were above the standard of 5 mg/L or 60 percent saturation for Class C waters.

Hourly water temperature monitoring at sampling station 15 in the impoundment (approximately 1,000 feet upstream of the Shawmut dam) and the riverine sample sites overlapped from June 2 to August 25, 2016 (Brookfield 2017). Overall, water temperature at the shallower, riverine location was more variable than in the middle of the water column (i.e., 4 meters) in the impoundment (Brookfield 2017). Water temperature upstream and downstream of the Shawmut dam exhibited the same temporal trends, and readings were within approximately ±1ºC. The mean temperature in the impoundment was 18.7ºC, 22.7ºC, and 24.3ºC in June, July, and August, respectively (Brookfield 2017); in the tailwater, the mean water temperature was 18.9ºC, 23.0ºC, and 24.2ºC in June, July, and August, respectively. The range of DO concentrations measured in the vertical profiles at the lake trophic site were compared with the mid-day DO levels (1000 to 1700) downstream of the dam. The DO concentrations downstream either agreed with the concentrations at the lake trophic site or were approximately 0.1 to 0.3 mg/L higher.

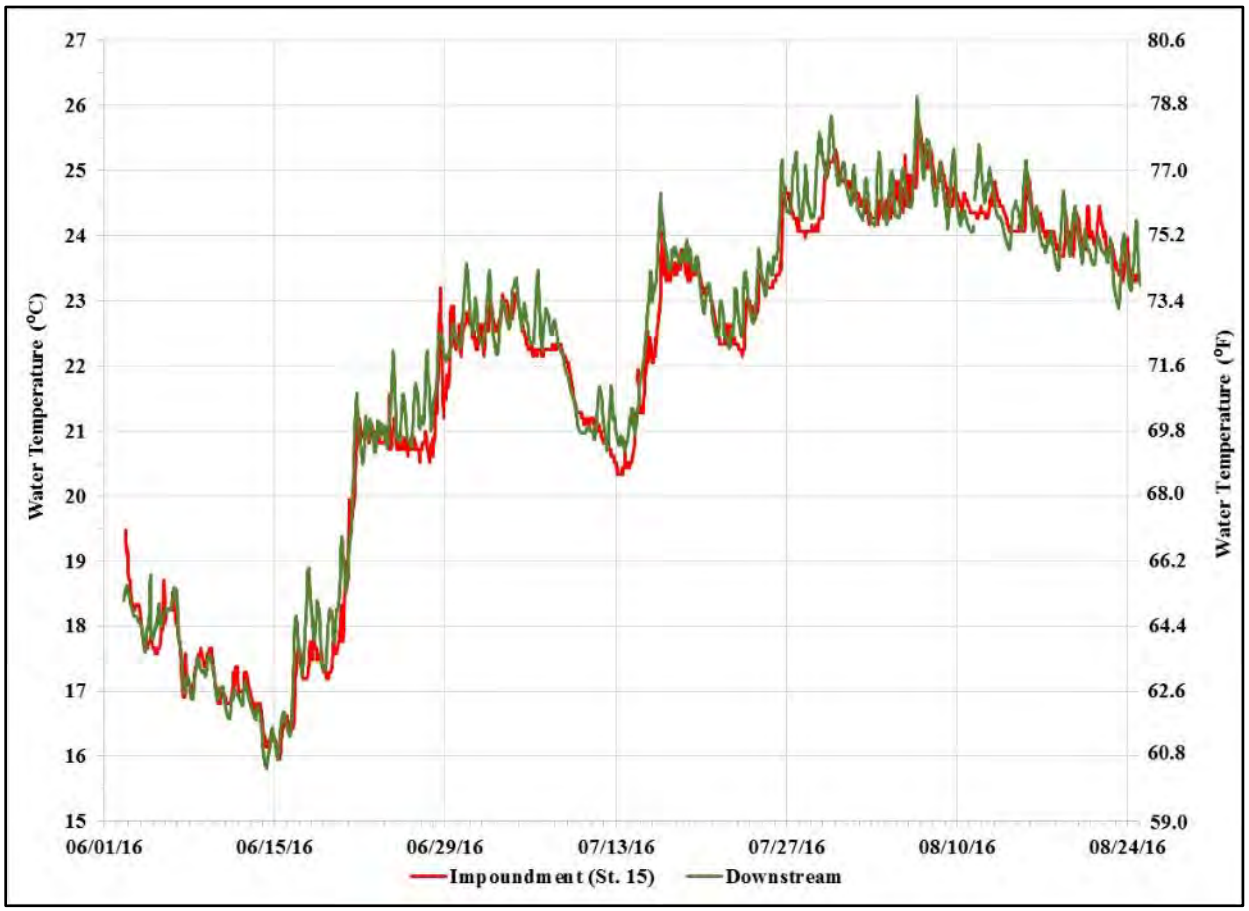


Figure 4-9 Hourly Water Temperature at the Lake Trophic Sample Site in the Impoundment (Station 15) and at the Riverine Sample Site Downstream of the Shawmut Dam

White Pine Hydro also collected water temperature data from the three primary tributaries in 2016. In summary, for all tributaries:

- The average temperature in June ranged from 18.2ºC to 21.2ºC (64.8ºF to 70.2ºF);
- The average temperature in July ranged from 21.9ºC to 23.8ºC (71.4ºF to 74.8ºF);
- The average temperature in August ranged from 17.7ºC to 23.4ºC (63.9ºF to 74.1ºF);
- The average water temperature in September ranged from 12.1ºC to 19.5ºC (53.8ºF to 67.1ºF);
- The average water temperature in October ranged from 10.1ºC to 12.1ºC (50.2ºF to 53.8ºF);
- The maximum water temperature in Martin Stream (near confluence and upstream site), in Carrabassett Stream (near confluence and upstream site), and at the upstream site in Wesserunsett Stream was observed on July 27 and ranged from 27.2ºC to 30.1ºC (81.0ºF to 86.2ºF) depending on site;

- The maximum water temperatures near the confluence in Wesserunsett Stream was 27.1ºC (80.8ºF) on July 15 and was 26.1ºC (79.0ºF) on August 11 at the middle site;
- The water temperatures recorded near the mouths Martin, Carrabassett, and Wesserunsett streams were consistent with the range of temperatures near the confluence and upstream sites (and middle site in Wesserunsett Stream)
- Near the mouths of each tributary, the water temperature was highest just below the surface (i.e., approximately 3 inches below the water surface).

4.6.1.4 Tributary Habitat

Three small tributaries (Wesserunsett, Martin, and Carrabassett streams) discharge into the mainstem upstream of the Shawmut dam (Figure 4-8). Wesserunsett Stream originates at Wesserunsett Lake and flows into the Project area in the town of Skowhegan. Carrabassett Stream originates at Sibley Pond and flows into the Project area in the town of Clinton, downstream of the SAPPI paper facility. Martin Stream enters the Project area just downstream of the Route 23 Bridge in the town of Hinckley. Wesserunsett, Carrabassett, and Martin streams have drainage areas of 143, 53, and 85-square-miles and join the mainstem approximately 12, 5, and 3.75 miles upstream of the Shawmut dam, respectively (USGS 2019). Additional information about the effects of episodic maintenance activities at the dam on fish access to these tributaries is described below and in the Tributary Access Report which was included in the ISR.

White Pine Hydro manages the Shawmut Project run-of-river operations by maintaining headpond elevations within 1 foot of the normal full pool elevation of 112.0'. The Licensee reviewed river flow and impoundment level data from 2001 to 2015 in response to an additional information request on the PAD (Brookfield 2016). The review demonstrated that operation of the Shawmut Project is consistent with run-of-river operations and that impoundment variations were typically within 1-foot of the normal full impoundment elevation of 112.0'; variations were the result of wave action, variable inflows, and the time necessary to adjust to changes in unit, gate, or spillway settings. As part of the review, White Pine Hydro completed a detailed desktop analysis of hourly impoundment elevation variations below the normal full pond impoundment level for the period January 1, 2010, to December 31, 2015. The analysis demonstrated that a deviation of 0.5-foot or 1-foot occurred infrequently; on an annual basis, deviations of 0.5-foot or more and 1-foot or more occurred approximately 4 percent and 1 percent of the time, respectively, during the 6-year period (Figure 4-10).

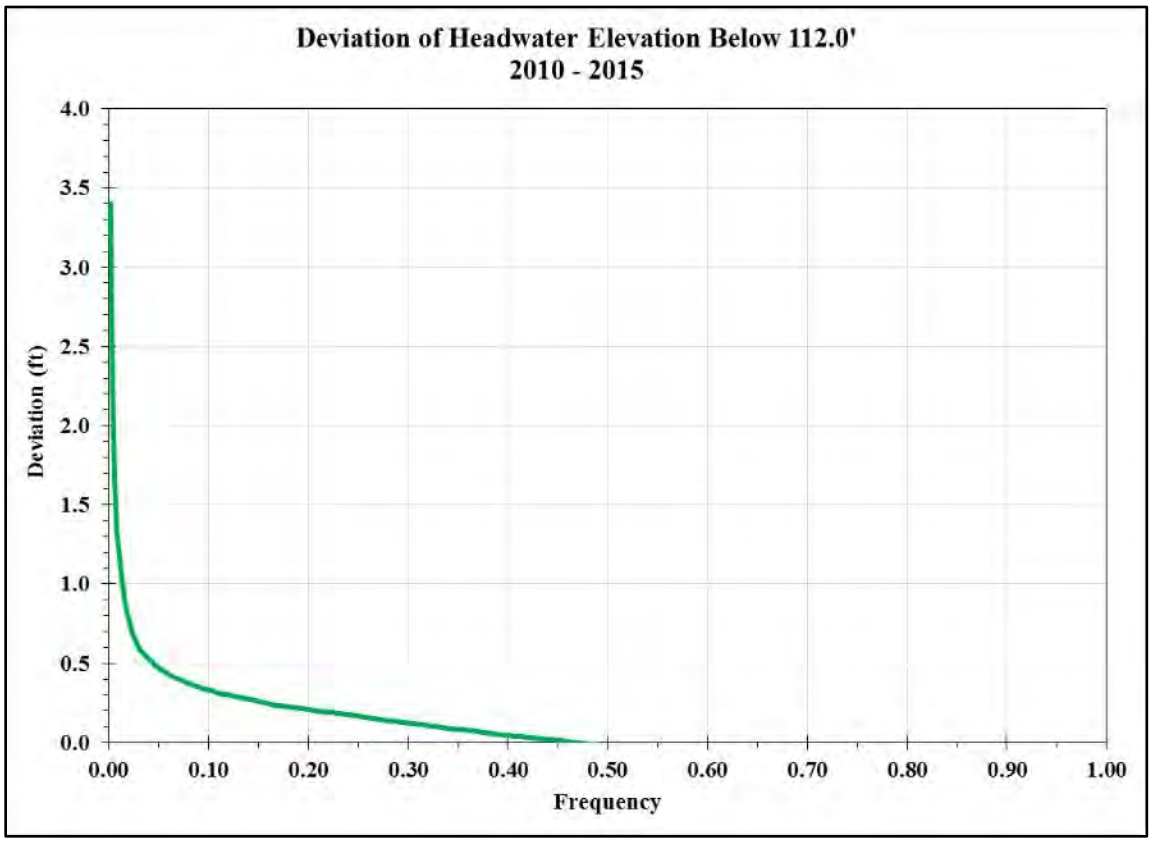


Figure 4-10 Percent of Time Shawmut Headpond Level Deviated from Normal Full Pond Level (112.0') Between January 1, 2010 and December 31, 2015.

Shawmut Impoundment Tributary Access Study

In accordance with the RSP, White Pine Hydro completed a study to assess whether lowering of the impoundment for maintenance activities affected the ability of fish to access Wesserunsett, Martin, and Carrabassett streams. White Pine Hydro periodically needs to lower the impoundment to an elevation of 108.0'+/- (permanent crest of the spillway) for maintenance. White Pine Hydro conducted bathymetry surveys using a boat-mounted Lowrance Elite 7 depth sounder and global positioning system (GPS) at full headpond condition (approximate elevation 112.0'). The surveys began at the mouth of each stream and extended upstream to the transition from low-gradient backwater or flatwater to free-flowing riverine reaches. To obtain adequate coverage, data was collected along longitudinal transects and from the right to left banks. In addition, White Pine Hydro collected water depth data using a stadia survey rod in the thalweg (i.e., deepest point along a stream cross section) at the habitat transition point to riverine conditions and in shallow locations that were difficult to navigate the boat.

White Pine Hydro performed a second bathymetry survey when the headpond was drawn down 1.1 feet (elevation 110.9') during scheduled operations to remove the boat barrier in the Shawmut impoundment on November 3, 2016; this survey represented headpond conditions typical of normal operations (i.e., approximately 1-foot below full). The Shawmut headpond was lowered to an elevation of 109.1' on September 19, 2017, for maintenance activities (approximately a 3-foot drawdown). While the pond was down, White Pine Hydro performed bathymetry surveys at the lower head pond elevation using the same methods as described above. Bathymetry maps of the three tributaries at the three headpond conditions evaluated during the study are provided in the study report filed as part of the ISR.

Martin Stream

The inlet to Martin Stream extends under a railroad trestle into a pool formed between the trestle and the Route 201 bridge. The water depth at the inlet and extending upstream through a narrow, deep channel in the pool (i.e., thalweg) ranged from approximately 10 to 20 feet at a full headpond elevation of 112.0', and there were no velocity barriers that would adversely affect upstream fish movements (i.e., water velocity was generally less than 0.5 feet per second [fps]); thus, there were no impediments to fish accessing Martin Stream. At a headpond elevation of 110.9', the water depth at the confluence and inlet area of Martin Stream ranged from 8 to 20 feet, and there were no velocity barriers (i.e., water velocity was generally less than 0.5 fps). At a headpond elevation of 109.1', the water depth at the confluence and inlet area of Martin Stream ranged from approximately 5 to 18 feet, and there were no velocity barriers (i.e., water velocity was generally less than 0.5 fps).

Carrabassett Stream

Water depth in the Kennebec River near the inlet to Carrabassett Stream ranged from approximately 5 to 10 feet at the full pond elevation of 112.0'. Just upstream of the inlet on the main stem of the Kennebec River, there is a shallow vegetated area with water depths of approximately 1.4 to 3 feet at a full pond elevation. At a headpond elevation of 110.9', the water depth at the inlet to Carrabassett Stream and under the East River Road bridge ranged from approximately 4 feet to 9 feet. The water depth over the shallow vegetated area was approximately 0.6 foo to 2 feet. Water depth in front of the inlet to Carrabassett Stream and

under the East River Road bridge ranged from approximately 2 feet to 7 feet at a headpond elevation of 109.1'. The water depth over the shallow vegetated area was less than 1-foot.

Wesserunsett Stream

Water depth at the confluence of Wesserunsett Stream with the main stem Kennebec River and extending upstream approximately 1,600 feet ranged from approximately 4 feet to 12 feet at a full pond elevation. Wesserunsett Stream consists of flatwater with a fairly uniform stream width, low water velocity, and water depths ranging from 3 feet to 12 feet for approximately 2-miles upstream, at which point the stream transitions to low gradient riffle habitat. There were no velocity barriers (i.e., water velocity was generally less than 0.5 fps). At a headpond elevation of 110.9', the water depth at the confluence of Wesserunsett Stream with the main stem Kennebec River ranged from 4 feet to 7 feet demonstrating that the water was of sufficient depth to allow unimpeded access to the stream. The water depth in the lower 1,600 feet of Wesserunsett Stream ranged from 4 feet to 8 feet, and there were no velocity barriers (i.e., water velocity was generally less than 0.5 fps). At a headpond elevation of 109.1, the water depth at the confluence of Wesserunsett Stream with the main stem Kennebec River ranged from approximately 1 foot to 5 feet demonstrating that the water was of sufficient depth to allow unimpeded access to the stream. The water depth in the lower 1,600 feet of Wesserunsett Stream ranged from approximately 1 foot to 7 feet, and there were no velocity barriers (i.e., water velocity was generally less than 0.5 fps).

The study demonstrated that fish access to tributary habitat is not affected by normal operations. No physical or hydrological barriers for fish accessing Martin, Carrabassett, or Wesserunsett stream were identified at the three headpond conditions evaluated. Water velocities at the confluence of each stream were estimated to be less than approximately 0.5 fps and did not present a barrier to fish accessing the streams. At the transition to free-flowing riverine sections in each stream, there were shallow spots (water depths of approximately 0.5 foot to 1.0 foot) between bedrock and boulders; however, adjacent areas (i.e., thalweg) provided deeper channels and access for fish into free-flowing tributary reaches.

4.6.1.5 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act requires NMFS to describe and identify EFH (i.e., spawning, nursery, and rearing habitat) for commercial species managed by a federal fisheries council (i.e., the New England fisheries council). The Magnuson-Stevens Act requires federal agencies to consult with NMFS when any activity is proposed to be permitted, funded or undertaken by a federal agency that may have adverse effects on designated EFH. In Maine, EFH has been designated for Atlantic salmon; other diadromous fish species that may occur in the Shawmut Project area (i.e., river herring, American shad, and American eel) are managed by the states (i.e., Atlantic States Marine Fisheries Council) and do not require that EFH be designated. EFH for Atlantic salmon in Maine includes all river habitat that was historically occupied by the species, including the Kennebec River.

4.6.1.6 Fisheries Management

MDIFW manages the Kennebec River from Madison to head-of-tide in Augusta, Maine, including the Shawmut Project area, for stocked salmonids and smallmouth bass (MDIFW 2004). MDIFW's recreational fishery goal for the Kennebec River from Skowhegan to head-of-tide is to provide an open water, stocked, sport fishery for brown trout (MDIFW 2004). The objectives for this fishery are to:

- provide a catch rate of at least one legal brown trout per angler per day for experienced brown trout anglers; and,
- produce brown trout with an average size of 18 inches and average weight of 2.5 pounds from the Shawmut dam to the Donald Carter Bridge in Waterville.

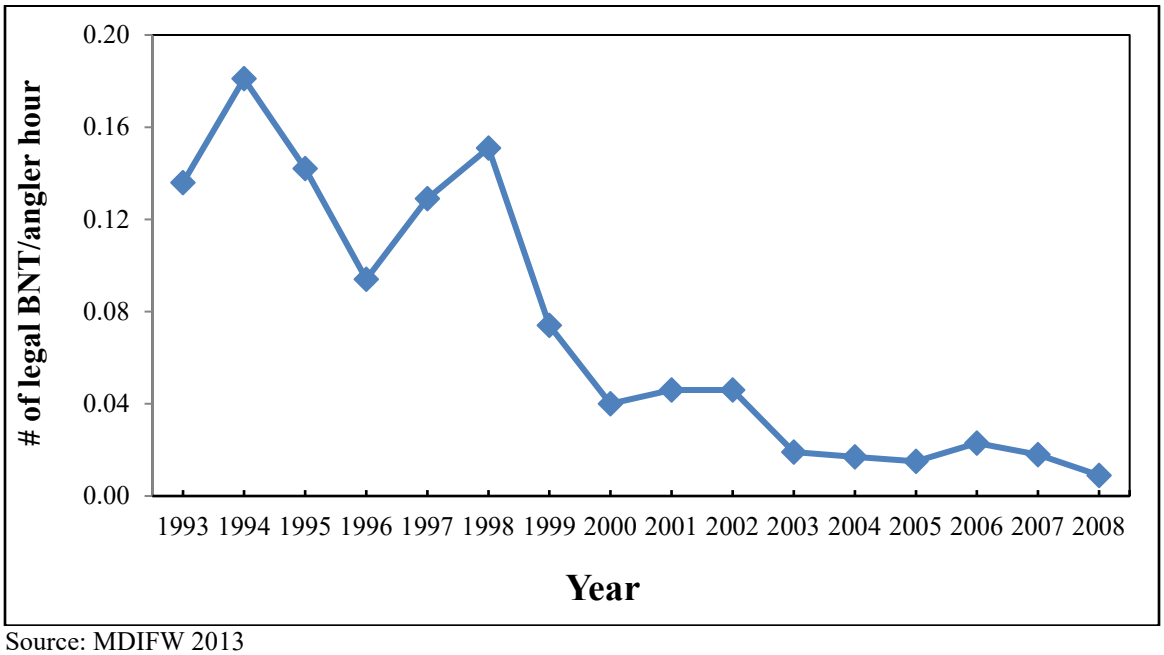
To achieve these management goals, MDIFW stocks spring and fall yearling brown trout annually between Weston dam and Hydro-Kennebec dam (which includes the Shawmut Project area) as discussed above.

<u>MDIFW Angler Creel Surveys</u>

MDIFW conducted a recreational creel survey in the Shawmut Project tailrace in May and June of 2014 to evaluate angler use, catch rates, and harvest of riverine fishes (J. Seiders, MDIFW, personal communication with Randy Dorman, Regulatory Specialist, April 2016). MDIFW

estimated a total of 676 angler parties and 993 angler days. Anglers caught six fish species including black crappie, brown trout, fallfish, pumpkinseed, smallmouth bass, and yellow perch. Catch rates and numbers varied by species but rates were highest for smallmouth bass (1.0 fish per hour), brown trout (1.0 fish per 3.5 hour), and fallfish (1.0 fish per 4.1 hour). Most brown trout were of a sub-legal size (65 percent) and none of 123 legal brown trout captured were kept by anglers, indicating that the brown trout fishery in the Shawmut tailrace is a put-grow-take fishery that is essentially catch and release.

Although creel information is limited, data from 1993 to 2008 indicates moderate to excellent brown trout catchability (0.10-0.18 legal brown trout/angler hour) (MDIFW 2013). During the 1993-1998 timeframe, the Shawmut tailwater supported a nationally renowned brown trout fishery (MDIFW 2013). Beginning in 1999, catch rates on legal and trophy brown trout declined (Figure 4-11), and to date the fishery has essentially collapsed.



Source: MDIFW 2013

Figure 4-11 Hourly Catch Rates of Legal Sized Brown Trout in the Shawmut Tailwater, Kennebec River (1993 – 2008).

In accordance with the RSP, White Pine Hydro conducted a study in 2016 and 2017 to assess recreational use and recreation facility condition in the Shawmut Project area. The study demonstrated that fishing was the third most popular activity behind sightseeing and picnicking.

Anglers have access to the Kennebec River at several locations throughout the Project boundary, including the following sites which are discussed further in Section 4.9.

- Hinckley Boat Launch,
- Shawmut Canoe Portage (including the take-out and put-in),
- Skowhegan Boat Launch (non-Project),
- Skowhegan Route 2 Wayside Picnic Area (non-Project).
- Route 2 Informal Fishing Access Areas (including the Route 2 East Roadside Access Area and Route 2 West Roadside Access Area),
- River Road Angler Access Area, and
- East Abutment Informal Angler Access Area.

4.6.1.7 Benthic Macroinvertebrates

As discussed in detail in the water resources section (Section 4.5), the Licensee sampled the benthic macroinvertebrate community in the tailwater area in 2016 to determine if water quality standards based on the invertebrate community were attained.

Metrics evaluating community tolerance/intolerance revealed that sensitive genera comprised a measurable proportion of the macroinvertebrate community downstream of Shawmut. Members of the orders Ephemeroptera, Plecoptera, and Trichoptera (EPT) are considered particularly sensitive to pollution and can provide information important to the condition of the benthic macroinvertebrate community. Individuals from the EPT assemblage were present at both sampling locations 1 and 2, comprising 40.3 percent of the total number of specimens at sampling location 1 and 67.7 percent of the total number of specimens at sampling location 2.

Macroinvertebrate samples collected at both sample locations yielded adequate numbers of sensitive taxa indicating that under the current and proposed operational regime there are no detrimental effects to the macroinvertebrate community. MDEP provided the Classification Attainment Reports for both sites. MDEP's final determinations was that the macroinvertebrate

community sampled at site 1 met Class A water quality standards and the community sampled at site 2 met Class B water quality standards[15]; a full report was provided as part of the ISR.

4.6.2 Environmental Effects

4.6.2.1 Water Quality

Water temperature and DO conditions can affect both resident and diadromous fish species. Resident brown trout and other salmonids are particularly influenced by water temperature. The near-lethal water temperature for adult brown trout is 27.2ºC (81ºF); optimal growth for adult and juvenile brown trout occurs between 12 and 19ºC (53.6 to 66.2 ºF) (Raleigh 1984). Generally, brown trout avoid water with DO less than 5.0 mg/L (Raleigh 1984). DO monitoring demonstrated that values were above 5 mg/L throughout the impoundment and throughout the water column in the summer months, except for four individual measurements where some low DO conditions were observed at water depths of 8 meters and 9 meters. These rare low readings were unlikely to be caused by run-of-river operations.

Monitoring in the Shawmut Project area indicates that water temperature in the summer months (June – August) supports most resident fish species. Water temperature is less than optimal but was less than the near-lethal limit for brown trout throughout the impoundment and throughout the water column in the summer months. Researchers noted six individual temperature measurements in the main stem of the Kennebec River on July 27, 2016, at the surface of the water (i.e., 3 inches below the water surface) that exceeded 27.2 ºC. Also, some elevated temperature readings (> 27.2 ºC) occurred in tributary habitat, upstream of the main stem of the Kennebec River.

4.6.2.2 Aquatic Habitat

Continued operation of the Shawmut Project with existing and proposed fish passage measures, discussed in greater detail below, is not expected to adversely affect aquatic habitat, including EFH and critical habitat for Atlantic salmon. The Licensee normally operates the Shawmut Project in a run-of-river mode. Run-of-river operations provide relatively stable headpond

[15] In a letter dated December 3, 2018 the MDEP concluded that the benthic macroinvertebrate community in the Kennebec River below the Shawmut dam meets Class B aquatic life standards.

elevations and downstream river flows that protect existing habitat from changes in water level conditions. The Licensee's impoundment tributary access study demonstrated that fish and other aquatic organisms can access tributary habitat during normal operations, or during maintenance activities that may require an impoundment drawdown. The study demonstrated that fish access to tributary habitat is not adversely affected by operations. No physical or hydrological barriers to fish access into Martin, Carrabassett, or Wesserunsett stream were identified at the three headpond conditions evaluated. The Licensee's brown trout study and water temperature study demonstrated that the Shawmut Project provides habitat for brown trout, especially in the upper reaches of the impoundment near the Big Eddy, but that optimal water temperature conditions are naturally limited during the summer months.

4.6.2.3 Fish Passage

The fish passage study results discussed herein and developed in the preparation of the SPP and draft BA were used to evaluate existing fish passage effectiveness, to identify fish passage enhancements, to design new fishways or modifications to the existing fishways for both upstream and downstream passage, and to consider Atlantic salmon passage performance standards for the Kennebec River hydropower projects, including Shawmut. Final design and construction of a new upstream fish passage facility, as authorized under the existing license for the Shawmut Project, is currently under way. Information garnered through ISPP-required fish passage studies led to the development of a final SPP that outlines operation of the upstream passage facility, installation and operation of downstream passage measures, and performance standards. The final SPP was developed in consultation with the fishery agencies and was filed with FERC December 31, 2019. The fish passage measures for the Shawmut Project currently required for implementation and included in the SPP are described in more detail below.

Upstream Fish Passage

Permanent upstream fish passage (fish lift) at the Shawmut Project is planned to be operational by May 2021. The Licensee developed the conceptual engineering design for an upstream fish passage facility at the Shawmut Project in consultation with the resource agencies in 2016 and 2017 (Brookfield White Pine Hydro 2018). The Licensee also performed a CFD 3D-model and a river herring radio telemetry study to inform the design and location of the upstream fishway.

The Licensee met with state and federal agencies to discuss potential fishway concepts, locations, the CFD modeling results, and the results of an adult river herring telemetry study in October 2016 and January 2017. At the January 2017 meeting, the Licensee and the agencies agreed to a conceptual design for a new fish lift adjacent to Unit 1, an upstream fish flume to connect the Unit 7 and 8 powerhouse tailrace to the Unit 1-6 powerhouse tailrace, and a downstream flume to discharge Tainter gate and deep gate flows into the Unit 7 and 8 tailrace. The 30 percent and 60 percent fishway design agency consultation meetings were held in August and December 2017, and the 90 percent design meeting was held in 2019. Following agency review and comment, final Shawmut fishway design plans were filed with FERC on December 31, 2019.

Under the final SPP and new license issued for the Project, White Pine Hydro will operate the upstream fish passage facility pursuant to the Fish Passage Operations and Maintenance Plan (filed with FERC December 31, 2019), as approved by the appropriate fisheries resource agencies. White Pine Hydro anticipates that the installation and operation of upstream fish passage facilities will result in the successful passage of the target fish species at the site.

The Licensee will continue to provide upstream passage for American eels using existing techniques (i.e., seasonal installation of an eelway at the dam). Based on capture data of juvenile eels, the continued operation of the Shawmut Project is expected to result in successful passage of American eels over the dam.

Downstream Fish Passage

Downstream passage for Atlantic salmon, shad and river herring at Shawmut is provided through a combination of a sluice, Tainter gate, and opening of hinged flashboards. The sluice is located on the right-hand side of the intake structure next to Unit 6. The sluice is 4-feet-wide by 22-inches-deep and can be manually adjusted by adding or removing stoplogs. With all stoplogs removed the sluice passes between 30 and 35 cfs of water which is discharged over the face of the dam into a 3-foot-deep plunge pool connected to the river. The Tainter gate located next to the sluice measures 7-feet-high by 10-feet-wide and can pass flow up to 600 cfs.

As discussed in Section 4.6.1.3, White Pine Hydro has conducted several years of Atlantic salmon smolt studies to evaluate the effectiveness of the existing downstream passage facilities

at the Shawmut Project. The results of downstream smolt studies conducted in 2012, 2013, 2014 and 2015 found passage effectiveness and station survival at Shawmut varied considerably depending on river flows, Project operations, and gate openings. Three-year average estimates of percent utilization of various passage routes, and the survival rate associated with each route are provided in Table 4-21. On average, 38.7 percent of smolts were found to utilize the downstream bypass, and the majority of those did so via the Tainter gate when it was operated wide open (600 cfs). Fish passing through the sluice or Tainter gate had a survival rate of 97.4 percent. In addition, it was found that opening the three sections of hinged flashboards adjacent to unit 1 (passing approximately 420 cfs) helped to increase the percent of smolts bypassing the powerhouse, with 5.2 percent of smolts using the hinged flashboard openings. However, these fish had a lower survival rate (86.7 percent) than fish using the sluice gate or Tainter gate (100 percent). Smolt passage via turbine Units 7-8 was found to be 21.1 percent with a survival rate 93.1 percent; while passage via units 1-6 was 11.6 percent with a survival rate of 92.1 percent. On whole, the studies found that the 3-year station survival estimate for salmon smolts at Shawmut was 93.5 percent.

Based on 2012-2015 study results and the Licensee's different tests of adding downstream passage through the Tainter gate and lowered flashboard sections, it was concluded that the lowering of one more hinged flashboard section (for a total of four sections), raising the flow from 420 cfs to 560 cfs, should provide adequate flow to allow additional smolts to pass via this route. NMFS, by letter dated May 22, 2017, concluded that the additional measures are expected to result in whole station survival rates of more than 95 percent.

Because downstream passage effectiveness and survival rates could be improved and contribute further to meeting the proposed cumulative performance standard for the four lower Kennebec projects, the Licensee proposed in the SPP to undertake certain modifications to the downstream passage facility and its operation at the Shawmut Project. Specifically, the SPP includes the following proposed measures:

- Install a guidance boom (e.g., Worthington boom) in the forebay in front of Units 7 and 8. The proposed boom will have a depth of 10 feet, consist of rigid panels with ½ inch perforations (48 percent opening).

- Continue to operate the forebay bypass gate for utilization by adult and juvenile Atlantic salmon April 1 through December 31, as river conditions allow.
- Ensure that the forebay bypass gate is operated to maintain a flow of 6 percent of station unit flow through the gate.
- Continue to provide a flow of 600 cfs through the Tainter gate for the smolt passage season.
- Undertake measures necessary to keep the guidance boom in place and in good operating condition. If the guidance boom becomes dislodged or damaged, repair or replacements to the guidance boom would be performed as soon as can be safely and reasonably done.

In the interim period, until the fish boom is installed, the Licensee also proposes the following measure to enhance downstream passage of Atlantic salmon at the Shawmut Project:

- Drop four sections of hinged flashboard (passing approximately 560 cfs in total) for the month of May during the smolt passage season.

Continued operation of the downstream passage facilities at Shawmut with the proposed modifications will provide out-migrating smolts with safe, timely and effective passage. The results of studies conducted in 2012-2015 and summarized in Table 4-21, suggest that increases in whole station survival rates can be achieved by increasing the portion of smolts utilizing the downstream bypass (sluice or Tainter gate). The Licensee's proposal in the SPP to install a guidance boom to help direct the fish to the bypass gates should significantly increase the portion of smolts using the bypass, thereby increasing the survival rate of a larger portion of smolts.

The Licensee retained Normandeau Associates to conduct a desktop assessment to evaluate the potential installation of a guidance boom in the Shawmut forebay in front of units 7 and 8. The desktop model evaluated station survival over a range of Kennebec River flow conditions from 25 percent up to 75 percent exceedance (Brookfield 2019b). The model assumed the distribution of smolt passage follows a 1:1 ratio proportional to the distribution of river flow between spill and forebay routes. Analysis of generational discharge reported by White Pine Hydro operations, at the time of downstream passage for radio-tagged Atlantic salmon smolts in the Shawmut forebay during the 2013-2015 study years, indicated that the overall effectiveness of the existing downstream bypass was inversely related to total generation (i.e., as generation flows increase the effectiveness of the forebay Tainter gate decreases). For each model run associated with this analysis, the bypass effectiveness rate for the potential guidance boom was represented by the

sum of the observed rate of effectiveness for the forebay Tainter gate (under a no-boom condition) plus 53 percent of the proportion of smolts fated to pass downstream via the turbine units. Smolt turbine passage was reduced in proportion to the rates of entrainment observed among all radio-tagged individuals passing via either the Francis (Units 1 through 6) or propeller units (Units 7 and 8) at Shawmut during the 2013-2015 field studies. The 53 percent guidance boom effectiveness rate was based on the overall rate observed for all radio-tagged smolts which entered the power canal at Lockwood during the 2013-2015 studies. Survival rates at all passage routes were estimated using the route-specific rates summarized in Table 4-21. Based on the assumptions summarized here, the expected station survival for Atlantic salmon smolts at Shawmut will range from 96 percent to 96.3 percent across the range of flow conditions considered. Thus, with the proposed installation of the guidance boom, the whole stations survival rate for downstream passage of Atlantic salmon smolts at Shawmut is expected to increase sufficiently for the four lower Kennebec hydro projects to collectively meet the proposed cumulative performance standard in the SPP.

To demonstrate that the addition of a guidance boom to the Shawmut downstream bypass system has improved the overall effectiveness of the downstream passage facilities, the Licensee proposes in the SPP to conduct up to 3 years of additional smolt studies designed to evaluate whole station survival at the Shawmut Project, and the overall contribution of Shawmut to achieving the cumulative (end-of-pipe) performance standard for Atlantic salmon smolts for the four projects. The studies would be designed in consultation with the agencies and would utilize methods that are acceptable to both the Licensee and agencies. The studies would be designed to provide a reasonable estimate of whole station survival for salmon smolts. The joint probability of the four station-specific survival estimates would generate the cumulative (end of pipe) estimate for each study year. The average of the cumulative estimates for the 3 study years would be evaluated relative to the downstream salmon smolt station survival standard. The individual performance of the Shawmut Project would be assessed during these comprehensive studies. Conduct of additional smolt studies following completion of the proposed modifications to the downstream passage facilities at Shawmut would ensure that the modifications have increased the whole station survival for Atlantic salmon smolts at the Project, and that the Project is providing safe and effective passage for smolts.

The proposed guidance boom at Shawmut is also expected to improve Atlantic salmon kelt passage. While there are not currently enough returning adult Atlantic salmon to conduct studies of downstream kelt passage, it is likely that the guidance boom would improve kelt passage by ensuring that more downstream migrating kelts are directed to the bypass.

The Licensee is proposing improvements to the existing downstream fish passage, including a forebay fish boom. In the interim, the Licensee will continue to provide downstream passage for diadromous fish species at the dam using the existing system of gates and spillage. The downstream fish passage system is operated from April 1 through early December annually to provide passage for Atlantic salmon, river herring, and American shad.

The Licensee has extensively studied turbine entrainment, turbine survival and whole-station survival of Atlantic salmon at the Shawmut Project as part of its long-standing and ongoing efforts to improve fish passage at all of the lower Kennebec River projects. Under the terms of its current license which was amended to incorporate significant fish passage measures and monitoring included in the ISPP, the Licensee conducted extensive studies of smolt passage, mortality, and survival during the period 2012-2015. The results of these study efforts are discussed at length in annual anadromous fish passage reports that have been filed with the Commission over the decades as part of the KHDG Agreement and more recently in compliance with ISPP and supporting BO. In December 2019, the Licensee filed a final Species Protection Plan with the Commission for the four lower Kennebec River projects, including Shawmut. A draft BA was filed at the same time, and included a comprehensive analysis of the effects of Shawmut Project operations, fishway operations, as well as ongoing (previously authorized under the ISPP) and proposed (in the SPP) fish passage enhancement measures to benefit Atlantic salmon, and other diadromous species including American shad, river herring, and American eel. The draft BA, as applicable to the Shawmut Project, is incorporated herein by reference.

The Licensee also studied the effects of the Project on American eel downstream passage. As described in Section 4.6.1.1, in 2007, the Licensee conducted a radio-telemetry study to evaluate downstream passage of out-migrating silver American eels at the Shawmut Project. The Licensee completed a second radio-telemetry study in 2008 to evaluate the effectiveness of the deep gate

located between the two powerhouses at various flows while altering nighttime operation of turbine Units 1-6 and restricting the nighttime use of Units 7 and 8. Based on the study results, the Licensee annually opens the deep gate 2.5 feet and turns off Units 7 and 8 for eight hours during the night for a 6-week period between September 15 and November 15 as a permanent means to pass adult eels downstream. The Licensee is proposing to continue this eel passage measure as a condition for the term of the new license.

Resident Species

Because fisheries management of the lower Kennebec River over the past several decades has focused primarily on the restoration of native diadromous species to the river, most of the study work done to evaluate Project effects on fish passage and related issues such as entrainment potential have also focused on the diadromous species. As a result, no agencies have requested, and the Licensee has not conducted specific assessments of entrainment potential and turbine survival/mortality rates for brown trout, smallmouth bass, or other resident species. In fact, in its 2013 BO issued in response to the ISPP, NMFS noted that smallmouth bass and brown trout introductions, along with other non-indigenous species, significantly degrade habitat quality throughout the Merrymeeting Bay salmon habitat recovery units (SHRU) by altering natural predator/prey relationships. Notwithstanding this statement, the Licensee believes that all the fish passage measures being undertaken currently and proposed under the SPP, including the proposal to install a new guidance boom at the Shawmut Project, would likely reduce the entrainment potential for brown trout and smallmouth bass, as well as for anadromous salmon, herring, and shad.

The Licensee conducted a brown trout telemetry study as part of this relicensing effort which tracked the movements of 50 radio-tagged brown trout. The results of this study did not specifically examine brown trout entrainment, but the study did find that many of the tagged trout moved out of the Shawmut impoundment and downstream of Shawmut dam on high flows. Most of those fish took up residence in the Shawmut tailwater area or moved even further downstream. Brown trout telemetry studies such as that conducted by the Licensee and reported on in this application, provide sufficient information about the ability of this species to pass downstream of the dam.

More importantly, as discussed in the SPP and BA these ongoing and proposed measures are expected to allow the Shawmut Project (along with the other lower Kennebec River projects) to meet the endangered species take limitations that are likely to be established by NMFS in their BO to be issued in response to the SPP. Thus, going forward, while some entrainment of salmon smolts may still occur during normal Shawmut project operations, the Licensee expects, based on the results of effectiveness testing and proposed modifications to the downstream bypass system, that the SPP take limits will be met in the future.

4.6.3 Species of Special Concern

The potential effects of continued operation of the Shawmut Project on aquatic species of special concern are addressed in the Rare, Threatened and Endangered Species section, Section 4.8.

4.6.4 Proposed Environmental Measures

White Pine Hydro proposes the following measures related to fish and aquatic resources:

- Continue the current run-of-river mode of operation during the term of the new Project license, with a formal condition to maintain a pond level within one foot of the normal full pond elevation of 112.0' during normal operations in order to manage pond levels in a manner that outflow generally matches inflow to the project. Temporary and minor fluctuations while managing the pond level may occur while turning units on and off, opening gates, and inflating/deflating the rubber dam segments.

The continued operation of the Project as run-of-river will protect fish and aquatic habitat in the impoundment by minimizing fluctuations in water levels and providing consistent impoundment aquatic habitat conditions. Run-of-river operations will also maintain consistent Project outflows where outflow is generally equal to Project inflow on a daily basis. Relatively consistent river flows in the Project tailwater area will protect fish and aquatic habitat downstream of the dam and also ensure consistent migratory pathway conditions for diadromous fish.

In addition to this operational proposal, White Pine Hydro is proposing to continue to implement the SPP and to undertake the fish passage measures contained therein, including:

- Continue to operate the new upstream fish lift (expected to be installed by May 2021) in accordance with agency approved operational plan.
- Install a fish guidance boom (e.g., Worthington boom) in the forebay (in front of Units 7 and 8) to direct downstream migrants to the existing downstream bypass.

- Continue to operate the existing downstream fish passage facility and maintain the forebay fish guidance boom.
- Conduct up to three years of additional downstream passage studies to reevaluate smolt passage and station survival.
- Conduct up to two years of adult salmon studies to evaluate the performance of the Shawmut fish lift.
- Revise and implement a site-specific Fish Passage Operations and Maintenance Plan.

As described previously, the SPP developed in consultation with the fishery agencies and filed with FERC December 31, 2019 details the Licensee's commitments for protection of GOM DPS of Atlantic salmon at the Shawmut Project to provide safe, effective and timely upstream and downstream passage measures and to protect and enhance access to critical habitat. These same measures are designed to enhance restoration and passage for other anadromous species including alewife, blueback herring, and American shad. Atlantic salmon would be protected through a combination of enhanced upstream and downstream passage, avoiding and minimizing delay and injury, and protection of critical habitat in the Project area. Measures to be undertaken by the Licensee and related activities expected to occur during the term of the SPP for the protection of Atlantic salmon at Shawmut are outlined in Table 4-24. While the fish passage measures included in the SPP were developed to protect Atlantic salmon and salmon habitat, the fish passage measures will provide effective upstream and downstream passage for American shad and river herring.

Table 4-24 Overview of Species Protection Plan Measures for the Shawmut Project

Upstream Passage Measures	Downstream Passage Measures	Monitoring Measures and Management
Operational – Operate the new upstream fish lift in accordance with agency approved operational plan.	**Structural** – Install guidance boom (e.g., Worthington boom) in forebay (in front of units 7 and 8) to direct downstream migrants to the bypass gate(s). **Operational** – continue to operate the existing downstream fish passage facility and maintain the forebay fish boom.	Up to 3 years of additional downstream passage studies to reevaluate smolt passage and whole station survival. Up to 2 years of adult salmon studies to evaluate the performance of the Shawmut fish lift. Revise and implement site-specific Fish Passage Operations and Maintenance Plan.

4.6.5 Cumulative Effects

In SD2 FERC identified migratory fish, including Atlantic salmon, American shad, alewife, and blueback herring, and American eel, as resources that could be cumulatively affected by the continued operation and maintenance of the Shawmut Project. FERC identified the geographic scope for migratory fish to include the Kennebec River Basin, from the upstream Brassua Hydroelectric Project (FERC Project No. 2615) on the Moose River to the mouth of the Kennebec River at Merrymeeting Bay and the Atlantic Ocean, including mainstem Kennebec River dams and impoundments. Activities within this basin that may cumulatively affect these migratory fish species include the construction and operation of dams within the river basin, which have resulted in migratory barriers and loss of spawning habitat.

4.6.5.1 Kennebec Basin Description

The Kennebec River's mainstem originates at the outlet of Moosehead Lake and flows generally southward through the towns and cities of Bingham, Solon, Anson, Madison, Norridgewock, Skowhegan, Waterville, and Augusta. The river transitions from a high gradient cold water river

from upstream of Indian Pond to Madison, to a warmwater river from Skowhegan to Augusta. A 24-mile-long, mostly freshwater tidal segment of the river exists downstream from Augusta, and slightly brackish conditions exist periodically in Merrymeeting Bay.

The three storage projects in the Kennebec River storage system, Brassua, Moosehead, and Flagstaff, account for 20 percent, 53 percent and 27 percent, respectively, of the nearly 45 billion cubic feet (bcf) of useable water storage available in the Kennebec River storage system. The river storages are used to help manage high flows in the spring, and to provide steady base flows during the summer. Downstream of the storages, river flow in the upper basin (e.g., Harris Hydroelectric Project, Wyman Hydroelectric Project) is modified daily to provide hydropower peaking and storage operations. However, White Pine Hydro operates the Williams Project to capture and re-regulate water released from the Wyman Project and other upper basin projects to provide a more uniform daily outflow to downstream river reaches including the lower Kennebec River projects: Weston, Shawmut, Hydro-Kennebec and Lockwood. The operation of the upper basin storage Projects, in coordination with the operation and reregulation of flows at the Williams Project help to ensure relatively stable river flows downstream of Solon. From that point downstream, the mainstem Kennebec River projects are all operated as run-or-river, passing relatively stable flows throughout the lower portion of the river basin.

The Lockwood Project (FERC Project No. 2574) is the lowermost dam and hydroelectric plant on the mainstem river. The drainage area above the Lockwood Project is 4,228 square miles. Other mainstem projects upstream of Lockwood include Hydro-Kennebec (FERC Project No. 2611), Shawmut (FERC Project No. 2322), Weston (FERC Project No. 2325), Abenaki (FERC Project No. 2364), Anson (FERC Project No. 2365), Williams (FERC Project No. 2335), Wyman (FERC Project No. 2329), and Harris (FERC Project No. 2142). There are also dams on many of the major tributaries (i.e., Cobbosseecontee Stream, Messalonskee Stream, Sebasticook River, Sandy River, Carrabassett River, and Dead River). Three major dam removal projects have occurred in the last 15 years in the Kennebec River basin: Edwards Dam in Augusta (1999), Fort Halifax Dam in Winslow (2008), and the Sandy River Dam removal in Norridgewock (2006). Figure 4-12 depicts the location of the Kennebec River mainstem hydroelectric projects.

4.6.5.2 Historic Effects on Diadromous Fish

The Kennebec River basin has been extensively developed for over a century for industrial use, including driving of logs and pulpwood, mills, and hydroelectric power production. These historic uses of the river have affected water quality, flows, and habitat conditions. In the past several decades, however, changes in watershed management and stricter environmental regulations have resulted in significant improvements in river water quality and flow conditions. Today, water quality at the Shawmut Project and those waters upstream and downstream is very good and meets state water quality standards. Kennebec River flows have also significantly benefitted from the coordinated operation of the upper basin storages, reregulation of flows at the Williams Project, and run-of-river operation of all the lower river hydropower projects, including Shawmut.

It is reported that all species of migratory fish native to coastal Maine watersheds have been adversely affected by development, habitat alteration, construction of dams, timber harvest and log drives, impaired water quality, altered river flows, over-fishing, competition from non-native species, and climate change among other factors (USFWS 2018, NMFS 2009). In the Kennebec River, as in the other Maine rivers, runs of Atlantic salmon, American shad, and other diadromous species have declined since the late 1700s and early 1800s with the industrialization of the river and the effects of many types of human development and human activity. NMFS has identified a number of specific threats to Atlantic salmon in the Kennebec River basin including habitat connectivity (affected by dams, culverts and other obstructions), habitat alteration, water quantity, water quality, over-harvest, disease, predation, aquaculture, low marine survival, and other ecological changes such as climate change (NMFS 2009). Many of these same effects have undoubtedly had an impact on runs of other diadromous species including American shad, alewife, blueback herring, and American eel.

4.6.5.3 Anadromous Fish Restoration Efforts

In the past several decades, state, local, and federal regulations (e.g., Clean Water Act, Federal Power Act, Endangered Species Act) have resulted in improved conditions for migratory fish, leading to significantly improved water quality, the installation of fish passage, and in some instances, dam removal in the watershed. Since the 1970s, the state of Maine and federal fishery

agencies have undertaken numerous activities and efforts to restore diadromous fish stocks to the Kennebec River. These efforts have focused on restoration of American shad, river herring (alewife and blueback herring), Atlantic salmon, American eel, and a few other species. Many of these restoration efforts have been undertaken in partnership with hydropower project owners and licensees. Today, the State of Maine has an established the Kennebec River Diadromous Fish Restoration Project, the goal of which is to restore Maine's native diadromous fishes to their historic range and abundance in the watershed. These species include alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), Atlantic sturgeon (*Acipenser oxyrhinchus oxyrhinchus*), shortnose sturgeon (*Acipenser brevirostrum*), rainbow smelt (*Osmerus mordax*), Atlantic salmon (*Salmo salar*), striped bass (*Morone saxatilis*), Atlantic tomcod (*Microgadus tomcod*), sea lamprey (*Petromyzon marinus*), and American eel (*Anguilla rostrata*) (State of Maine 2019).

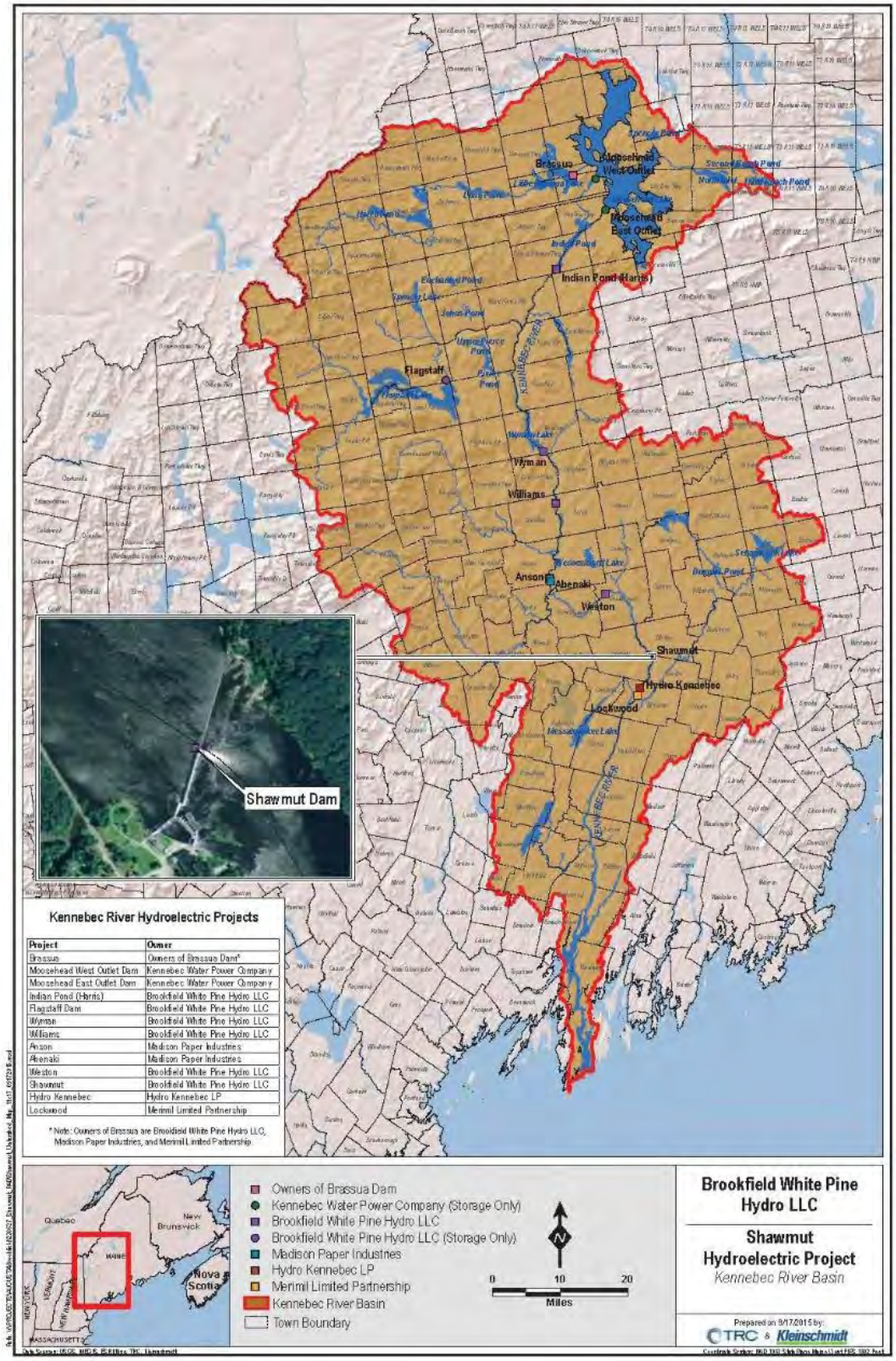


Figure 4-12 Location of Hydroelectric Projects in the Kennebec River Basin

Major restoration efforts that have been undertaken by the state and federal fishery agencies, along with hydroelectric project and dam owners, in the Kennebec River basin include:

- 1987 - First Kennebec Hydro Developers Group (KHDG) settlement agreement signed
- 1998 - Second KHDG settlement agreement signed
- 1987 - 1999 MDMR stocks nearly 644,000 adult alewife and 8.4 million American shad fry into spawning and nursery habitat
- 1999 - Removal of Edwards Dam (Kennebec River)
- 2002 - Fish passage completed at Plymouth Pond Dam
- 2003 - Fish passage completed at Sebasticook Lake Dam (Sebasticook River)
- 2006 – Fish lift operational at the Lockwood Project (Kennebec River)
- 2006 – Fish lift operational at Benton Falls Project (Sebasticook River)
- 2006 – Fish lift operational at Burnham Project (Sebasticook River)
- 2006 - Removal of Madison Electric Works Project Dam (Sandy River)
- 2009 - Removal of Fort Halifax Dam (Sebasticook River)
- 2001-2018 –Atlantic salmon egg, fry and smolt stocking in the Sandy River
- 2005- 2019 – installation and improvements to various downstream fish passages at Lockwood, Hydro-Kennebec, Shawmut and Weston hydroelectric projects.
- 2016 – Fish lift operational at Hydro Kennebec Project

Fish stocking has also been a significant part of Kennebec River basin diadromous fish restoration efforts. In the 1980s and 1990s, state and federal fishery agencies periodically stocked juvenile lifestages of Atlantic salmon in the Kennebec River drainage, primarily in the Sandy River. Starting in 2001, an egg planting program was undertaken in the Sandy River, which has become the primary Atlantic salmon hatchery supplementation strategy for the Kennebec River (USASAC 2019). Details of the salmon stocking efforts were previously covered in Section 4.6.5.3. During the same period, to support American shad restoration in the state of Maine MDMR stocked adult American shad in the river. Details of the American shad stocking efforts can be found in various annual reports developed as part of the 1987 and 1998 KHDG settlement agreements. There have been no efforts and no need to stock alewife in the river (as opposed to the stocking program in several of the lakes of the watershed), as river herring runs have increased significantly since the 1980s.

In summary, diadromous fish recovery efforts in the basin have been ongoing for decades. The resource agencies and the Licensee have been addressing upstream and downstream fish passage on the lower Kennebec since the establishment of the second KHDG Agreement in 1998. The implementation of fish passage and fisheries management efforts have been integral to the process.

4.6.5.4 Species Protection Plans

Since the ESA listing of the GOM DPS Atlantic salmon in 2009, federal anadromous fish restoration efforts for the Kennebec River basin have been focused primarily on Atlantic salmon, while the State of Maine continues its restoration efforts for river herring and American shad. Following the listing of Atlantic salmon, the licensees of the lower Kennebec River projects (Lockwood, Hydro-Kennebec, Shawmut and Weston) developed interim species protection plans (ISPPs) for those projects. The ISPPs were developed through ESA Section 7 consultation with NMFS and the other federal and state fishery agencies and addressed upstream and downstream fish passage needs for Atlantic salmon, as well as for river herring, American shad and American eel (FPLE 2013, HK 2012). The ISPPs were subsequently approved by FERC and the four project licenses were amended to incorporate the terms of the ISPPs. As part of the Section 7 consultation process NMFS issued Biological Opinions (BOs) for the ISPPs, as well as Incidental Take Statements (ITS). The terms and conditions of the BO and the Take limits of the ITS also became operating conditions for the four projects (NMFS 2012, NMFS 2013). The BO issued by NMFS that specifically included the Shawmut Project, included a comprehensive analysis of the cumulative effects of the ISPPs on Atlantic salmon, as well as the other anadromous fish species of management interest (NMFS 2013).

Because the ISPPs expired in 2019, on December 31, 2019, White Pine Hydro filed a final Species Protection Plan (SPP) for the four lower Kennebec River Projects (BWPH 2019). As with the ISPPs, the SPP was developed in consultation with the federal and state fishery agencies. The SPP builds on and continues the protection and restoration efforts undertaken through the ISPPs for Atlantic salmon, as well as the other diadromous fish species, including specific protection and enhancement measures for fish passage and fish passage operations at the Shawmut Project. As with the ISPPs, White Pine Hydro has requested that FERC approve the

SPP and amend the four project licenses to include the terms of the SPP in the project licenses. It is anticipated that NMFS will issue a BO and ITS for the SPP. Once again, it is expected that NMFS will fully assess the cumulative effects of the SPP and SPP measures on Atlantic salmon and the other diadromous species of the Kennebec River.

Because the cumulative effects of continued operation of the Shawmut Project, along with the other hydropower projects in the Kennebec River basin on diadromous fish species has been previously, and will be again, evaluated by NMFS as part of the ESA biological opinion process, the remainder of this section draws from the cumulative effects assessment made by NMFS in the 2013 BO (NMFS 2013), and also from the draft Biological Assessment (BA) that was filed with FERC on December 31, 2019, along with the SPP (BWPH 2019).

4.6.5.5 Fish Passage

The primary cumulative effects on diadromous fish associated with the Lockwood, Hydro-Kennebec, Shawmut and Weston projects are migratory effects. Because 64% of the spawning habitat for Atlantic salmon lies above the Weston Project (primarily in the Sandy River), Atlantic salmon migration is particularly impacted by the migratory effects created by the four projects on the lower Kennebec. American shad and river herring are less affected by the mainstem river project dams, as there are significant quantities of spawning habitat located downstream of Lockwood, and the in the intervening mainstem reaches and tributaries between the Lockwood, Shawmut and Weston projects. Accordingly, the focus of the ISPPs and SPP developed for the four lower Kennebec River projects is on providing safe, effective and timely volitional passage to Atlantic salmon adults and smolts at all four projects. These same measures are expected to also improve passage conditions for the other anadromous species. The measures approved by the previous ISPP and FERC license amendments included three new upstream passage facilities, one each at Lockwood (in the bypass reach), Shawmut, and Weston. Improved passage conditions for American eel were also addressed. The measures proposed in the recently filed SPP are to operate the upstream fish passage facilities, improve the effectiveness of the downstream passages, and achieve a proposed performance standard for the passage of Atlantic salmon at all four projects.

In addition to the mainstem river, upstream and downstream fish passage systems are installed at two dams on the main stem Sebasticook River (Benton Falls Hydroelectric Project and Burnham Hydroelectric Project). No upstream fish passage is presently provided on Cobbosseecontee or Messalonskee streams, although downstream passage and upstream eel passage is being developed at the American Tissue Hydroelectric Project in Gardiner, Maine (Cobbosseecontee Stream). There are also no upstream passage facilities at many of the outlet dams on Kennebec basin ponds and lakes that support significant spawning habitat for river herring. Thus, continued operation of trap and transfer operations for alewife and blueback herring from the Lockwood fish life are an important component of MDMR's restoration and management efforts for these two species.

Other recovery efforts include a major Atlantic salmon egg stocking effort in the Sandy River watershed since the early 2000s undertaken by the MDMR, as well as annual habitat assessments and monitoring programs implemented by MDMR.

Upstream and downstream eel passage measures are in place at the lower Kennebec Projects: Weston, Shawmut, Hydro-Kennebec and Lockwood. Upstream and downstream eel passage measures are also in place at the Anson and Abenaki hydroelectric projects near Madison, Maine, and are being developed at the Williams Project in Solon, Maine. As discussed in Section 4.6.1.2, the Licensee monitors upstream eel passage and has undertaken significant measures to enhance safe downstream passage of eel at the Shawmut Project. Similar measures have been undertaken at the Hydro-Kennebec and Lockwood projects, as well.

The Licensee will be completing upstream and downstream fish passage effectiveness studies to determine whether the existing or newly-installed fish passage measures attain the proposed performance standards for upstream and downstream passage of Atlantic salmon and are effective at passing other anadromous species such as shad and river herring.

4.6.5.6 Cumulative Effects Assessment

Currently, the portion of the Kennebec River in which the Shawmut and other lower Kennebec River projects are located serves as an upstream and downstream migration corridor to and from suitable spawning and rearing habitat. Salmon have been particularly impacted by the cumulative

effect of these migration barriers since 65 percent of salmon spawning and rearing habitat is located upstream of the Weston Project (primarily the Sandy River). Cumulative effects on American shad and river herring are somewhat less, as these species are broadcast spawners, and there is abundant spawning habitat for both below the Lockwood Project and in the lower tributaries.

Thus, the species and life stages of diadromous fish most affected by the cumulative effect of the four lower Kennebec projects include Atlantic salmon adults migrating upstream to spawn and downstream migrating smolts and kelts (Fay et al. 2006). Many of the cumulative effects of the lower Kennebec River projects on returning Atlantic salmon adults, and other anadromous species, have been, or are being, reduced through the provision of permanent volitional upstream fish passage facilities at Lockwood, Hydro-Kennebec, Shawmut and Weston (as authorized through the approval of the ISPP), and interim trap and truck operations from the Lockwood fishlift.

Cumulative impacts to downstream migrating Atlantic salmon (smolts and kelts) as well as shad and river herring have been similarly mitigated through the provision of downstream fish passage facilities at Weston, Shawmut, Hydro-Kennebec and Lockwood, as discussed extensively in the SPP and BA (incorporated herein by reference). The existing facilities at Shawmut and the other hydropower projects were all designed to accommodate all of the anadromous species. Similarly, proposed enhancements to the Shawmut downstream fish passage facilities, as outlined in the SPP, are designed to accommodate and improve passage for salmon, as well as herring and shad.

Because of the KHDG Agreement and more recent regulatory proceedings, including ESA Section 7 consultation and development of the ISPP and the SPP, fish passage measures at the Lockwood, Hydro-Kennebec, Shawmut, and Weston project are either completed or actively under development. The Licensee has completed or will be completing upstream and downstream fish passage effectiveness studies to determine whether existing or newly-installed fish passage measures attain the proposed performance standards for upstream and downstream passage of Atlantic salmon or other effectiveness targets as agreed to with state and federal

resource agencies for shad and river herring. More specific discussion of the cumulative effects on each of the migratory fish species of concern is provided below.

Atlantic Salmon

Runs of Atlantic salmon and other anadromous fish have declined since the late 1700s and early 1800s. In the 1980s and 1990s, state and federal fishery agencies periodically stocked juvenile life stages of Atlantic salmon in the Kennebec River drainage, primarily in the Sandy River. Starting in 2001, an egg planting program was undertaken in the Sandy River, which has become the primary Atlantic salmon hatchery supplementation strategy for the Kennebec River (USASAC 2019). Table 4-25 lists the Atlantic salmon stocking efforts undertaken in the Kennebec River basin in recent years.

Table 4-25 Number of Atlantic Salmon Stocked by Life Stage in the Sandy River

Year	Eggs	Fry	Parr	Smolts
2001-2008	320,000	169,000	0	0
2009	159,000	2,000	0	200
2010	600,000	147,000	0	0
2011	810,000	2,000	0	0
2012	921,000	2,000	0	0
2013	654,000	2,000	0	600
2014	1,151,000	2,000	0	0
2015	275,000	2,000	0	0
2016	619,000	3,000	0	0
2017	447,000	0	0	0
2018	1,228,000	0	0	0

Source: USASAC 2019.

Returns of adult Atlantic salmon to the Kennebec River are low. Since 2006, returns of adult Atlantic salmon to the Kennebec River have been estimated based on the number of fish captured in the Lockwood fish lift. These totals are shown in Table 4-26 and Table 4-27. Table 4-27 provide age and origin information for returning adult salmon. Detailed biological

information on all of the Atlantic salmon captured at the Lockwood fish lift since 2006, including date of capture, age, sex, origin, river temperature and river flow is provided in the annual Kennebec River Diadromous Fish Passage Reports. Reasons for low returns including low marine survival and continued ecological pressures such as climate change and over-fishing.

Currently, there are no reliable estimates of smolt production in the Sandy River. However, NMFS has estimated smolt production based on egg to smolt survival estimates from the literature to be 1.5 percent (NMFS 2013). On this basis, cohort estimates for smolt production from recent egg stockings in the Sandy River (Table 4-27) range from 2,385 (2009) to 18,420 (2018). According to NMFS, given that the Sandy River is relatively pristine, it is possible that production could exceed these estimates (NMFS 2013). In fact, some juvenile production data from the Sandy River suggests the above smolt estimates are likely low (NMFS 2013). In addition, some amount of natural reproduction is likely occurring in the Sandy River (NMFS 2013).

Table 4-26 Number of Atlantic Salmon Adults Captured at the Lockwood Project

Year	Number of Atlantic Salmon Captured	Number Trucked to Sandy River	Number Released to Mainstream River Downstream of Lockwood Dam
2006	15	15	0
2007	16	16	0
2008	22	22	0
2009	32	26	6 (Domestic salmon that had been stocked in the Sandy in the fall 2008)
2010	5	5	0
2011	60	60	0
2012	5	5	0
2013	7	7	0
2014	18	18	0
2015	31	30	1 (At the time, MDMR thought it was a landlock salmon)
2016	37	33	20 (16 of these were recaptured)
2017	39	35	20 (14 of these were recaptured)
2018	11	9	6 (4 of these were recaptured)

Sources: Brookfield 2019; USASAC 2019.

Table 4-27 Adult Salmon Returns by Origin to the Kennebec River 2006-2018

	Hatchery Origin				Wild Origin				
Year	**1SW**	**2SW**	**3SW**	**Repeat**	**1SW**	**2SW**	**3SW**	**Repeat**	**Total**
2006	4	6	5	0	3	2	0	0	15
2007	2	5	0	0	2	6	0	0	16
2008	6	15	1	0	0	0	0	0	21
2009	0	16	0	6	1	10	0	0	33
2010	0	2	0	0	1	2	0	0	5
2011	0	21	0	0	2	41	0	0	64
2012	0	1	0	0	0	4	0	0	5
2013	0	1	0	0	0	7	0	0	8
2014	0	2	0	0	3	13	0	0	18
2015	0	2	0	0	3	26	0	0	31
2016	0	0	0	0	1	38	0	0	39
2017	0	0	0	0	3	25	2	0	40
2018	0	1	0	0	3	7	0	0	11

Source: USASAC 2019

Downstream Atlantic salmon smolt studies demonstrate that successful passage of smolts at the four lower Kennebec hydropower project is very high. As discussed in Section 4.6.1.2, results of smolt telemetry studies conducted between 2012-2015 found that whole station survival rates at the Lockwood, Hydro-Kennebec, Shawmut and Weston projects ranged between 98.6 percent (Lockwood) and 93.5 percent (Shawmut). Since then, the Licensee has undertaken additional measures (opening of flashboard sections) to further improve whole station survival at the Shawmut Project. Together these efforts to continue to improve downstream passage the lower Kennebec River stations undertaken as part of the ISPP and proposed to continue and be enhanced under the SPP ensure that the cumulative effects of the continued operation of the Shawmut Project on outmigrating Atlantic salmon smolts will be minimized.

River Herring

The Shawmut Project lies upstream and downstream of tributaries, ponds and lakes that provide a mix of lotic and lentic habitats where blueback herring and alewife historically spawned. Currently, river herring returning to the Kennebec River have significant amounts of habitat available for spawning below the first mainstem dam on the river, the Lockwood Project. Fish seeking to move above Lockwood, that utilize the Lockwood fish lift, are trapped and trucked to a variety of upstream spawning habitats. These habitats include the mainstem river and tributaries both above Shawmut and between the Shawmut and Lockwood projects, in addition to tributary lakes and ponds that would otherwise be inaccessible to the fish due to outlet barriers. The Lockwood fish lift, trap, and truck provides passage for river herring during the upstream migration period. In addition, a new volitional fish lift at the Hydro-Kennebec Project is available to any fish that are released into the Lockwood impoundment. With the construction of the fish lift at Shawmut, which was authorized as part of the ISPP and will be operational in May 2021, river herring will be afforded access to the mainstem river and tributaries between the Shawmut and Weston project dams, including Martin and Wesserunsett streams. Some of the ponds and lakes located in the headwaters of these tributaries will remain inaccessible to herring other than through trapping and trucking due to barriers at the pond outlets.

MDMR's target run sizes for alewife and blueback herring in the Kennebec River below Skowhegan (Weston Project) are 134,000 and 1,535,000 fish, respectively. The fish lift that will be constructed at the Shawmut Project has been designed to accommodate this number of river herring. Thus, once the fish lift becomes operational in 2021, thousands of river herring will be afforded volitional access to significant amounts of additional spawning and rearing habitat. Under the provisions of the SPP, a year later, in 2022 when volitional fishways become operational at the Lockwood Project bypass and the Weston Project, over 1,000,000 river herring will have volitional access to the entire Kennebec River mainstem and tributaries downstream of Madison, Maine (BWPH 2019). Thus, the continued operation of the Shawmut Project as proposed will result in significant positive cumulative effects on river herring.

American Shad

American shad have been the focus of a concerted effort by MDMR to restore anadromous fish to the Kennebec River for decades. Since the 1980s, American shad have been periodically stocked in the Kennebec River by MDMR, depending on the availability of broodstock.

Shad have access to large amounts of spawning habitat downstream of the Lockwood Project. Some fish that utilize the Lockwood fish lift and may be captured and transported upstream of Lockwood. Once installed, the volitional upstream fishway in the Lockwood bypass will also be available for use by American shad. The new fish lift at the Hydro-Kennebec Project provides shad with volitional passage past that dam.

MDMR's target run size for American shad below Skowhegan (Weston Project) is 177,000 fish (BWPH 2019a). The fish lift being constructed at the Shawmut Project has been designed to accommodate this number of shad. Therefore, once the fish lift becomes operational in 2021, American shad will be afforded volitional access to additional mainstem river spawning and rearing habitat. Under the provisions of the SPP, a year later, in 2022 when volitional fishways become operational at the Lockwood Project bypass and the Weston Project, more than 100,000 American shad will have volitional access to the entire Kennebec River mainstem and tributaries downstream of Madison, Maine. Thus, the continued operation of the Shawmut Project as proposed will result in significant positive cumulative effects on American shad.

American Eel

American eel is the only catadromous fish species that occurs at the Project. Eel passage is provided at all four of the lower Kennebec hydroelectric projects, including Shawmut. As discussed previously, upstream passage at Shawmut is provided via a seasonally installed eelway. Upstream eel passage is also available at the Lockwood and Hydro-Kennebec projects. Downstream passage at Shawmut is provided by opening a deep gate and turning off units 7 and 8 for an 8-hour period per night for a 6-week period between September 15 and November 15 annually. Provisions for downstream passage of American eel are also provided at the other lower Kennebec River projects. Collectively, these measures ensure that downstream migrating American eel are afforded enhanced passage resulting in reduced cumulative impacts to out migrating eels.

4.6.6 Unavoidable Adverse Effects

Proposed operation of upstream fish passage will provide access to upstream habitat, while implementation of downstream passage and protection measures will reduce the potential for entrainment, and thereby facilitate the safe, timely, and effective passage of migratory fish species. Operation of the Shawmut Project may continue to result in the delay or entrainment of individual fish, but these effects are expected to be limited in scope and will not have an effect at the population level.

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4.7 Wildlife and Botanical Resources

4.7.1 Affected Environment

4.7.1.1 Upland Habitats, Communities and Species

Most wildlife habitat at the Shawmut Project occurs on private lands adjacent to, but outside, the Project boundary. The Project occurs along the Kennebec River with limited upland acreage. The area immediately surrounding the Project consists primarily of a hardwood forested shoreline surrounded by extensive agricultural and light residential development.

A reconnaissance field survey was conducted in 2016 to identify the botanical and wildlife resources in the study area. The study area included the main stem of the Kennebec River from the upper Shawmut area (approximately 12 miles upstream of the dam) to approximately 1,200 feet downstream of the dam. The study area included areas within 200 feet of the project shoreline. Based on the information collected during the field work, a habitat cover type map was developed using field data and available aerial imagery (Figure 4-13 - Figure 4-24). The dominant terrestrial communities within the current Project boundary include mixed northern hardwoods, silver maple floodplain forest, and hardwood floodplain terrace (Table 4-28). Combined, these three terrestrial communities account for 9.14 percent of the total area within Project boundary.

Table 4-28 Shawmut Project Habitat Types, Acreages, and Percent of Project Area

Habitat Type	Acres	Percent of Project Boundary Area
Agriculture	2.8	0.16
Alder Floodplain	7.1	0.41
Bulrush Marsh	11.0	0.64
Cattail Marsh	4.1	0.24
Cobble-River Shore	1.3	0.08
Commercial/Industrial	2.4	0.14
Eastern Hemlock	1.7	0.10
Hardwood Floodplain Terrace	11.2	0.65
Hardwood Seepage Forest	3.5	0.20
Japanese Knotweed (Mono-Culture)	2.2	0.13
Laurentide River Beach	0.2	0.01
Mixed Northern Hardwoods	91.4	5.28

Habitat Type	Acres	Percent of Project Boundary Area
Open Water	1432.4	82.83
Palustrine Emergent Wetland	3.4	0.20
Pickerelweed Marsh	39.6	2.29
Railroad	0.2	0.01
Recreation	1.8	0.10
Red Pine	0.5	0.03
Residential	3.4	0.20
River-Shore Outcrop	1.6	0.09
Road	0.7	0.04
Silver Maple Floodplain Forest	55.5	3.21
Successional	0.0	0.00
Transmission ROW	1.0	0.06
Water Lily/Macrophyte Aquatic Bed	31.7	1.83
White Pine	1.6	0.09
Area Not Surveyed	16.9	0.98
Total Acres	*1729.2*	*100.00*

Source: Brookfield 2017

The mixed northern hardwood community is the most abundant vegetative community in the study area. This forest type is variable, but generally is characterized by a closed canopy with a mixture of deciduous and evergreen trees and sparse shrub and herbaceous layers. This community typically occurs on somewhat steeply sloping sites with well-drained soils (Grawler and Cutko 2010). This community type is broadly defined and can be characterized by variable dominant tree species including both hardwoods and softwoods such as oak, pine, and maple species.

Silver maple floodplain forest is another common community along shores and islands within the study area. This community type was found in 3.21 percent of the study area. It generally occurs in low-lying plains directly adjacent to the impoundment and tailwater shore and is influenced by seasonal flooding. The community development is typically on fine silt or sand (Gawler and Cutko 2010). Trees are widely spaced and many have multiple trunks due to the fluctuation of flood waters. The dominant overstory tree is silver maple which makes up more than 60 percent of the canopy cover.

Hardwood floodplain terraces make up 11.2 acres (0.65 percent) of the overall study area. This community is found on raised terraces directly adjacent to the impoundment and tailwater shore. This community is influenced by flooding, but flooding may not occur annually. The frequency and duration of flooding is less than that of the silver maple floodplain since these areas are slightly elevated from the river. The mineral soils typically have good drainage capacity and are nutrient rich. The tree layer consists of a nearly closed-canopy and includes green ash, American basswood, American elm, black willow, red maple, red oak, and quaking aspen.

Small areas within the Project boundary are classified as agricultural/open field habitat. Most of these lands are actively farmed or used as livestock pasture. Most vegetation within this community type is introduced and include species such as timothy-grass, red clover, buttercup and ragged-robin.

Only 0.20 percent of the Project area was classified as residential. Many of these residential sites are actively maintained by the landowners and therefore much of the vegetation in these areas are manicured lawns or dominated by ornamental cultivars.

4.7.1.2 Wetlands, Riparian, and Littoral Habitat

Table 4-28 provides information on the types and extent of floodplains, wetlands, riparian, and littoral habitat that were identified and mapped as part of the habitat surveys.

The River-shore outcrop community is rare within the study area and is found exclusively downstream of the dam on the east side of the river (Photo 4-1). This community is characterized by sparse herbaceous vegetation growing on outcrops along the shore of the river. Based on the habitat preference of the long-leaved bluet (Photo 4-2), a Maine state-species of special concern, this habitat community was thoroughly searched during the estimated flowering period and plants were observed in several locations on the exposed bedrock. Seasonal flooding and ice scour restrict woody vegetation from establishing in this community, however trace amounts of silky dogwood[16] are present (Gawler and Cutko 2010). Birds associated with this community type include common yellowthroat and alder flycatcher.

[16] Silky dogwood is identified in the Initial Study Report in communities 6, 9, 10, 11, 12, 24, and 26

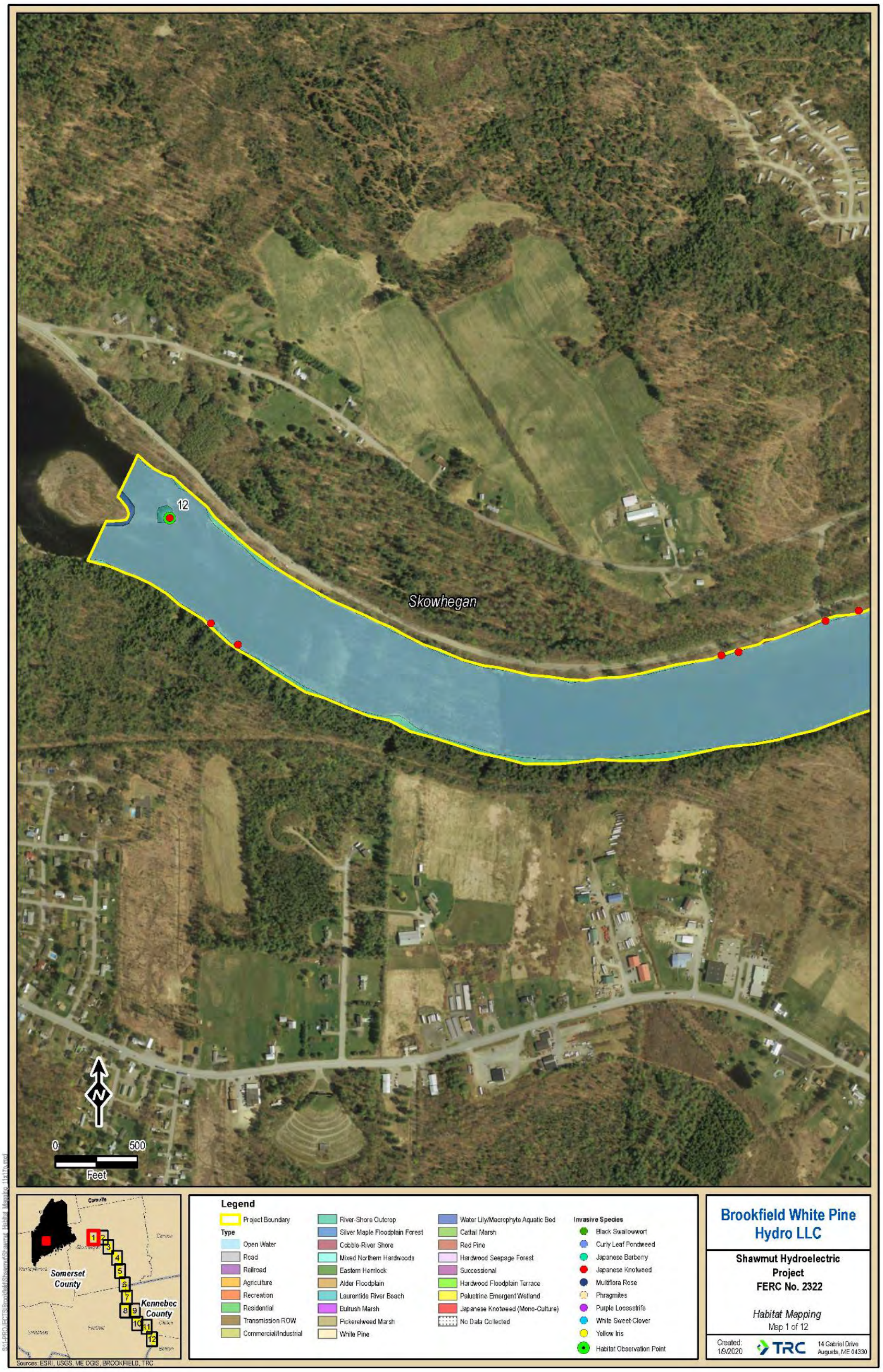

Figure 4-13 Habitat Mapping Map 1

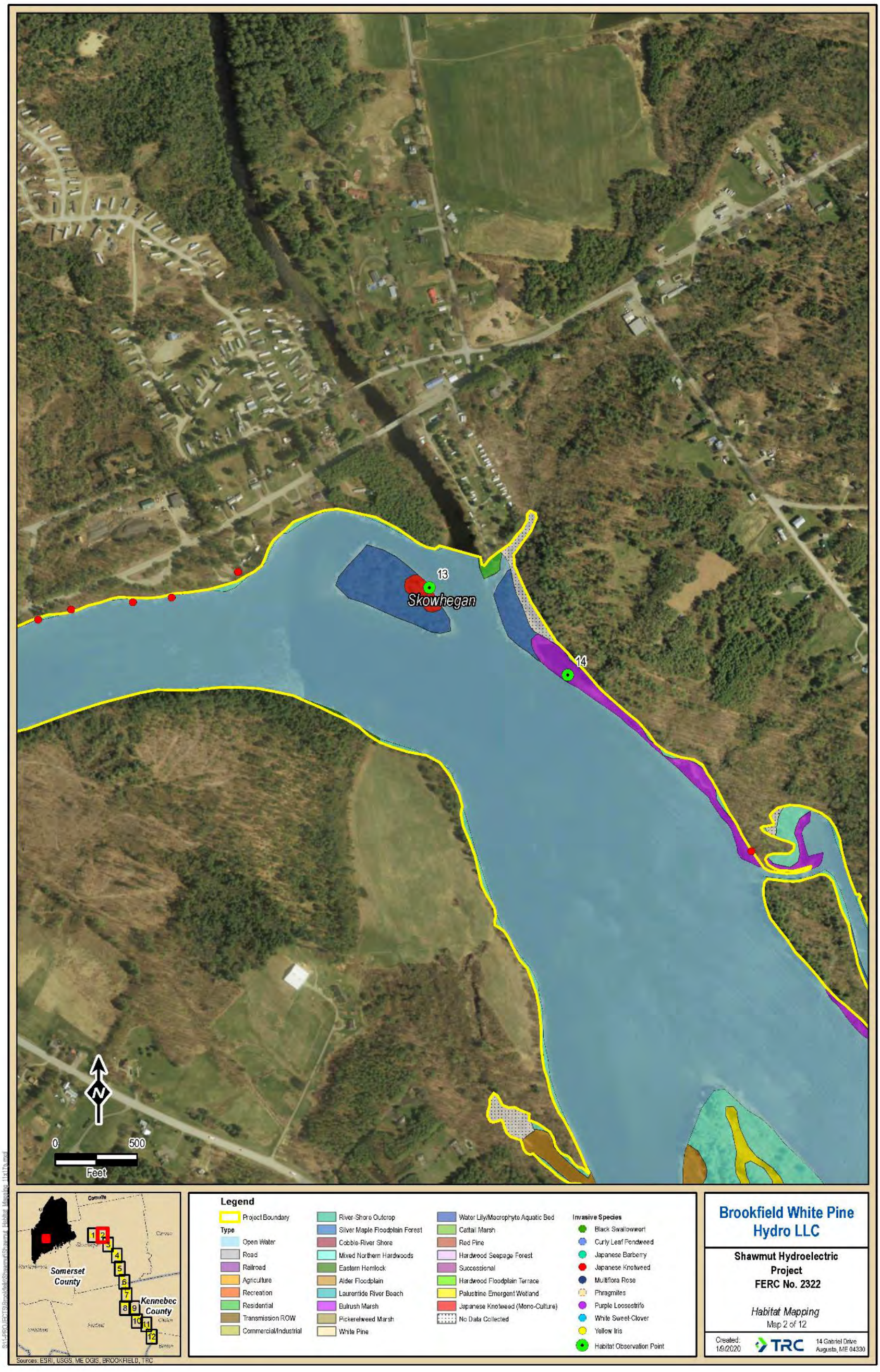

Figure 4-14 Habitat Mapping Map 2

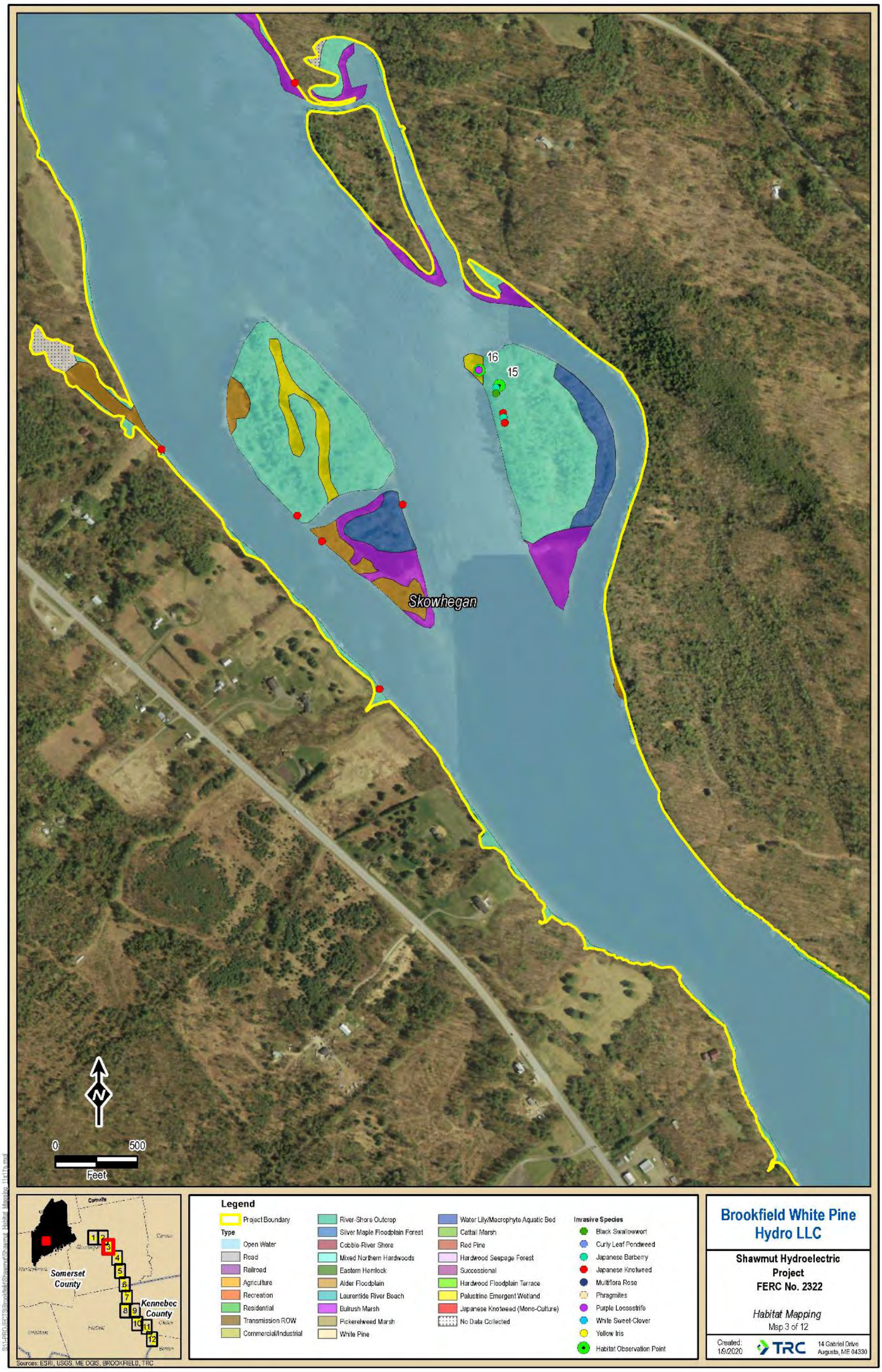

Figure 4-15 Habitat Mapping Map 3

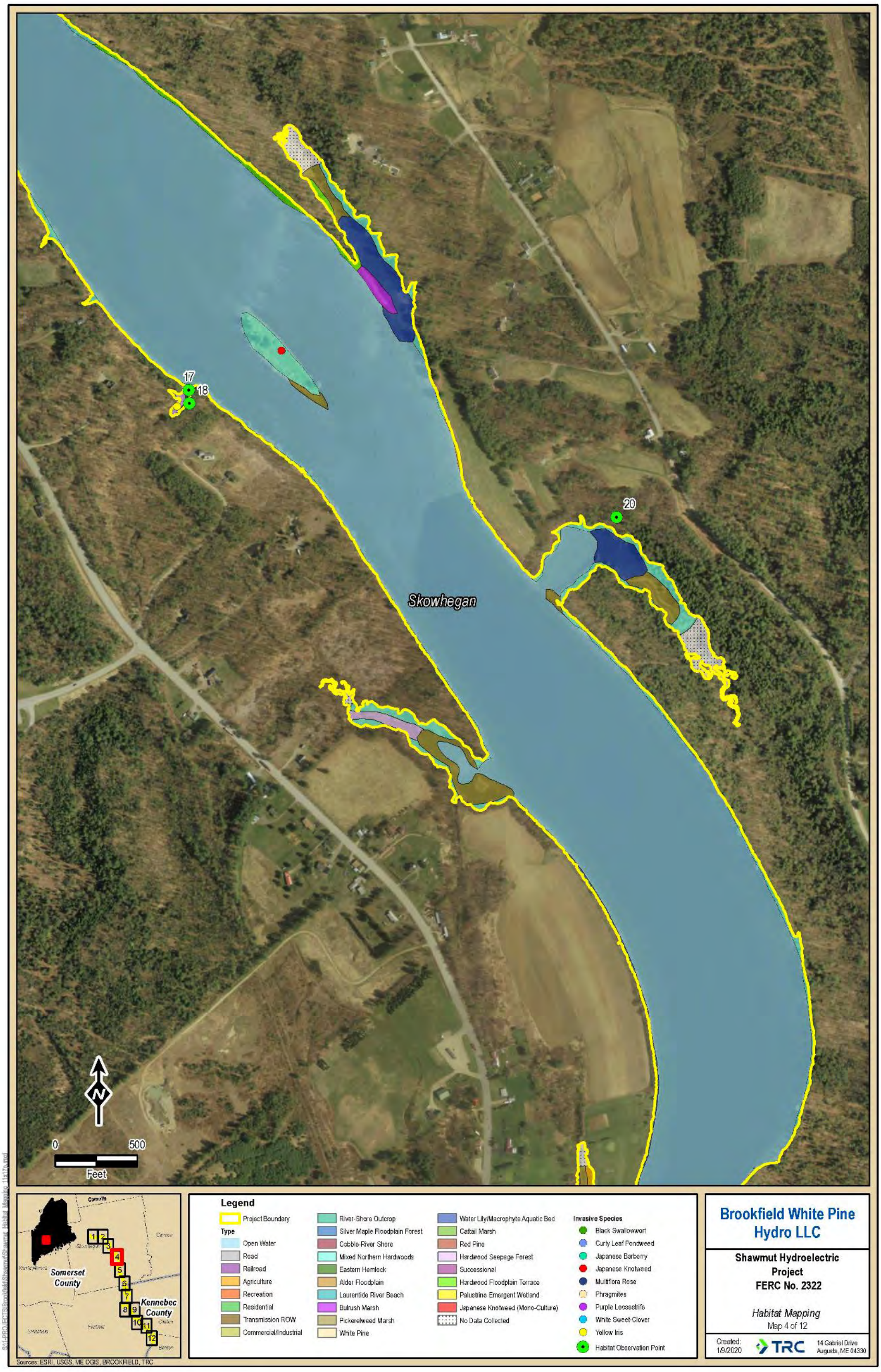

Figure 4-16 Habitat Mapping Map 4

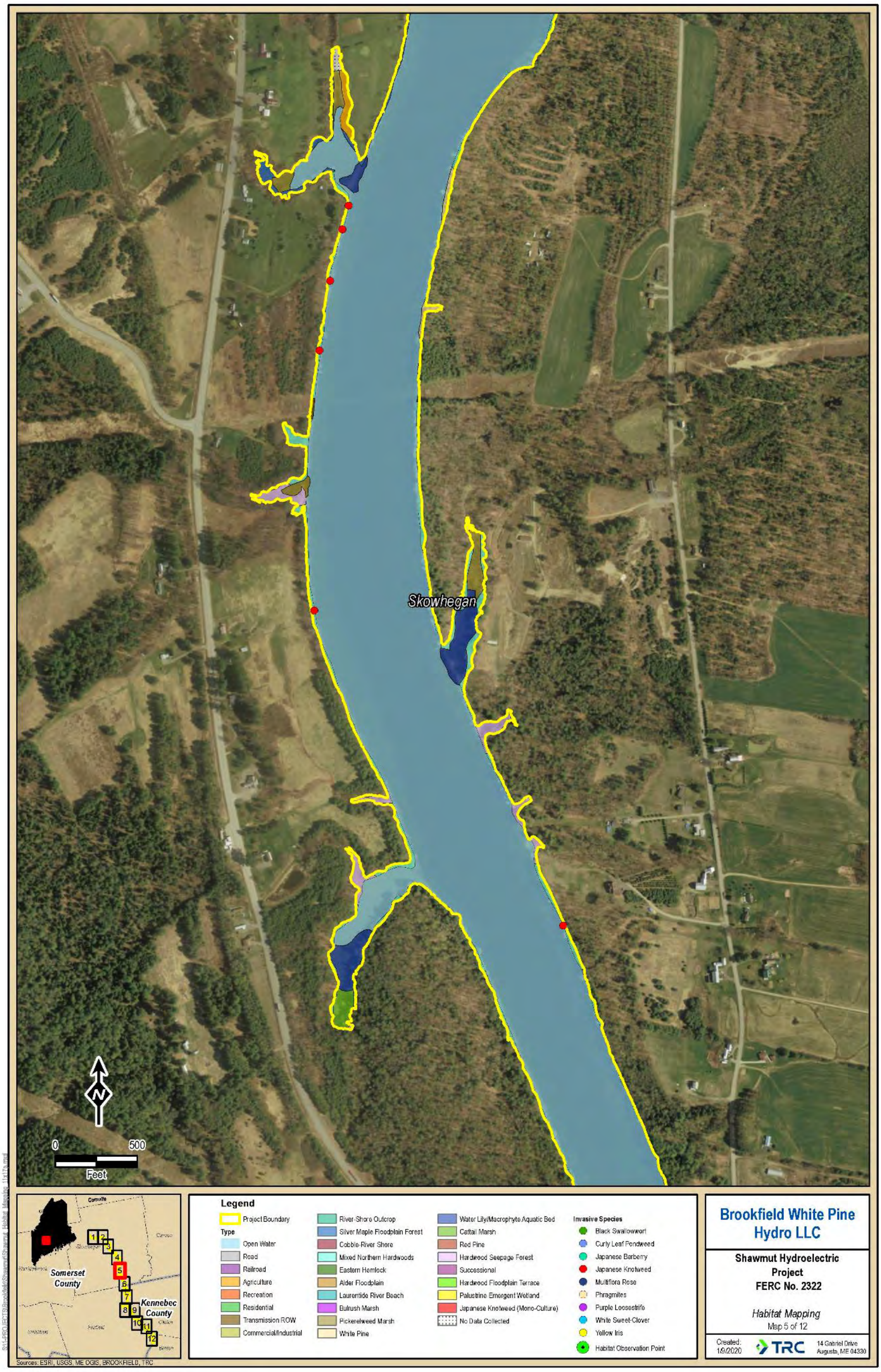

Figure 4-17 Habitat Mapping Map 5

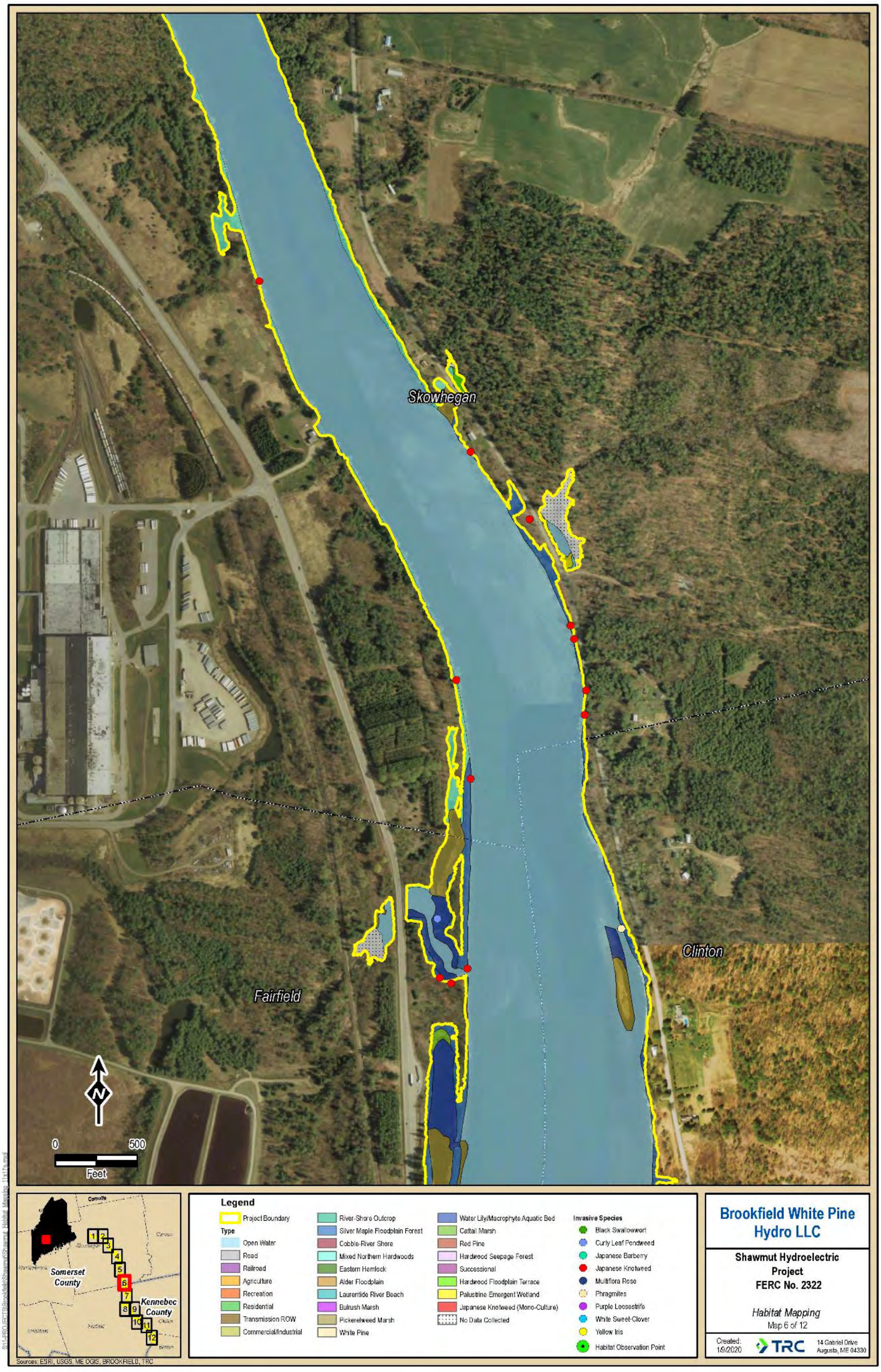

Figure 4-18 Habitat Mapping Map 6

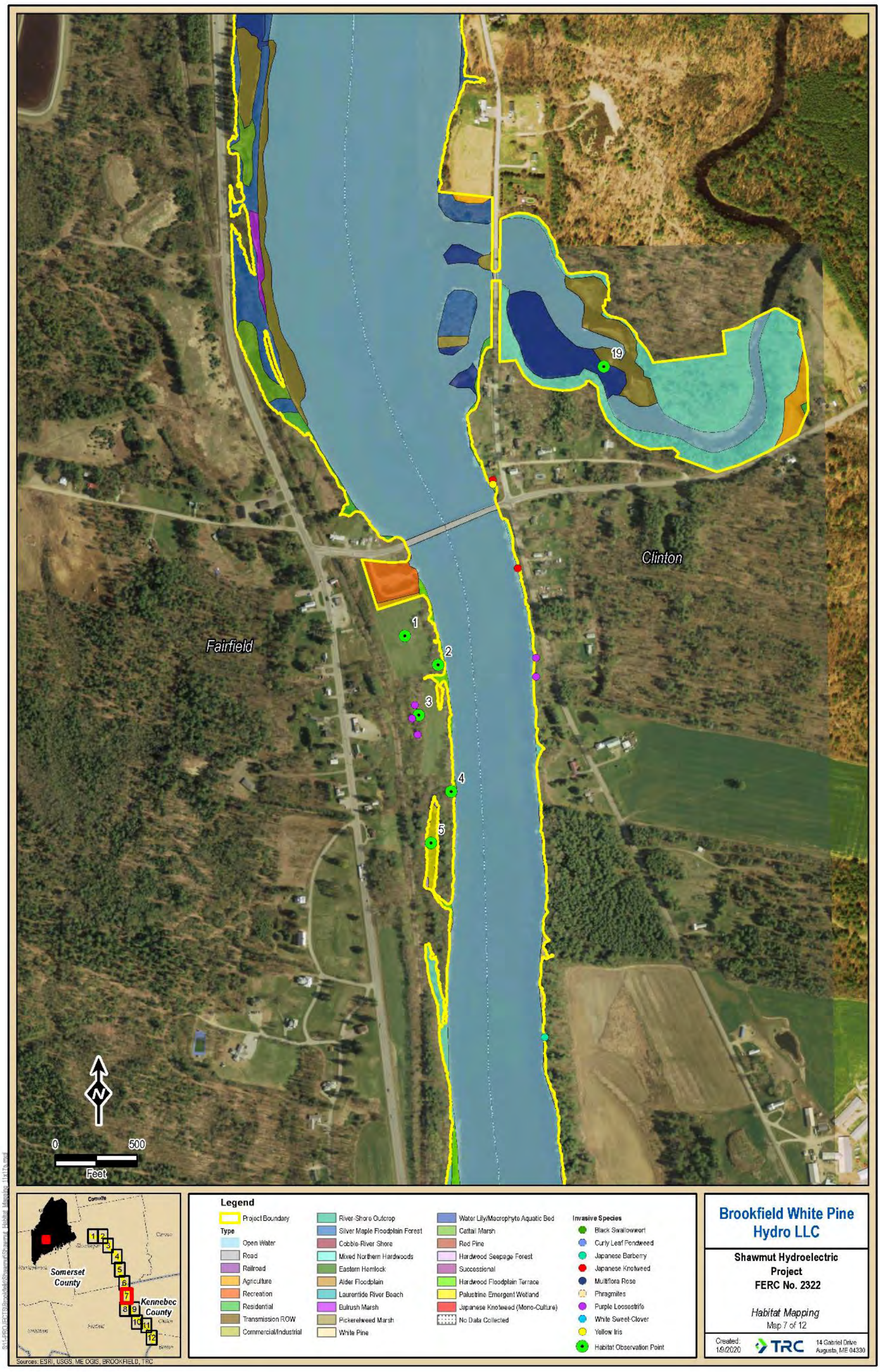

Figure 4-19 Habitat Mapping Map 7

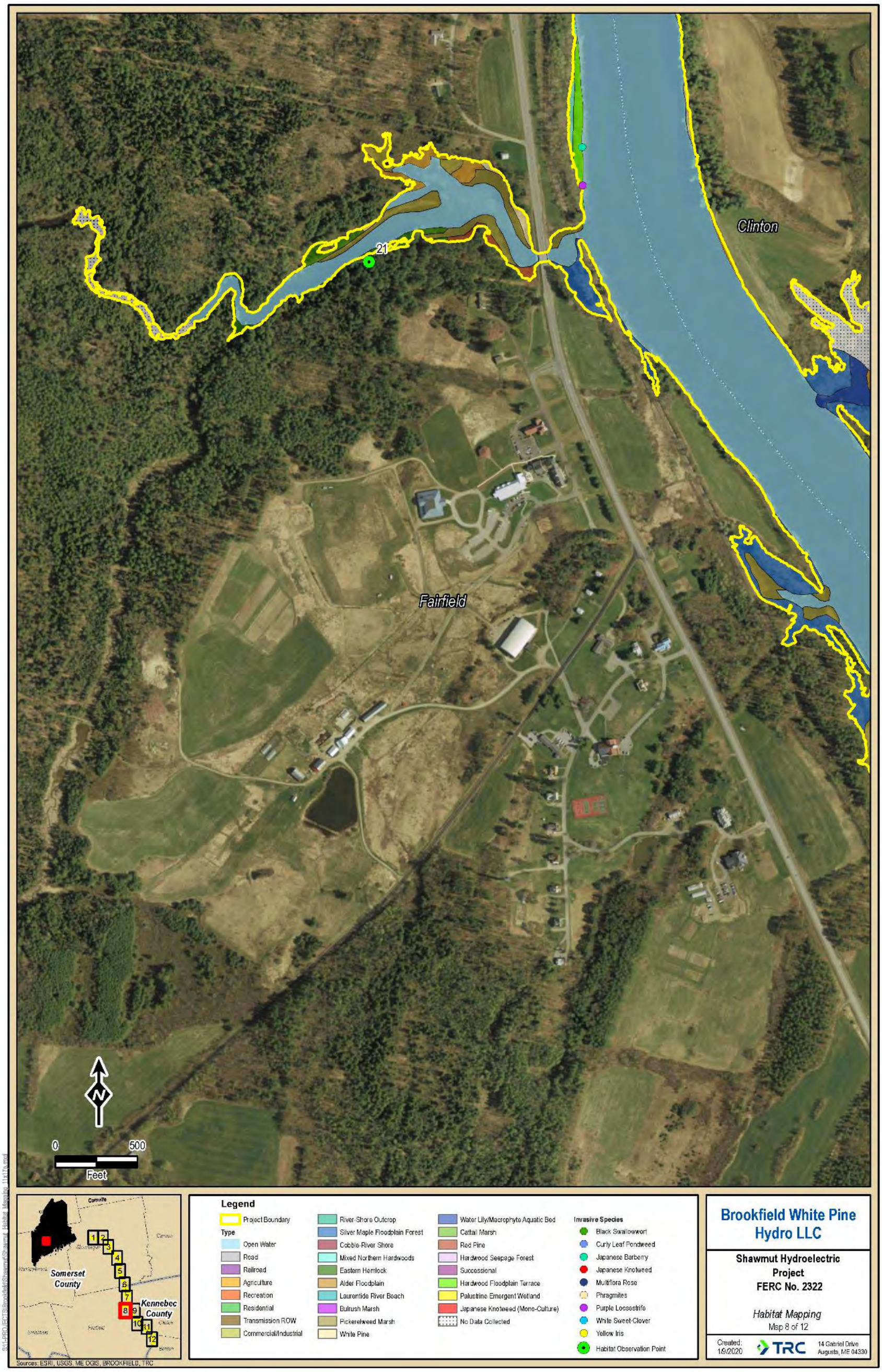

Figure 4-20 Habitat Mapping Map 8

Figure 4-21 Habitat Mapping Map 9

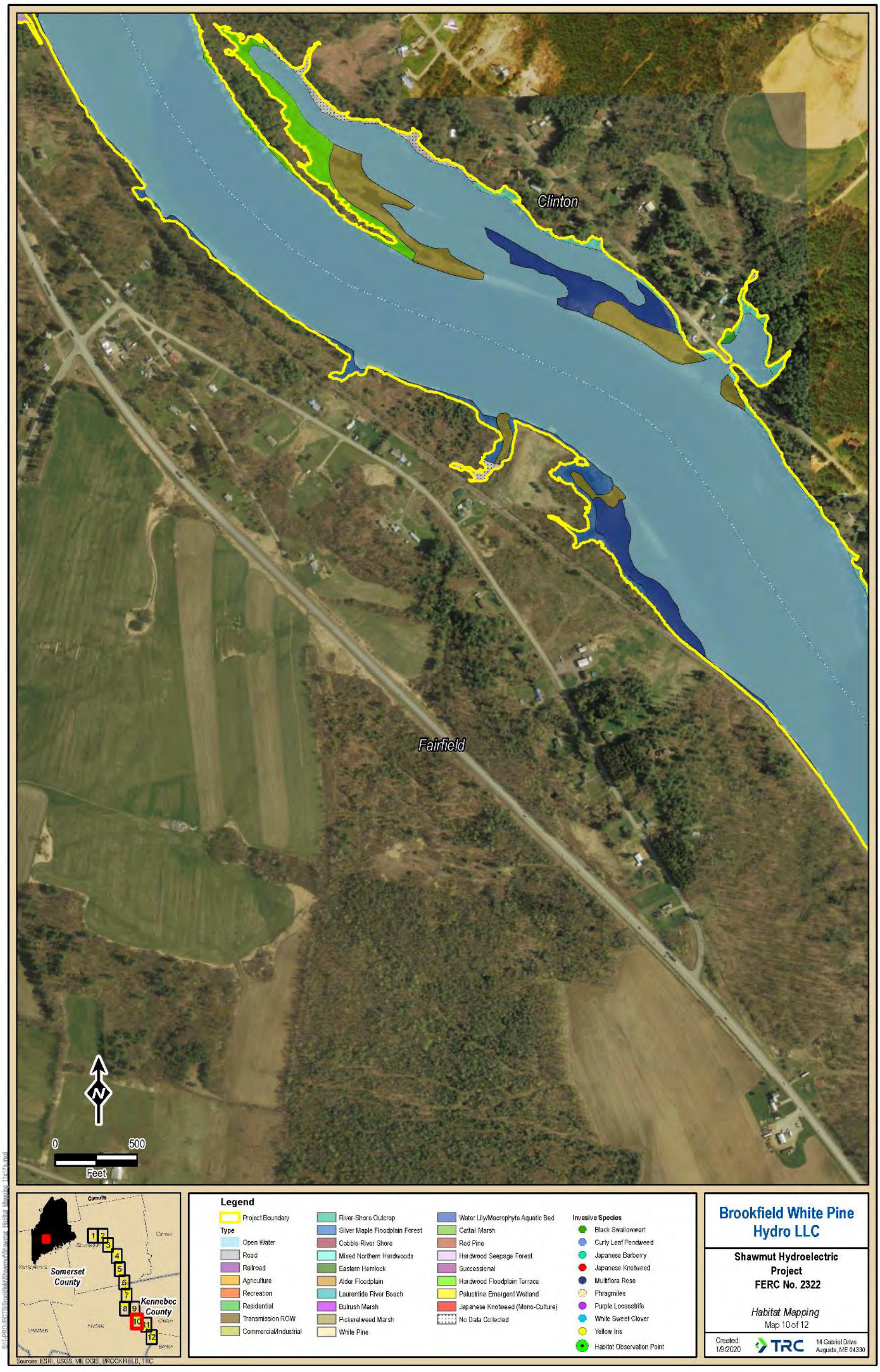

Figure 4-22 Habitat Mapping Map 10

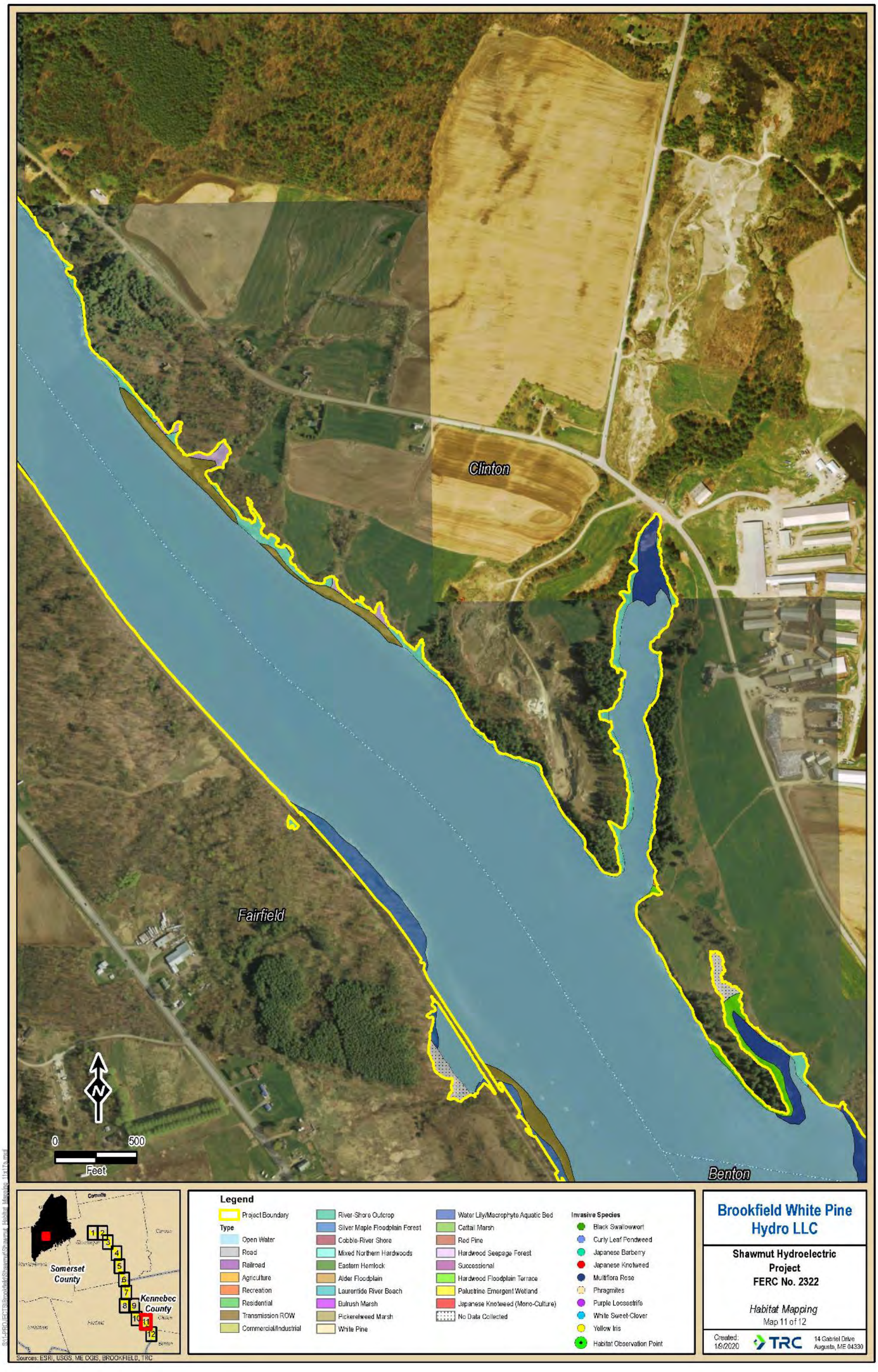

Figure 4-23 Habitat Mapping Map 11

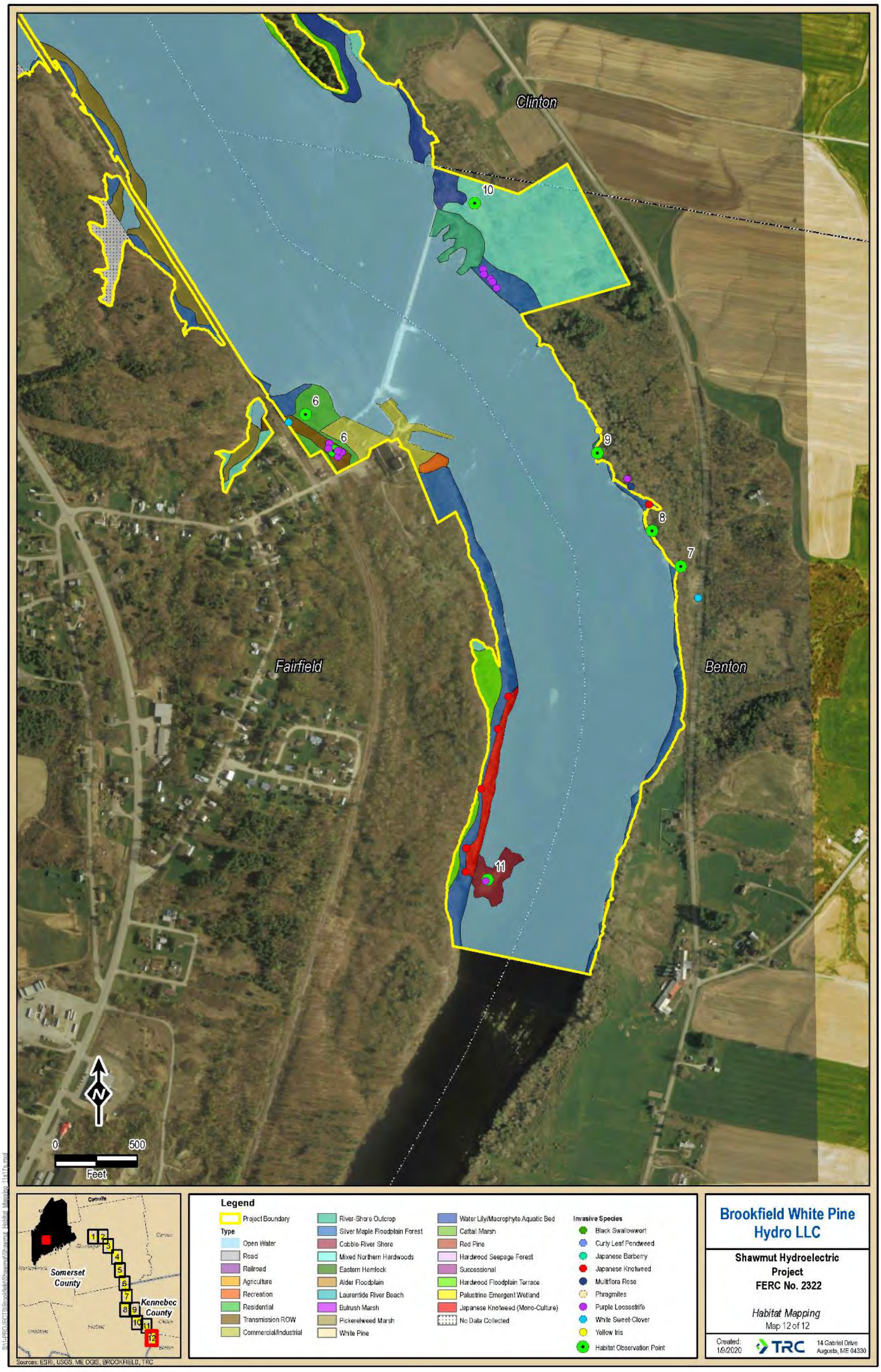

Figure 4-24 Habitat Mapping Map 12

Photo 4-1 Representative View of River-shore Outcrop Community

Photo 4-2 Photo of Long-leaved Bluet

The cobble-river is community type (Photo 4-3) is rare within the study area and was found exclusively downstream of the dam on the western side of the river. The relatively dense herbaceous vegetation occurs on course cobble deposited within the active river channel. Seasonal flooding and ice scour limit the woody vegetation in this community and only trace amounts of stunted silver maple and silky dogwood were observed in this community. Trace amounts of purple loosestrife[17] were observed, otherwise few exotics were found in this community. Wildlife observed in this community included belted kingfisher, spotted sandpiper, and muskrat.

Photo 4-3 Example of Cobble-River Shore

The alder floodplain community (Photo 4-4) occurs in small patches along the shoreline of the upper impoundment as well as some areas below the dam. The primary example of this

[17] Purple loosestrife was identified in communities 11, 24, 26, and 27 of the Initial Study Report

community occurs on a large island with several posted "no trespassing" signs and therefore observations were made from the boat. Alder floodplains are subject to seasonal flooding and some ice scour, and typically occur on mineral soils. These wetlands are dominated by speckled alder which frequently comprise greater than 30 percent cover. These shrublands provide habitat for a variety of wildlife. Bird species may include common yellowthroat and alder flycatcher. Vernal pools may occur in these communities and provide critical breeding habitat for many types of amphibians including wood frog, spotted salamanders and blue-spotted salamanders, a state special concern species. Wood turtles, a state special concern species, may, if present, also use this habitat for basking and foraging (Gawler and Cutko 2010).

Photo 4-4 Representative View of Alder Floodplain

The Laurentide River beach community (Photo 4-5) occurs exclusively on a single island on the north most end of the Project boundary (just downstream from the Big Eddy). The island is dominated by large and medium sized cobble deposited in the active river channel. This site is flooded in the spring and sparse vegetation occurs below ordinary high water. Photo 4-5 shows a representative view of this habitat.

Photo 4-5 View of Laurentide River Beach Community

The bulrush marsh (Photo 4-6) is an emergent marsh dominated by tall rushes and other non-persistent vegetation. Within the study area these deep water marshes are continuously inundated and are found along the shore of the impoundment in areas with slower moving water. This community offers good foraging and nesting habitat for wading birds and waterfowl. Rare species may include the least bittern, which was not observed during the 2016 field survey.

Photo 4-6 Example of Bulrush Marsh

The Pickerelweed marsh (Photo 4-7) is the most abundant marsh community in the study area. It is found in quiet waters along the shore of the impoundment. This community is generally inundated with water depth less than 0.7 meter. Pickerelweed marshes are similar to the Water-lily Macrophyte Aquatic Bed community; however, this community is dominated by emergent species (especially pickerelweed) rather than floating and submerged aquatic vegetation. This community may provide breeding habitat for Northern leopard frogs and nesting and foraging habitat for variety of waterfowl.

Photo 4-7 Example of a Pickerel Weed Marsh

The waterlily/macrophyte marsh community (Photo 4-8) is found in slow-moving water along the shores of the impoundment, this community is similar to the bulrush marsh and pickerelweed marsh community. However, it is dominated by floating and submerged aquatic plants, rather than emergent plants. In this community, waterlilies are predominant and pickerel weed is typically absent. Within the study area, this habitat type generally collocated with either pickerelweed or bulrush marsh communities and occupies areas of deeper water depth.

Photo 4-8 View of Waterlily/Macrophyte Marsh Community (Foreground)

Cattail marshes (Photo 4-9) are the most uncommon marsh community within the study area, occurring in less than 0.2 percent of the area. The community was generally observed in sheltered coves and embayments near the edges of pickerelweed or bulrush marshes. This community is inundated through most of the growing season and is dominated by tall broadleaf cattail growing over low shrubs and sedges. Due to the dense overstory of cattail and shrubs, there may not be much room for the growth of other herbaceous plants. Like the other marsh communities, this community hosts a number of water-dependent animals.

Photo 4-9 Example of a Cattail Marsh

Palustrine emergent wetlands (Photo 4-10) are found along the impoundment and on the islands. These communities occur on mineral soil but may have a layer of muck on the surface. They are likely inundated early in the spring and remain saturated or flooded during the remainder of the growing season. A green frog was observed in this community. Other amphibians may include species such as blue-spotted salamander, spotted salamander, and wood frogs.

Photo 4-10 Example of a Palustrine Emergent Wetland

A number of locations are dominated by large dense patches of Japanese knotweed (Photo 4-11), and therefore this community was mapped individually when encountered as a large monoculture. The Japanese knotweed monoculture often occurs as an understory inclusion within the silver maple floodplain and the oak northern hardwood communities. A particularly large monoculture extends along much of the study area below the Shawmut dam (along the western bank). These monoculture areas have developed along the shore of the impoundment where Japanese knotweed has formed dense thickets and displaced the native shrub and herb layers almost entirely. Although Japanese knotweed dominates the shrub and herb layer (more than 95 percent) a small number of other species may persist at trace levels. In many areas, the native tree species have remained intact and include silver maple, sugar maple, American basswood, and black willow.

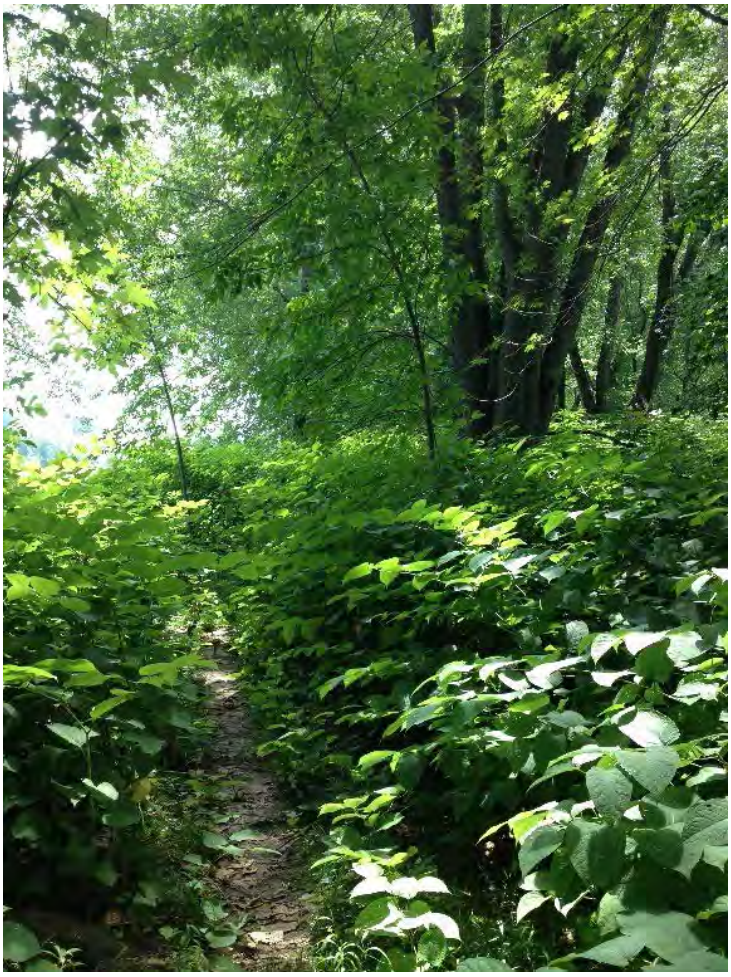

Photo 4-11 Example of a Japanese Knotweed Monoculture

4.7.1.3 Invasive Species

A total of 10 invasive botanical species were documented in the study area (Table 4-29). Invasive species were ubiquitous throughout the study area. The most common invasive botanical species include Morrow's honeysuckle, Tartarian honeysuckle, and Japanese knotweed which dominated the shrub layer in several hardwood communities including the hardwood seepage forest, hardwood floodplain terrace, silver maple floodplain forest and the oak-northern hardwood communities. The location of notable areas of invasive botanical species identified can be found in the Initial Study Report, Figure 4-1 sheets 1 through 11. The wetland, wildlife and terrestrial habitat study conducted was a reconnaissance level study that produced general maps of various vegetative cover types, and observations of the species make-up of these communities.

In addition to terrestrial invasive species, curly pondweed an aquatic invasive was observed in the study area (Photo 4-12). Curly pondweed is a submerged plant that grows in dense beds that may displace native vegetation or clog waterways.

Table 4-29 Invasive Plants within the 2016 Study Area

Scientific Name	Common Name	Lifeform Type	Notes
Berberis thunbergii[1]	Japanese barberry	Shrub	Wooded uplands and wetlands, grows in full sun to full shade, spread by birds, forms dense stands
Cynanchum louiseae[1]	Black swallow-wort	Perennial vine	Grows in full sun to partial shade, forms dense stands
Fallopia japonica[1]	Japanese knotweed	Perennial herb-subshrub	Widespread, grows in full sun to full shade, spreads vegetatively and by seed, forms dense thickets
Hesperis matronalis[2]	Dame's violet	Biennial herb	Grows in moist soils in full sun to partial shade. Forms dense stands.
Iris pseudacorus[2]	Yellow Iris	Perennial herb	Grows in nutrient rich soil in full sun to partial shade. Forms dense, monotypic stands
Lonicera morrowii[1]	Morrow's honeysuckle	Perennial Shrub	Widespread, grows full sun to full shade, invades intact understories, dispersed by birds, can hybridize with other honeysuckle species
Lonicera tatarica[1]	Tartarian honeysuckle	Perennial Shrub	Widespread, grows full sun to full shade, invades intact understories, dispersed by birds, can hybridize with other honeysuckle species
Lythrum salicaria[1]	Purple loosestrife	Perennial herb	Occurs in uplands and wetlands, grows in full sun to partial shade, high seed production, overtakes wetlands
Potamogeton crispus[1]	Curly pondweed	Aquatic herb	Submerged herb that grows in large beds, grows in cool conditions.

Scientific Name	Common Name	Lifeform Type	Notes
Rosa multiflora[1]	Multiflora rose	Shrub	Grows in full sun to full shade, forms thorny thickets, dispersed by birds.

Source: DACF 2013
1 Currently considered invasive in Maine
2 Probably invasive in Maine

Photo 4-12 Curly Leaved Pondweed Observed Within the Study Area

4.7.1.4 Wildlife

The Shawmut Project is located in the Central Interior Biophysical Region of Maine. The Project boundary encompasses only a small area of habitat outside of the wetted portions of the Project impoundment and tailwater areas. A reconnaissance field survey was conducted in 2016 to identify the botanical and wildlife resources in the study area. In accordance with the RSP, the study area included the main stem of the Kennebec River from the upper Shawmut Project area (approximately 12 miles upstream of the dam) to approximately 1,200-feet downstream of the

dam. The study area included areas generally within 200 feet of the project shoreline. The wide range of terrestrial, wetland and littoral habitat types within the study area provide habitat for a large diversity of wildlife species. Wildlife found within the study area (Table 4-30) may range from generalist species that use a broad range of habitat types to more specialized species that are adapted to narrower habitat types.

The diversity of natural communities within the study area offer habitat to a variety of mammal species. Large tracts of deciduous, mixed and coniferous forest provide excellent habitat for a range of mammals from white-tailed deer to red squirrels. Although no bats were observed, riparian forests may provide daytime roosting trees for several species of bats including silver-haired bats and the NLEB, a federally threatened species. The open habitats found in the agricultural residential and right-of-way communities support several rodent species including the meadow vole, house mouse, and meadow jumping mouse. The open water of the impoundment and streams is a habitat requirement for river otter and beaver. Wetland mammal species may include the star-nosed mole, beaver, muskrat, and mink.

Table 4-30 Mammals Observed or Likely to occur within the Project Vicinity

Common Name	Scientific Name
Northern short-tailed shrew	*Blarina brevicauda*
Coyote	*Canis latrans*
North American beaver	*Castor canadensis*[S]
Star-nosed mole	*Condylura cristata*
Big brown bat	*Eptesicus fuscus*
North American porcupine	*Erethizon dorsatum*
Northern flying squirrel	*Glaucomys sabrinus*
Silver-haired bat	*Lasionycteris noctivagans*
Red bat	*Lasiurus borealis*
Hoary bat	*Lasiurus cinereus*
Snowshoe hare	*Lepus americanus*
North American river otter	*Lontra canadensis*
Groundhog	*Marmota monax*
Fisher	*Martes pennanti*
Striped skunk	*Mephitis*
Meadow vole	*Microtus pennsylvanicus*
House mouse	*Mus musculus*
Ermine	*Mustela erminea*

Common Name	Scientific Name
Long-tailed weasel	*Mustela frenata*
Southern red-backed vole	*Myodes gapperi*
Little brown bat	*Myotis lucifugus*
Northern long-eared bat	*Myotis septentrionalis*
Woodland jumping mouse	*Napaeozapus insignis*
American mink	*Neovison vison*
White-tailed deer	*Odocoileus virginianus*[S]
Muskrat	*Ondatra zibethicus*[O]
Eastern pipistrelle	*Perimyotis subflavus*
White-footed mouse	*Peromyscus leucopus*
Deer mouse	*Peromyscus maniculatus*
Raccoon	*Procyon lotor*
Norway rat	*Rattus norvegicus*
Eastern gray squirrel	*Sciurus carolinensis*
Masked shrew	*Sorex cinereus*
American pygmy shrew	*Sorex hoyi*
American water shrew	*Sorex palustris*
Eastern chipmunk	*Tamias striatus*
American red squirrel	*Tamiasciurus hudsonicus*
Gray fox	*Urocyon cinereoargenteus*
Black bear	*Ursus americanus*
Red fox	*Vulpes*
Meadow jumping mouse	*Zapus hudsonius*

O= Species Seen

C= Auditory identification

S= Sign observed (i.e., track scat, etc.)

Photo 4-13 View of Beaver Lodge Found Downstream of the Shawmut Dam

The 2016 reconnaissance survey indicated that a total of 24 herptile species were either observed or are likely to occur within the Project study area, based on habitat preferences (Brookfield 2017). These species are listed in Table 4-31.

Table 4-31 Herptiles Observed or Likely to Occur within Project Vicinity

Scientific Name	Common Name
Ambystoma laterale	Blue-spotted salamander
Ambystoma maculatum	Spotted salamander
Bufo americanus	Eastern American toad
Chelydra serpentina[O]	Common snapping turtle
Chrysemys picta	Painted turtle
Desmognathus fuscus	Northern dusky salamander
Diadophis punctatus	Northern ringneck snake
Eurycea bislineata	Northern two-lined salamander

Scientific Name	Common Name
Glyptemys insculpta	Wood turtle
Hemidactylium scutatum	Four-toed salamander
Lampropeltis triangulum	Eastern milk snake
Lithobates catesbeianus	American bullfrog
Lithobates clamitans^{O}	Green frog
Lithobates palustris	Pickerel frog
Lithobates pipiens	Northern leopard frog
Nerodia sipedon	Northern water snake
Notophthalmus viridescens	Red-spotted newt
Opheodrys vernalis	Smooth green snake
Plethodon cinereus	Red-backed salamander
Pseudacris crucifer	Spring peeper
Rana sylvatica	Wood frog
Storeria occipitomaculata	Northern redbelly snake
Thamnophis sauritus	Ribbon snake
Thamnophis sirtalis	Common garter snake

O= Species Seen

A total of 128 bird species were observed or are likely to occur in the Project study area. These species are listed in Table 4-32. The diverse vegetation communities within the Project boundary provide habitat for a variety of avian species. Mature mixed forests may offer opportunities for cavity nesters such as owls, ducks, and woodpeckers. Wading birds and waterfowl use the marsh communities and open water of the impoundment for nesting resting and foraging.

Table 4-32 Bird Species Observed or Potentially Occurring within the Study Area

Scientific Name	Common Name
Acanthis flammea	Common redpoll
Acanthis hornemanni	Hoary redpoll
Accipiter cooperii	Cooper's hawk
Accipiter gentilis	Northern goshawk
Accipiter striatus	Sharp-shinned hawk
Actitis macularius^{O}	Spotted sandpiper
Agelaius phoeniceus^{O}	Red-winged blackbird
Aix sponsa	Wood duck
American woodcock^{O}	American woodcock
Anas crecca	Green-winged teal
Anas platyrhynchos^{O}	Mallard
Anas rubripes	American black duck

Scientific Name	Common Name
Archilochus colubris	Ruby-throated hummingbird
Ardea herodias[O]	Great blue heron
Asio otus	Long-eared owl
Aythya collaris	Ring-necked duck
Bartramia longicauda	Upland sandpiper
Bombycilla cedrorum[O]	Cedar waxwing
Bombycilla garrulus	Bohemian waxwing
Bonasa umbellus	Ruffed grouse
Botaurus lentiginosus	American bittern
Branta canadensis[O]	Canada Goose
Bubo virginianus	Great horned owl
Bucephala clangula	Common goldeneye
Buteo jamaicensis	Red-tailed hawk
Buteo platypterus	Broad-winged hawk
Butorides virescens	Green heron
Calcarius lapponicus	Lapland longspur
Caprimulgus vociferus	Whip-poor-will
Cardellina canadensis	Canada warbler
Cardinalis	Northern cardinal
Catharus fuscescens	Veery
Catharus guttatus[C]	Hermit Thrush
Certhia americana	Brown creeper
Charadrius vociferus	Killdeer
Chordeiles minor	Common nighthawk
Coccothraustes vespertinus	Evening grosbeak
Coccyzus americanus	Yellow-billed cuckoo
Coccyzus erythropthalmus	Black-billed cuckoo
Colaptes auratus	Northern flicker
Columba livia	Rock dove
Contopus virens	Eastern wood-pewee
Corvus corax	Common raven
Corvus brachyrhynchos	American crow
Cyanocitta cristata[O]	Blue jay
Dendroica fusca	Blackburnian warbler
Dendroica petechia	Yellow warbler
Dolichonyx oryzivorus	Bobolink
Dryocopus pileatus	Pileated woodpecker
Dumetella carolinensis[O/C]	Gray catbird
Empidonax alnorum	Alder flycatcher
Empidonax flaviventris	Yellow-bellied flycatcher

Scientific Name	Common Name
Empidonax minimus	Least flycatcher
Falco sparverius	American kestrel
Gallinago	Common snipe
Gavia immer[O]	Common loon
Geothlypis philadelphia	Mourning warbler
Geothlypis trichas[O/C]	Common yellowthroat
Haemorhous purpureus	Purple finch
Haliaeetus leucocephalus[O/S]	Bald eagle
Hirundo rustica	Barn swallow
Hylocichla mustelina[C]	Wood thrush
Icterus galbula	Baltimore oriole
Ixobrychus exilis	Least bittern
Junco hyemalis	Dark-eyed junco
Lanius excubitor	Northern shrike
Larus argentatus	Herring gull
Lophodytes cucullatus	Hooded merganser
Loxia curvirostra	Red crossbill
Megaceryle alcyon[O/C]	Belted kingfisher
Melospiza melodia[O/C]	Song sparrow
Melospiza georgiana	Swamp sparrow
Mergus merganser	Common merganser
Mniotilta varia	Black-and-white warbler
Molothrus ater	Brown-headed cowbird
Myiarchus crinitus	Great crested flycatcher
Nyctea scandiaca	Snowy owl
Oreothlypis ruficapilla[C]	Nashville warbler
Pandion haliaetus[O]	Osprey
Parkesia noveboracensis	Northern waterthrush
Parula americana	Northern Parula
Passer domesticus	House sparrow
Passerculus sandwichensis	Savannah sparrow
Passerina cyanea	Indigo bunting
Pheucticus ludovicianus	Rose-breasted grosbeak
Picoides pubescens[O]	Downy woodpecker
Picoides villosus	Hairy woodpecker
Pipilo erythrophthalmus	Eastern towhee
Piranga olivacea	Scarlet tanager
Poecile atricapillus	Black-capped chickadee
Pooecetes gramineus	Vesper sparrow

Scientific Name	Common Name
Porzana carolina	Sora
Quiscalus quiscula	Common grackle
Rallus limicola	Virgina rail
Riparia riparia[O/S]	Bank swallow
Sayornis phoebe	Eastern phoebe
Scolopax minor	American woodcock
Seiurus aurocapilla	Ovenbird
Setophaga caerulescens	Black-throated blue warbler
Setophaga coronata	Yellow-rumped warbler
Setophaga pensylvanica[C]	Chestnut-sided warbler
Setophaga magnolia	Magnolia warbler
Setophaga petechia[C]	Yellow warbler
Setophaga ruticilla[O/C]	American redstart
Setophaga virens	Black-throated green warbler
Sialia sialis	Eastern bluebird
Sitta carolinensis	White-breasted nuthatch
Sphyrapicus varius	Yellow-bellied sapsucker
Spinus tristis	American goldfinch
Spizelloides arborea	American tree sparrow
Spizella passerina	Chipping sparrow
Spizella pusilla	Field sparrow
Stelgidopteryx serripennis	Northern rough-winged swallow
Strix varia	Barred owl
Sturnella magna	Eastern meadowlark
Sturnus vulgaris[O]	European starling
Tachycineta bicolor	Tree swallow
Toxostoma rufum	Brown thrasher
Troglodytes aedon	House wren
Troglodytes	Winter wren
Turdus migratorius[O]	American robin
Tyrannus	Eastern kingbird
Vireo gilvus	Warbling vireo
Vireo olivaceus	Red-eyed vireo
Vireo solitarius	Blue-headed vireo
Zenaida macroura[O]	Mourning dove
Zonotrichia albicollis [C]	White-throated sparrow

O= Species Seen

C= Auditory identification

S= Sign observed (i.e., track scat, etc.)

4.7.2 Environmental Analysis

Any potential effects of the continued operation of the Shawmut Project on wildlife habitats within the Shawmut Project boundary would be related primarily to water level regimes. Since the Shawmut Project is operated as run-of-river with impoundment fluctuations typically less than 1 foot, impacts associated with water level changes are minimal. Wildlife habitats within the Shawmut Project boundary may be exposed to, or isolated from, different potential influences depending on their location. However, no changes of current Project operation are proposed; therefore, no adverse effects on wildlife habitats within the Shawmut Project area are expected.

Furbearers, such as beaver and muskrat, are known to occur and build dens within the Shawmut Project area, both upstream and downstream of the dam. Furbearers using the impoundment are adapted to the Shawmut Project's operations including the small, short-term fluctuations in impoundment water levels associated with run-or-river operations. Because, the Project is operated as run-of-river, with relatively stable downstream flows, furbearers utilizing habitat downstream of the dam and in the main stem side channel habitat are unaffected by the operation of the Shawmut Project. Furbearers in both areas are expected to continue to use Project lands and waters as they have for decades.

The Licensee's management of vegetation within the Project boundary is limited to mowing or trimming vegetation in areas directly surrounding project structures, the powerhouse access road, and portions of the project recreation sites (i.e., Hinckley boat launch and Shawmut canoe portage). No changes in the management of these areas are expected or proposed, and no effects on wildlife species that use these habitats would occur.

The Licensee proposes to remove two small parcels of Project lands from the Project boundary near the upstream end of the Project impoundment that are not needed for Project purposes. The two parcels, are 2.2 acres and a 26.4 acres in size, and are not occupied by significant wildlife or botanical habitats. The habitats located within each of the two parcels are shown in Figure 4-25. As shown, both areas are predominantly mixed northern hardwood forest (blue). There is also a small strip of monoculture Japanese knotweed (red) along the shoreline of the eastern parcel. Neither habitat type is unique or provides critical habitat for riparian or upland species.

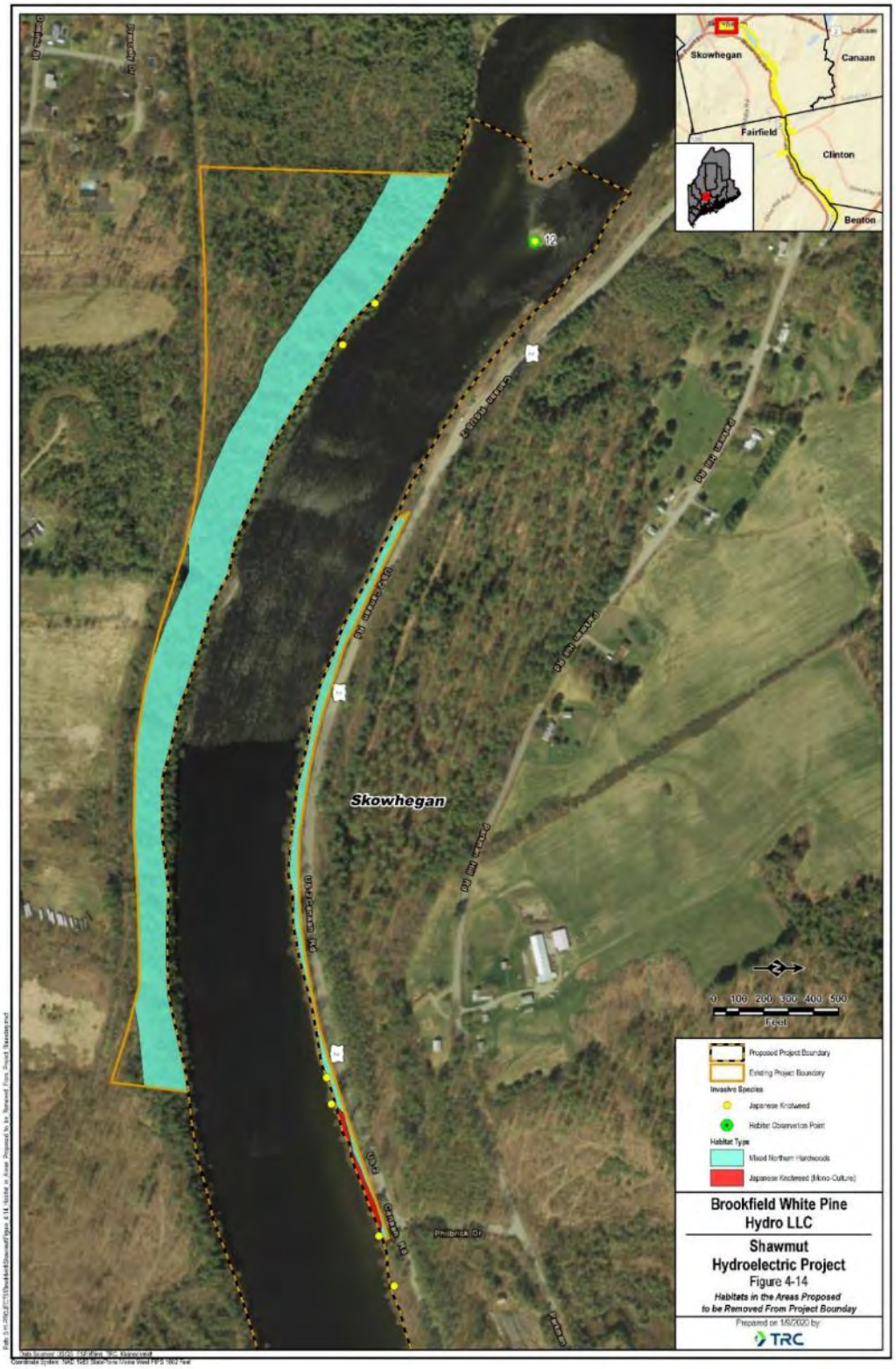

Figure 4-25 Habitats in the Areas Proposed to be Removed from Project Boundary

Continued operation of the Project as run-or-river, with minimal impoundment variations during normal operations, generally within 1 foot of the normal full pool elevation will minimize Project-related shoreline erosion or scour opportunities that could provide conditions for invasive species to establish, grow, and spread are minimized. The Licensee does not maintain a transmission corridor at the Project or conduct regular tree clearing or ground disturbing activities that would provide a mechanism for spreading of invasive species.

The potential effects of Project operation on Maine state threatened species and species of special concern is discussed in Section 4.8.

4.7.3 Unavoidable Adverse Effects

The Licensee anticipates that no significant unavoidable adverse effects on any wildlife species or their habitats that will occur as a result of relicensing the continued operation of the Shawmut Project.

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4.8 Rare, Threatened, and Endangered Species

4.8.1 Affected Environment

The Shawmut Project area includes a variety of terrestrial and aquatic habitats that may be utilized by federally and state-listed rare, threatened, or endangered (RTE) species. The state of Maine also identifies species of special concern. These are species that do not meet the criteria established for being state or federally listed but are particularly vulnerable and could become threatened or endangered due to restricted distribution, low or declining numbers, specialized habitat needs, or other factors. To assess the potential occurrence of RTE species within the Project area, White Pine Hydro made information requests to the Maine Natural Areas Program (MNAP) and MDIFW in 2015 and again in 2019. The USFWS IPaC Trust Resource Report (2019) and the state of Maine's Natural Heritage Database were also consulted to assess whether RTE species have the potential to occur within the Project area. In addition, a reconnaissance field survey was conducted in 2016 to identify the botanical and wildlife resources in the study area, including RTE plant and animal species. RTE species that were observed or likely to occur within the project vicinity are listed in Table 4-33.

Table 4-33 Rare, Threatened, and Endangered Species Observed or Likely to Occur within The Project Vicinity

Common Name	Scientific Name	Group	Federal or State Status
Federally Threatened or Endangered Species			
Atlantic salmon	*Salmo salar*	Fish	FE
Northern long-eared bat	*Myotis septentrionalis*	Mammal	FT/SC
State Threatened or Endangered Species			
Least bittern	*Ixobrychus exilis*	Bird	SE
Tomah mayfly	*Siphlonisca aerodromia*	Invertebrate	ST
Upland sandpiper	*Bartramia longicauda*	Bird	ST
State Special Concern Species			
Bald eagle*	*Haliaeetus leucocephalus*	Bird	SC
Barn swallow	*Hirundo rustica*	Bird	SC
Black-and-white warbler	*Mniotilta varia*	Bird	SC
Blue spotted salamander	*Ambystoma laterale*	Amphibian	SC
Canada warbler	*Wilsonia canadensis*	Bird	SC
Common loon*	*Gavia immer*	Bird	SC
Eastern kingbird	*Tyrannus tyranus*	Bird	SC
Eastern ribbon snake	*Thamnophis sauritus*	Reptile	SC
Eastern tohee	*Pipilo erythrophthalmus*	Bird	SC
Great blue heron*	*Ardea herodias*	Bird	SC
Little brown bat	*Myotis lucifugus*	Mammal	SC
Long-leaved bluet*	*Houtonia longifolia*	Plant	SC
Northern leopard frog	*Rana pipiens*	Amphibian	SC
Olive-sided flycatcher	*Contopys cooperi*	Bird	SC
Spring salamander	*Gyrinophilus porphyriticus*	Amphibian	SC
Tree Swallow	*Tachycineta bicolof*	Bird	SC
Whip-poor-will	*Caprimulgus vociferus*	Bird	SC
White-throated sparrow*	*Zonotichlia albicollis*	Bird	SC
Wood thrush *	*Hylocichla mustelina*	Bird	SC
Wood turtle	*Clemmys insculpta*	Reptile	SC
Yellow warbler	*Dendroica petechia*	Bird	SC

*Observed, auditory identification, or sign observed during 2016 reconnaissance survey
Source: Brookfield 2017; USFWS 2019

4.8.1.1 Rare, Threatened, and Endangered Species Survey

Consistent with the RSP, the Licensee conducted a reconnaissance level survey to document RTE botanical or wildlife species, botanical resources, wildlife resources, and wildlife habitat in

the Shawmut study area over the course of several days throughout the spring, summer and early fall of 2016.

The objectives of the reconnaissance level survey were to provide information on:

- the nature and extent of riparian and wetland botanical resources;
- the presence or absence of RTE botanical species or associated habitats within the study area;
- existing wildlife habitats in areas along the Project impoundment and tailwater shoreline;
- the presence of wildlife species within the study area; and
- the presence or absence of RTE wildlife species or associated habitats.

In addition to the special concern species identified during 2016 surveys, MNAP and MDIFW identified other special concern species with the potential to occur within the Project area. The potential presence determinations are based on known species distributions, and whether species distributions overlap with the Project area. These species include eastern ribbon snake, wood turtle, mink frog, northern leopard frog, and blue spotted salamander-hybrid.

4.8.1.2 Atlantic Salmon

The GOM DPS of Atlantic salmon is a federally endangered species that occurs in the Kennebec River. The NMFS listed Atlantic salmon and designated their critical habitat in the Kennebec River in 2009.

As discussed previously in Section 4.6.1.1, NMFS identified threats to GOM DPS Atlantic salmon; including habitat connectivity (e.g., dams, impassible culverts and other obstructions), habitat alteration, water quantity, degraded water quality, over-harvest, disease and predation, aquaculture, low marine survival, other ecological changes (i.e., depletion of other co-evolved native anadromous species and increased competition), and climate change. As part of the recovery strategy, NMFS partitioned the GOM DPS into three (SHRUs) based on geo-ecological and subpopulation factors known at the time of the listing. The Shawmut Project area is part of the Merrymeeting Bay SHRU which includes parts of the Kennebec, Androscoggin, and Sheepscot rivers, as well as several additional coastal watersheds west of Penobscot Bay (NMFS 2009).

In 2009, NMFS designated critical habitat (i.e., habitat necessary to support species recovery and believed to be occupied by salmon at the time of the listing); the critical habitat designation for the Kennebec River extends from the mouth of the Kennebec River upstream to the Carrabassett River near Madison, Maine including the entire Shawmut Project area.

The potential effects of the proposed action on Atlantic salmon and Atlantic salmon critical habitat are addressed in Section 4.6.2.

4.8.1.3 Tomah Mayfly

This species prefers habitat associated with small streams and rivers bordered by floodplain sedge meadows. The Tomah mayfly's range extends from central to northern Maine and has 15 documented occurrences within the state (MDIFW 2003). Tomah mayflies complete their life cycles in 1 year. Eggs are laid in June in stream channels and hatch in early winter. In the spring, after snowmelt, nymphs move into seasonal floodplain habitat to develop. Emergence from the water and transformation into adult form takes place in late-May and June. The adult stage lasts for a period of approximately 2 weeks, during which mating and egg-laying takes place over streams in early evenings (MDIFW 2003). While there is suitable habitat for the species, there have been no reports of the Tomah mayfly in the Project area.

4.8.1.4 Reptiles and Amphibians

The spring salamander requires a cold water, well oxygenated aquatic environment. The diet for these salamanders consists primarily of invertebrates and occasionally small vertebrates including frogs. Reproduction takes place during the fall, winter, and spring; eggs are laid in early spring and summer (DeGraaf 2001). No spring salamanders were observed during studies conducted by the Licensee in 2016 (Brookfield 2017).

The Northern leopard frog uses both terrestrial and aquatic environments. The Northern leopard frog spends summer months within terrestrial habitats consisting of grasslands and forested landscapes (DeGraaf 2001). No Northern leopard frogs were observed or heard at the Project during studies conducted by the Licensee in 2016 (Brookfield 2017).

The mink frog prefers rivers and lakes with bog shoreline habitats. The species produces a musky, mink-like odor when handled. They are a shoreline-dependent species but also forage on and around floating mats of vegetation away from the shoreline in the littoral zone. Sometimes they may be found in permanent waters were no bog characteristics exist, although they are usually associated with tannin-stained waters. Mink frogs overwinter in water to avoid freezing (WDNR 2017b). This species was not identified as potentially being located within the study area (Brookfield 2017).

The wood turtle is found in all major drainage basins within Maine. This turtle is semi-aquatic and occupies terrestrial habitat adjacent to streams and rivers. Wood turtles have also been known to use vernal pools. The turtles use riparian habitats for forage, cover and basking (DeGraaf 2001). Suitable wood turtle habitat was identified during 2016 reconnaissance surveys (Brookfield 2017) but no wood turtles were observed.

The eastern ribbon snake is a slender, semi-aquatic snake often observed near the edges of emergent marshes, wet meadows, scrub-shrub wetlands, beaver impoundments, bogs, river and stream floodplains and vegetated shorelines of ponds and lakes. Their diet consists mainly of amphibians, but they will also consume mice, spiders, small fish, and insects (NHFGD 2017). No eastern ribbon snakes were observed during the 2016 study.

4.8.1.5 Bats

The NLEB was listed as a threatened species under the ESA on April 2, 2015. The NLEB is one of the species of bats most impacted by the white-nose-syndrome disease. The NLEB hibernates in caves and mines, swarming in surrounding wooded areas in autumn. During late spring and summer, NLEB roosts and forages in upland forests (USFWS 2017a). The USFWS maintains a list of counties within the United States that are located within NLEB range. This information indicates that Kennebec and Somerset counties are both located within NLEB range (USFWS 2017b). The USFWS additionally maintains a list of known hibernacula and maternity roost locations. This species may potentially feed in the Project area.

The little brown bat is a migratory bat found throughout New England. During the winter, little brown bats hibernate in caves, abandoned mines, or other caverns. The species feeds strictly on

insects and will typically live 6 to 7 years (National Wildlife Federation 2015). The species may use the Project area for feeding purposes.

The silver-haired bat is a documented summer resident throughout New England. The species is considered a solitary, tree roosting species that utilizes hardwood clear-cuts, coniferous, and mixed forests near lakes, streams, and ponds. They feed primarily on insects, often over ponds, streams and forest clearings (DeGraaf and Yamasaki 2001). The species may use the Project area for roosting and feeding purposes.

4.8.1.6 Avian Fauna

During the 2016 reconnaissance survey, several state special concern species were documented as present within the study area by direct observation, auditory identification, or observation of sign. They included bald eagle, common loon, white-throated sparrow, and wood thrush. Observations were documented, but specific location for each species were not recorded.

In addition to being listed as a state species of special concern, the bald eagle is also subject to federal protections under the Bald and Golden Eagle Conservation Act. In Maine, the species is most commonly seen along the coast and in forested areas adjacent to large bodies of water. Though the bird's diet is centered on fish, bald eagles are opportunistic feeders and will prey on other birds, reptiles, amphibians, invertebrates, and mammals (Cornell University 2015). The U.S. Forest Service (USFS) monitors the occurrence of nesting bald eagles in the state of Maine and maintains a comprehensive database of nest sites. Three bald eagle nest sites are located along the shoreline of the Project boundary. These are identified as nest sites BE414A and BE 414B at the north end of the Project and BE643A located along the middle of the Project. Bald eagles were identified during the 2016 reconnaissance survey (Brookfield 2017). No eagle nests are located within recommended buffer distances of any project recreational sites or facilities.

The least bittern is listed as an endangered species in Maine. This species prefers freshwater marshes where cattails and reeds predominate in swamps and marshes and dense emergent vegetation (WDNR 2017a). Habitat suitable for least bittern was identified within the marsh habitat communities during the 2016 reconnaissance survey but no least bitterns were observed (Brookfield 2017).

The upland sandpiper is listed as a threatened species in Maine. Upland sandpipers breed in large grasslands and barrens. They require large fields (preferably over 150 acres), with open shortgrass areas such as blueberry barrens, meadows, pastures, hayfields, fallow agricultural fields and airports. Pastures can be suitable habitat unless they are subject to heavy grazing. Extensive row crops or fields uniformly covered with mat forming grasses do not provide suitable habitat (MDIFW 2017). No upland sandpipers were observed during the 2016 survey (Brookfield 2017).

The common loon spends the winter in coastal waters and returns inland to breed shortly after spring ice-out. Loons generally build nests close to the water's edge and are constructed on the ground. The nests are often built on hummocks or small islands, where they are protected from predators. Loons generally return to the same nest site each year, unless they are disturbed or their habitat is degraded. Human disturbance and water level fluctuation may adversely impact loon nests (USFWS 2017c). Loons feed primarily on fish. Loons were identified within the Project impoundment during the 2016 reconnaissance survey; however, no loon nests were identified (Brookfield 2017).

The white-throated sparrow is found throughout North America east of the Rocky Mountains. It breeds primarily in the boreal coniferous and mixed forest and winters in the southeastern United States. It is a habitat generalist that tends to occur in shrubby edges or early successional stages or openings in the forest (Birds of North America 2017). White-throated sparrows were identified during the 2016 reconnaissance survey (Brookfield 2017).

The wood thrush breeds in deciduous and mixed forests in the eastern United States where there are large trees, moderate understory, shade, and abundant leaf litter for foraging. They winter in lowland tropical forests of Central America (Cornell University 2017). Wood thrush were identified during the 2016 reconnaissance survey (Brookfield 2017). They may utilize the Project area for feeding and/or nesting.

The Canada warbler favors moist forest undergrowth and shady thickets. Canada warblers feed primarily on insects and will commonly flush prey from foliage. Nests are built on or within 6 inches of the ground (National Audubon Society 2015a). The species may use the Project area for feeding and/or nesting.

The olive-sided flycatcher is a migrant species that summers in Maine and Canada within northern coniferous forests. The species winters in the tropics of South America (National Audubon Society 2015b). The species feeds almost entirely on flying insects and forage by watching from a high exposed perch, often on a dead branch at the top of a tree, and flying out to catch passing insects in the air. The species may use the Project area as a transient during migration.

4.8.1.7 Rare Plants

Long-leaved Bluet

Long-leaved bluet (*Houstonia longifolia*) is a state species of special concern. The species grows on slate ledges or rivershore gravels that are non-forested and seasonally wet. Long-leaved bluet is an herbaceous perennial that flowers from July to September. It is usually found growing in slight cracks or depressions on rivershore ledges (MNAP 2017). Long-leaved bluet was documented during the 2016 reconnaissance survey (Brookfield 2017). The Long-leaved bluet is shown as Community 9 on Figure 4-1 Sheet 11 of 11 in the ISR.

No other rare plant species or unique plant communities are known to occur within the Shawmut Project area, and none were observed during field surveys for botanical resources.

4.8.2 Environmental Analysis

The following sections discuss the potential impact of the continued operation of the Project as proposed on RTE species.

4.8.2.1 Federally-Listed Species

Federally listed species that are known or likely to occur at the Project include Atlantic salmon and NLEB. The Licensee observed no evidence of the NLEB during the 2016 wildlife reconnaissance surveys (Brookfield 2017). Although summer roosting habitat (i.e., streams, marshes, forest clearings) for the species may occur in the Shawmut Project area, NLEB would not be affected by the continued operation of the Shawmut Project, as proposed. The Licensee is not currently proposing any construction activities that would disturb habitat and does not

maintain a transmission corridor at the Project or conduct regular tree clearing or ground disturbing activities that would disturb habitat.

The potential effects of the proposed action on Atlantic salmon and Atlantic salmon critical habitat are discussed in detail in Section 4.6.2 and in the lower Kennebec SPP and draft BA, filed with FERC December 31, 2019.

4.8.2.2 State Listed Species

Tomah Mayfly

The Tomah mayfly is not known to occur within the Shawmut Project area, however it would not be affected by the relicensing of the Shawmut Project, or its continued operation.

Reptiles and Amphibians

Seven uncommon amphibian species may occur within the Project boundary: the blue spotted salamander, spring salamander, eastern ribbon snake, mink frog, leopard frog, and wood turtle, although none of the species were captured or heard during the 2016 studies, all species may be present within the Shawmut Project area.

Continued operation of the Shawmut Project would affect none of the species. The blue spotted salamander is more likely to be in small rivers, headwater creeks and streams, and/or vernal pools than they would be found in large rivers such as the Kennebec. The northern spring salamander requires a cold water and high oxygen aquatic environment, such as streams, rivers, and springs. Given the limited species specific habitat within the Project area, it is unlikely that the spring salamander would be located at the Project.

The eastern ribbon snake prefers wetland margins and is known to swim and hide in water. The northern leopard frog and mink frog are both species of concern in the state of Maine. Habitat for the leopard frog includes slow, vegetated sections of small to large rivers as well as emergent marshes, and mink frog habitat includes backwaters and ponded sections of small to large rivers. The Licensee is proposing no changes in the operation of the Shawmut Project; therefore, the terrestrial and aquatic habitats used by this species would not be affected.

The wood turtle may also occur in the Shawmut Project area. This turtle is semi-aquatic and occupies terrestrial habitat adjacent to streams and rivers. The turtles use riparian habitats for forage, cover and basking and have also been known to use vernal pools. The Licensee observed no wood turtles during the 2016 wildlife reconnaissance studies. If the species does occur in the Shawmut Project area, it would not be affected by the continued operation of the Shawmut Project because it is a highly mobile species that can easily adapt to changing water levels.

Mammals

As with the NLEB, the Licensee observed no evidence of the little brown bat, or the silver-haired bat during the 2016 wildlife reconnaissance surveys, although summer roosting habitat (i.e., streams, marshes, forest clearings) for all three species may occur in the Shawmut Project area. Based on the habitat preferences, foraging behavior, and roost selection, neither of these species would be affected by the continued operation of the Shawmut Project and the Licensee is not currently proposing any construction activities that would disturb habitat. The Licensee does not maintain a transmission corridor at the Project or conduct regular tree clearing or ground disturbing activities that would disturb habitat.

Avian Fauna

The Licensee did observe white-throated sparrow, bald eagle, common loon, and wood thrush within the Shawmut Project area; relicensing and continued operation of the Shawmut Project would not affect the habitats of these species for foraging, breeding, and nesting given run of river operations. A bald eagle and nest were observed in 2016 and a common loon was observed in 2016, although no nest was observed. Although one eagle nest is located near the shoreline, it is within an upland habitat type, and therefore unaffected by river flow conditions and normal operations of the Shawmut Project.

Rare Plants

The long-leaved bluet, a state species of concern was observed in the 2016 field surveys. This plant was found in the rare river-shore outcrop community, found exclusively downstream of the Shawmut dam on the east side of the river. Several locations on the exposed bedrock were observed with the species (Community 9 on Figure 4-1 Sheet 11 of 11 of the ISR). No changes to the run-of-river mode are being proposed for the Project. Relicensing and continued operation

of the Shawmut Project, as proposed, with no proposed land disturbing activities, would not affect the habitat of this species.

4.8.3 Proposed Environmental Measurers

The Licensee has demonstrated that operation of the Shawmut Project has no effect on terrestrial RTE species; therefore, the Licensee is not proposing PME measures for terrestrial RTE resources.

Potential Project effects on listed Atlantic salmon are fully addressed in Section 4.6.2. As discussed, White Pine Hydro is proposing to implement a comprehensive lower Kennebec SPP to include passage and protection measures for Atlantic salmon at the Shawmut Project. The SPP and accompanying draft BA were filed with FERC on December 31, 2019 and are incorporated herein by reference. The draft BA fully analyzes the effects of the lower Kennebec SPP including specific measures related to the continued operation of the Shawmut Project.

4.8.4 Unavoidable Adverse Effects

The Licensee anticipates that no unavoidable adverse effects on terrestrial RTE species would result from the proposed relicensing of the Shawmut Project.

The draft BA and prior sections of this Exhibit E discuss the potential to take Atlantic salmon as the result of the continued operation of the Project.

4.8.5 References

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4.9 Recreation and Land Use

4.9.1 Affected Environment

In 2016 and 2017, the Licensee conducted a recreation facilities inventory and public recreation use assessment. The results of this study are reported in the USR and summarized herein.

4.9.1.1 Land Uses and Management within the Project Vicinity

Lands around the Shawmut Project are principally rural with some residential and commercial development. The towns of Fairfield, Clinton, Benton, and Skowhegan surround the Project. With few exceptions, the lands immediately adjacent to the Project are primarily undeveloped woodlands and agricultural. Developed lands in the project vicinity are mostly concentrated within the town of Skowhegan upstream of the Project.

Land use in the Project vicinity is regulated by local and state zoning ordinances. Landowners must comply with town and state zoning ordinances for use and development of their lands. These ordinances include setbacks for construction or clearing near a waterbody. The town of Fairfield has a Shoreland Zoning Ordinance (SZO) that applies to all land areas within 250 feet of the Kennebec River, the Kennebec Water District Impoundment, Martin Stream, and Lost Brook, and all land areas within 75 feet of the edge of a freshwater wetland or normal high water line of a stream. The Ordinance also applies to any structure built on, over or abutting a dock, wharf or pier, or other structure extending or located below the normal high-water line of a water body or within a wetland (Fairfield SZO 2013). The towns of Clinton, Benton, and Skowhegan also have SZOs that apply to all land areas within 250 feet of the normal high-water line of any river, including the Kennebec, or freshwater wetland, and all land areas within 75-feet of the normal high-water line of a stream. The ordinances apply to any structure built on, over or abutting a dock, wharf or pier, or other structure extending beyond the normal high-water line of a waterbody or within a wetland (Clinton SZO 2015; Benton SZO 1992; Skowhegan SZO 2014). These ordinances are designed to protect environmentally sensitive areas, cultural resources, and aesthetics within the shoreland zone as defined in the Ordinance.

The SZOs for the towns of Fairfield, Clinton, Benton, and Skowhegan are similar due to Maine's Mandatory Shoreland Zoning Act (MSZA) enacted in 1971. In Maine's Guidelines for Municipal SZOs, developed by the MDEP, the state provides standards to guide the development of municipal ordinances, with minimum guidelines to be included in the SZOs. According to the minimum setback requirements set forth by the MSZA, all new principal and accessory structures, except those which are water dependent, are required to be set back 100 feet from great ponds classified GPA and rivers that flow into a great pond classified GPA, and 75 feet from the normal high-water line of other water bodies, streams, and wetlands (MDEP 2015).

The shoreland on the west side of the Kennebec River, in the town of Fairfield, and upstream of the Shawmut dam, is primarily zoned as a Resource Protection District, with a small section zoned as a Limited Residential District, near Nyes Corner Drive. Downstream of the Shawmut dam, in the town of Fairfield on the west side of the Kennebec River, the shoreland is zoned as a General Development District. In the General Development District, the minimum setback is 25 feet (MDEP 2015). In districts zoned for Resource Protection, the minimum setback requirement for principal and accessory structures is 250 feet (MDEP 2015).

The lands within the northern half of the Project in the town of Skowhegan are zoned in Resource Protection, except for approximately 1.3 miles on the western shore that are zoned in General Development. Setbacks for principal and accessory structures in the General Development District is 25 feet from the highwater line, while in the resource protection zone it is 250 feet (Skowhegan 2014). In Benton, all new principal and accessary structures must be set back a minimum of 75 feet (Benton 1992).

Additionally, there are minimum standards set forth by the MSZA with regards to parking areas, roads, driveways, building height, and building lot coverage. Regarding timber harvesting, there are multiple limits on the extent of tree harvesting within the shoreland zone (MDEP 2015). Further, there are restrictions on the removal of ground-cover in the shoreland buffer area, and the removal of vegetation in buffer areas surrounding a body of water zoned for resource protection. Adequate erosion and sedimentation measures are required by the MSZA for projects

involving land disturbance and require the implementation of a soil erosion and sedimentation control plan.

4.9.1.2 Land Use and Management of Project Lands

Lands within the Project boundary are predominately undeveloped woodlands, except for the developed lands immediately adjacent to the dam and the Hinckley Boat Launch. The lands adjacent to the dam contain Project features, such as maintenance buildings, the powerhouse and parking. The developed lands at the Hinckley Boat Launch, located on State Route 23, are used recreationally.

The total acreage within the proposed Project boundary is approximately 1,729 acres. Of this area, open water accounts for approximately 1,432 acres, consisting of an estimated 1,342 acres of impoundment waters and 90 acres of tailwater.

Project operations and maintenance are the primary activities that occur on Project lands. This includes the operation and maintenance of the Project facilities and powerhouse and may include road and parking lot maintenance, as well as vegetation management. The Licensee will review and grant permission for certain types of non-project use of Project lands if appropriate, as specified within the current license.

4.9.1.3 Regional Recreation Opportunities

The Shawmut Project is located in the central portion of the Kennebec River valley. This region of the Kennebec River valley offers recreationists with abundant opportunities for boating, fishing, hiking, hunting, mountain biking, all-terrain vehicle (ATV) riding, wildlife watching, snowmobiling and more. State parks and lands in the vicinity of the Project include the Fort Halifax State Historic Site (MBPL 2013). Additional recreation opportunities in the vicinity of the Project include the Eaton Mountain Ski Area (Maine Trail Finder 2018; Delorme 1999), Two Rivers Campground, and the Skowhegan Riverwalk, which is part of Debe Park. The region also offers several hiking opportunities:

- Good Will-Hinckley Trails – offer an easy trail system that winds through woodlands behind the L.C. Bates Museum (Maine Trail Finder 2018) near the west side of the Project.
- Hills-to-Sea Trail – starts in the town of Unity, winding through both scenic and working landscapes for 47 miles and extends to City Point in Belfast (Waldo County Trails Coalition 2019).
- Kennebec River Rail Trail – located to the south of the Project, this trail follows the Kennebec River downstream from the Project (Maine Trail Finder 2018).
- Skowhegan Riverwalk – A 0.5-mile Americans with Disabilities Act (ADA)-compliant trail along the Kennebec River Gorge in Debe Park, Skowhegan, ends at a pedestrian bridge that spans across the river, providing views of the Kennebec River (Maine Trail Finder 2018).

According to the Maine SCORP, there are a total of 12 commercial campgrounds located in the Kennebec Valley Region, which comprises both Kennebec and Somerset Counties (MBPL 2015). Somerset County has 1,498 miles of snowmobile trails and 635 miles of ATV trails, while Kennebec County has 725 miles of snowmobile trails and 65 miles of ATV trails. There are a total of 46 boat launches (13 of which are hand carry) in Somerset County and 51 boat launches (15 of which are hand carry) in Kennebec County. (MBPL 2015)

4.9.1.4 Project Recreation Opportunities

Recreation within the Project boundary typically includes boating (non-motorized and motorized) and fishing. Project lands and waters are generally available for public recreation use.

The recreation facilities inventory and public recreation use assessment included a site inventory and assessment conducted at the existing formal FERC-approved project recreation sites, other formal sites that provide access to Project lands and waters, as well as informal public recreation sites located immediately adjacent to the Project. The formal public recreation sites assessed include two Project and two non-project sites: (1) Hinckley Boat Launch, (2) Shawmut Canoe Portage (including the take-out and put-in), (3) Skowhegan Boat Launch (non-Project), and (4) Skowhegan Route 2 Wayside Picnic Area (non-Project). Detailed figures depicting amenities at each of the formal recreation sites that provide access to the Project, including the two Project recreation sites, are included in Appendix E-4. Three non-Project, informal, unimproved public

access areas were assessed for the recreation facilities inventory and public recreation use assessment: (1) Route 2 Informal Fishing Access Areas (including the Route 2 East Roadside Access Area and Route 2 West Roadside Access Area), (2) River Road Angler Access Area, and (3) East Abutment Informal Angler Access Area. Figure 4-26 depicts the locations of these sites. Detailed descriptions of each of the formal public recreation sites and informal public access areas follow.

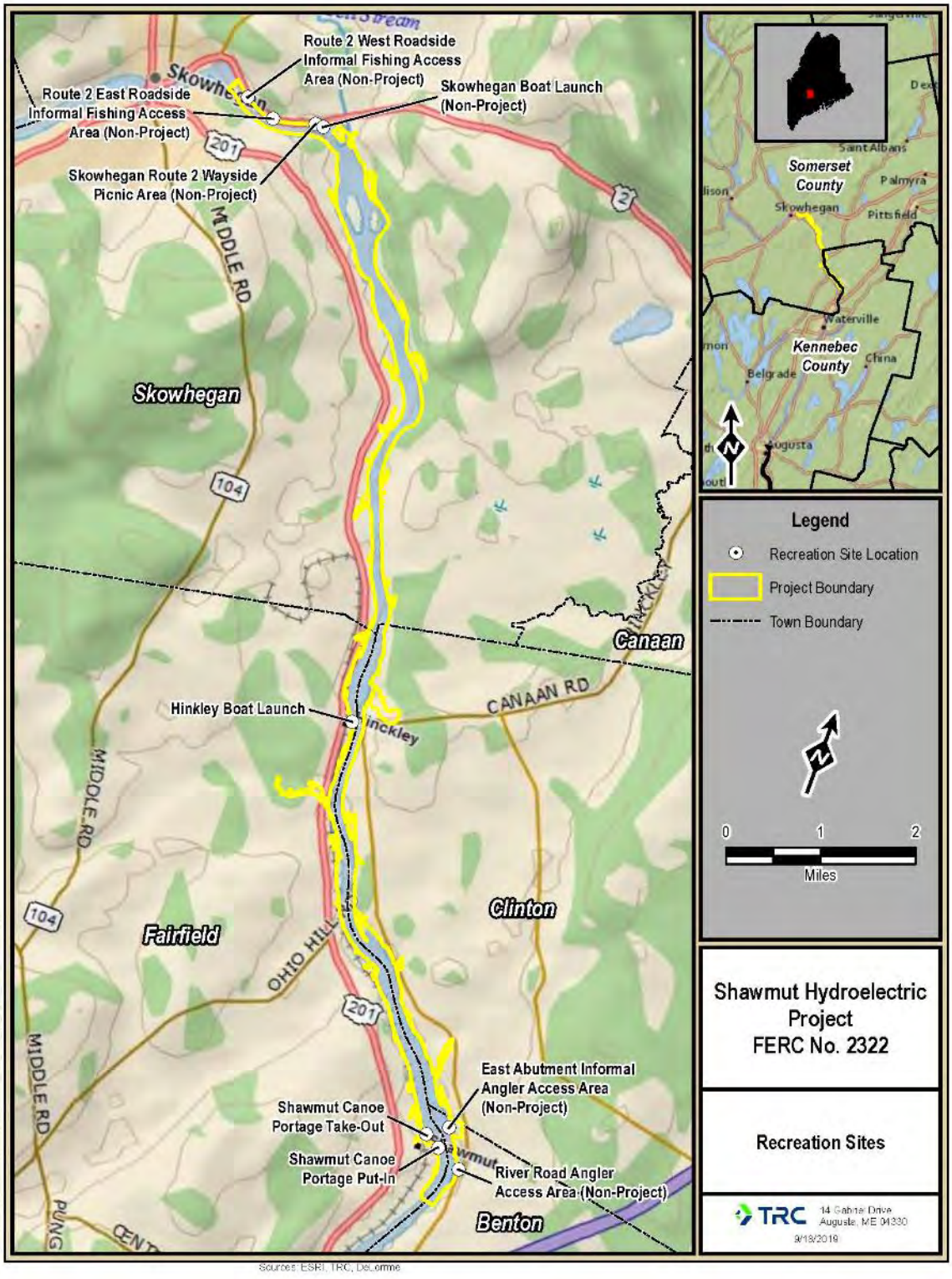

Figure 4-26 Recreation Sites Assessed at the Shawmut Project

Formal FERC-Approved Project Recreation Sites

Hinckley Boat Launch

The Hinckley Boat Launch is located on the west side of the Project impoundment, approximately 5 miles upstream of the dam, where State Route 23 crosses the Kennebec River. The launch and parking area are located within the Project boundary. The boat launch (Photo 4-14) is accessible via a two lane paved road. White Pine Hydro owns and manages the site. The boat launch is marked with a Part 8 sign at the entrance. The site consists of a single lane concrete boat launch that is approximately 10-feet-wide. The ramp is surfaced with concrete planks. The site is also used for bank fishing. There is an ADA-compliant concrete dock that is 4-feet-wide by 44-feet-long, with a concrete base at the shore. There is one (1) ADA-compliant parking space, three (3) spaces for vehicles and trailers, and five (5) spaces for vehicles without trailers (Photo 4-15). There is also a wooden kiosk and trash can at the site.

Photo 4-14 Hinckley Boat Launch

Photo 4-15 Hinckley Boat Launch Parking

Shawmut Canoe Portage

The canoe portage is located on the west side of Shawmut Dam. The portage take-out and put-in locations are located within the Project boundary. The canoe portage take-out area (Photo 4-16 and Photo 4-17) is located approximately 430-feet upstream from the dam, and the canoe portage put-in (Photo 4-18) is approximately 600-feet downstream from the dam at the lower end of the powerhouse tailrace. The access road into the take-out is a two-lane paved road that turns into gravel and there is parking for approximately eight (8) vehicles. The access road into the put-in turns into a single lane unpaved access road and there is parking for approximately five (5) vehicles. There are signs marking the canoe take-out and put-in locations. The path between the two areas is a dirt and gravel pathway that is approximately a quarter of a mile long. The trail is partially located on Project lands and partially on state lands (MDIFW). Angler access is provided at both the take-out and put-in locations and a portable toilet is available at the put-in.

Photo 4-16 Shawmut Canoe Portage Take-Out

Photo 4-17 Shawmut Canoe Portage Take-Out

Photo 4-18 Shawmut Canoe Portage Put-In

Photo 4-19 Shawmut Canoe Portage Put-In Parking

Formal Non-Project Recreation Sites

Skowhegan Boat Launch

The Skowhegan Boat Launch (also known as Cleaver Landing) is owned by the Maine Department of Agriculture, Conservation, and Forestry (MDACF) and managed by the Somerset Woods Trustees. The shoreline of the site and the boat launch ramp are located inside the Project boundary. All of the other recreation site amenities are located outside the Project boundary. The site is located on the east side of the impoundment, approximately 11 miles upstream of the dam, near the town of Skowhegan along Route 2 (two-lane, paved road) and adjacent to the Skowhegan Route 2 wayside picnic area. This site has a single-lane concrete boat launch that is approximately 20-feet-wide (Photo 4-20), a parking lot (Photo 4-21), portable toilet and informational signage. The site has one paved ADA parking space, and a gravel parking area for approximately two (2) vehicles with trailers and three (3) or four (4) vehicles without trailers. There are also designated make ready and tie down areas (with signage) for boaters to use when getting ready to launch or tie down their boats. The site provides shoreline fishing access.

Photo 4-20 Skowhegan Boat Launch

Photo 4-21 Skowhegan Boat Launch Parking Area

Skowhegan Route 2 Wayside Picnic Area

The Somerset Woods Trustees own the picnic area (also known as the Kennebec Bank Rest Area). Somerset Woods Trustees, the Maine Department of Transportation (Maine DOT) and the town of Skowhegan manage the site. The site is not Project related or a FERC-approved project recreation site but does lie immediately adjacent to the Kennebec River and the Project boundary. No recreation site amenities are located within the Project boundary. The site is located immediately adjacent to the Skowhegan boat launch on the east side of the impoundment, approximately 11 miles upstraeam of the dam, near the town of Skowhegan along Route 2 (two-lane, paved road). The site has a paved parking lot with 23 designated parking spaces (Photo 4-22), nine (9) picnic tables (Photo 4-23), three (3) grills, a portable toilet, and informational signage. The site provides informal shoreline fishing access to Project waters.

Photo 4-22 Skowhegan Route 2 Wayside Picnic Parking Area

Photo 4-23 Skowhegan Route 2 Wayside Covered Picnic Area

Informal Public Access Areas

Route 2 Informal Fishing Access Areas

There are two gravel road-side parking pull-offs owned and managed by Maine DOT along Route 2 (two-lane, paved road), south of Skowhegan that provide anglers access to the impoundment. The shoreline adjacent to these sites are located within the Project boundary. There are several informal foot trails from these two parking areas to the impoundment. There are no amenities at either access area. The pull-off located further east (Route 2 East Roadside Informal Fishing Access Area) can accommodate approximately three (3) vehicles (Photo 4-24). The pull-off located further west (Route 2 West Roadside Informal Fishing Access Area) can accommodate approximately nine (9) or ten (10) vehicles (Photo 4-25).

Photo 4-24 Route 2 East Roadside Informal Fishing Access Area Parking

Photo 4-25 Route 2 West Roadside Informal Fishing Access Area Parking

River Road Angler Access Area

The access area consists of a gravel Maine DOT pull-off located off River Road (two-lane, paved road) on the east side of the river, approximately 0.5-mile downstream of the dam, and informal access to the shoreline (Photo 4-26). The shoreline along the access area is within the Project boundary. Parking at the pull-off can accommodate approximately four (4) vehicles (Photo 4-27). There are several informal foot trails from this parking area to the Kennebec River below the dam.

Photo 4-26 River Road Angler Access Area Shoreline

Photo 4-27 River Road Angler Access Parking

East Abutment Informal Angler Access Area

The east abutment informal angler access area is accessed by anglers from several informal 4x4 vehicle tracks and trails through privately owned lands and via a gated road through privately owned woods (Photo 4-28). The site provides access for anglers to the shoreline on the eastern side of the Project tailrace, just below the dam. The shoreline of the access area is located within the Project boundary. There are no public facilities associated with this site, which is located at a rock ledge area downstream of the dam.

Photo 4-28 East Abutment Informal Angler Access Area Trail

Public Recreation Use Assessment

Recreation use data was collected year-round (between June 2016 and May 2017) at each of the recreation sites and informal access areas: Hinckley boat launch, Shawmut canoe portage take-out and put-in, Skowhegan boat launch, Skowhegan Route 2 wayside picnic area, Route 2 informal fishing access areas, River Road angler access area, and east abutment informal access area.

Based on recreation use data collected between June 2016 and May 2017, the total annual recreation use of all surveyed recreation sites and access areas was estimated to be 26,350 recreation days. Total recreation use at the formal Project recreation sites (Hinckley boat launch, canoe portage put-in and take-out) was estimated to be 5,909 recreation days. Table 4-34 provides a breakdown of estimated use for each recreation site and access area by season. Use was highest in the summer (60.9 percent), followed by the fall (23.8 percent), spring (10.9 percent), and winter (4.4 percent). The most popular recreation sites were the Skowhegan Route 2 wayside picnic area (8,581 recreation days, or 33 percent of total days), followed by Skowhegan boat launch (4,274 recreation days, or 16 percent of total recreation days), Route 2 west roadside access (3,471 recreation days, or 13 percent of total recreation days), Hinckley boat launch (2,849 recreation days, or 11 percent of total recreation days), and canoe portage put-in (2,810 recreation days, or 11 percent of total recreation days). While the highest recorded use was at the Skowhegan Route 2 wayside picnic area; none of the use at this site is directly attributable to the Project (i.e., taking place on Project lands or waters).

Table 4-34 Estimated Recreation Use at the Recreation Sites; Annual and Seasonal Use[1]

Recreation or Access Site	Estimated Annual Use	Estimated Summer Use	Estimated Fall Use	Estimated Winter Use	Estimated Spring Use
Canoe Portage Put-in	2,810	45.9%	50.7%	1.5%	1.8%
Canoe Portage Take-out	250	56.2%	23.2%	0.0%	20.6%
Hinckley Boat Launch	2,849	54.7%	22.4%	4.9%	18.0%
Skowhegan Boat Launch	4,274	65.4%	15.4%	0.0%	19.2%
River Road Angler Access	2,034	59.6%	25.1%	6.9%	8.4%
Route 2 East Roadside Informal Fishing Access	1,280	60.2%	39.8%	0.0%	0.0%
Skowhegan Route 2 Wayside Picnic Area	8,581	63.2%	21.7%	5.8%	9.2%
Route 2 West Roadside Informal Fishing Access	3,471	66.1%	11.1%	9.0%	13.8%
East Abutment Informal Angler Access	802	71.1%	26.2%	2.7%	0.0%
Total	26,350	60.9%	23.8%	4.4%	10.9%

[1] Percentages shown may not sum to 100% due to rounding.

Based on observations of recreation use made during 2016 and 2017, project-wide, the most popular recreation activity type at the Project is sightseeing, followed by fishing, picnicking, walking/hiking/jogging, non-motorized boating, and motor boating. Table 4-35 summarizes the estimated use in each activity type. As shown, an estimated 11,536 recreation days, or 43.8 percent of the total number of recreation days at the Project were spent participating in sightseeing[18] while picnicking accounted for the second most frequent recreation use with an additional 4,738 recreation days, or 18.0 percent.. The next most popular recreation uses of the Project include fishing (10.6 percent), motor boating (9.1 percent), walking/hiking/jogging (8.0 percent), non-motor boating (6.5 percent), "other recreation" (3.8 percent), and hunting (0.3 percent). Other recreation included biking, jet skiing, and riding mopeds. No swimming, bird watching, or snow mobile activity was observed.

Table 4-35 shows a breakdown of recreation use by activity type per recreation site surveyed. At the most popular recreation site, the Skowhegan Route 2 wayside picnic area, picnicking was the most popular activity, followed by sightseeing. At the Skowhegan boat launch, the most popular activities were sightseeing and motor boating.

Table 4-35 Shawmut Project Recreation Use by Activity Type

Recreation Activity	Estimated Use (Recreation Days)	Percent (%) of Recreation Use
Sightseeing	11,536	43.8%
Picnicking	4,738	18.0%
Fishing	2,801	10.6%
Motor Boating	2,397	9.1%
Walking/Hiking/Jogging	2,111	8.0%
Non-motor Boating	1,704	6.5%
Other Recreation	992	3.8%
Hunting	70	0.3%
Swimming	0	0.0%
Snowmobiling	0	0.0%
Bird Watching	0	0.0%
Total	26,350	**100%**

[18] Sightseeing was selected as the default activity if no other recreational activity was observed.

Table 4-36 Percent of Recreation Use by Activity at Each Site

Recreation Site	Sight-see	Picnic	Fish	Motor boat	Walk/ Hike/ Jog	Non-Motor boat	Other Rec	Hunt	Swim	Bird Watch	Snow-mobile
Canoe Portage Put-in	2%	0%	18%	5%	17%	52%	6%	0%	0%	0%	0%
Canoe Portage Take-out	0%	0%	21%	0%	60%	20%	0%	0%	0%	0%	0%
Hinckley Boat Launch	44%	0%	8%	39%	8%	1%	0%	0%	0%	0%	0%
Skowhegan Boat Launch	46%	0%	7%	26%	10%	4%	7%	0%	0%	0%	0%
River Road Angler Access	85%	0%	15%	0%	0%	0%	0%	0%	0%	0%	0%
Route 2 East Roadside Informal Fishing Access	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Skowhegan Route 2 Wayside Picnic Area	40%	41%	6%	0%	8%	0%	5%	0%	0%	0%	0%
Route 2 West Roadside Informal Fishing Access	52%	36%	7%	0%	1%	0%	4%	0%	0%	0%	0%
East Abutment Informal Angler Access	0%	0%	83%	0%	9%	0%	0%	9%	0%	0%	0%
Total Use of the above Sites	44%	18%	11%	9%	8%	6%	4%	0%	0%	0%	0%

In addition to determining the type and amount of use at each of the surveyed recreation sites, the degree to which each recreation site had the capacity to sustain the recreation activity occurring at a site was estimated. Table 4-37 provides a breakdown of percent of capacity utilized for each site. Percent capacity utilized was determined by comparing the available amount of parking at each site versus the average number of parking spaces that were occupied during surveys during summer weekends. The highest utilization rate, based on parking area capacity, was found to occur at the Skowhegan boat launch, which had an average summer weekend utilization of 54 percent of capacity. The parking area at Hinckley boat launch was found to have the next highest utilization rate, at 50 percent of capacity on average during summer weekends. All of the other recreation sites were found to have a utilization rate (based on parking) of 15 percent or less on average during summer weekends.

Table 4-37 Recreation Site Capacity Utilization by Site

Recreation Site	Summer Weekend Percent Capacity Utilized
Canoe Portage Put-in	15%
Canoe Portage Take-out	3%
Hinckley Boat Launch	50%
Skowhegan Boat Launch	54%
River Road Angler Access	13%
Route 2 East Roadside Informal Fishing Access	8%
Skowhegan Route 2 Wayside Picnic Area	14%
Route 2 West Roadside Informal Fishing Access	13%
East Abutment Informal Angler Access Area	N/A

4.9.2 Environmental Analysis

The Shawmut Project is located in the central portion of the Kennebec River valley. This region offers recreationists abundant opportunities for boating, fishing, hiking, hunting, mountain biking, ATV riding, wildlife watching, snowmobiling and more.

The Licensee maintains two formal FERC-approved project recreation sites: the Hinckley boat launch and the Shawmut canoe portage (put-in and take-out). The Hinckley boat launch is

located on the west side of the Project impoundment, approximately 5 miles upstream of the dam. The parking area and launch are located within the Project boundary. The Shawmut canoe portage includes the take-out area, located approximately 430-feet upstream from the Shawmut Dam; the put-in area, located approximately 600-feet downstream from the Shawmut Dam; and a quarter of a mile long path between the take-out and put-in areas. Both the canoe portage take-out and put-in locations are located within the Project boundary.

In addition to the Licensee maintained FERC-approved project recreation sites, the Licensee assessed two non-project formal recreation sites (Skowhegan boat launch and Skowhegan Route 2 wayside picnic area) and three non-project, informal, unimproved access areas (Route 2 informal fishing access areas including the Route 2 East roadside access area and Route 2 west roadside access area), River Road angler access area, and east abutment informal angler access area.

Generally, the formal recreation sites were in good condition and meeting their intended function. The informal, unimproved access areas mainly consisted of roadside pull-offs with pedestrian access to the river.

The results of the use and capacity portions of the public recreation use assessment conducted by the Licensee demonstrate that the recreation use at the Project recreation sites (the Hinckley boat launch and the Shawmut canoe portage) is light. The most popular recreation sites were the Skowhegan Route 2 wayside picnic area (non-project), followed by Skowhegan boat launch (non-project), Route 2 west roadside informal fishing access (non-project), Hinckley boat launch, and canoe portage put-in. While the highest recorded use was at the Skowhegan Route 2 wayside picnic area; none of the use at this site is directly attributable to the Project (i.e., taking place on Project lands or waters).

The results of the use and capacity portions of the public recreation use assessment conducted by the Licensee demonstrate that the recreation sites that provide access to the Shawmut Project are well used, but that use levels are well within the existing capacity of the existing recreation sites and access areas, even during the peak summer recreation season.

Proposed operation of the Project would continue to support all existing recreation uses and facilities. The Licensee's proposal for continued operation of the Project would have no adverse effects on existing recreation facilities or recreation use.

4.9.3 Proposed Environmental Measures

The Licensee is proposing to continue to operate and maintain the Shawmut Project under the existing run-of-river regime. Continue operation of the Project as run-of-river would ensure that Project induced fluctuations of the impoundment are minimized and therefore would have no effect on Project recreation sites, facilities or use.

The Licensee would continue to provide for public access and use of Project lands and waters as appropriate and consistent with Project purposes and maintain the existing Project recreation sites. The Licensee proposes to implement a Recreation Facilities Management Plan (RFMP) for the Project, which would address management of Project recreation sites over the term of a new license.

The Licensee is proposing the removal of two small parcels (2.2 acres and 26.4 acres) of upland at the upper end of the impoundment that are not needed for Project purposes. Neither of the parcels proposed for removal contain any of the recreation sites associated with the Project and are not needed for any future recreational access or use at the Project. The lands that are proposed for removal are not essential to Project operation, therefore it would not impact operation of the Project.

As no effects on existing recreation resources would result from the relicensing of the Shawmut Project as proposed, the Licensee is proposing no mitigation measures specifically related to Project recreation sites and facilities. The Licensee proposes to implement a recreation facilities management plan for the Project, which would address management of Project recreation sites over the term of a new license (Draft Recreation Facilities Management Plan attached as Appendix E-5).

4.9.3.1 Cumulative Effects

In SD2, recreation resources were identified as a resource that could be cumulatively affected by continued operation and maintenance of the Project. For recreation resources, because the construction and operation of dams on the Kennebec River have the potential to cumulatively affect recreation resources in the river basin, SD2 identified the geographic scope of analysis of cumulative effects as the Kennebec River, as bounded by the Project from the tailrace of the upstream Weston Project at RM 37.8 downstream to the lower end of the Hydro-Kennebec Project impoundment at RM 64, a distance of 26.2 miles. The Licensee's proposal to continue to operate and maintain the Project under the existing operating regime is not expected to result in cumulative impacts to recreational resources.

The Licensee is proposing to continue to operate and maintain the Project as a run-of-river project. No impacts to existing land uses are associated with this operational proposal.

4.9.4 Unavoidable Adverse Impacts

Continued operation of the Project would not result in any unavoidable significant adverse impacts to recreation resources.

4.9.5 References

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4.10 Cultural Resources

The Licensee conducted several studies to identify cultural resources eligible for listing on the NRHP in accordance with Section 106 of the NHPA. Studies were conducted for pre-contact resources (i.e., Native American archaeological resources), historic archaeological resources, and historic structures.

Pursuant to the July 1, 2016 RSP, as approved by FERC in its Study Plan Determination letter dated July 28, 2016, the APE for the Shawmut Project is defined as:

> *"(1) lands enclosed by the Project boundary, which include: (a) a 1,310-acre reservoir at elevation 112.0 feet (USGS datum); (b) a 1,480-foot-long, 24-foot-high concrete gravity dam; (c) a forebay containing 11 head gates; (d) two powerhouses containing eight turbine-generator units; (e) a 300-foot-long tailrace; (f) an interconnection with the transmission system at a non-Project substation; and (g) appurtenant facilities; and (2) lands outside of the Project boundary, where the authorized Project uses may cause changes in the character or use of historic properties, if historic properties exist."*

4.10.1 Affected Environment

4.10.1.1 Pre-contact Period History

The archaeological record of Maine is long and complex dating back more than 11,000 years ago. Archaeologists have divided this record into three major periods known as the Paleoindian, Archaic, and Ceramic cultural periods. Table 4-38 provides further subdivisions within these periods that are based on similarities in artifact forms and cultural adaptations over broad regions (Spiess 1990). The three major periods are described below.

Table 4-38 Comprehensive Planning Archaeological Study Units

Time Period (RCYBP*)	Study Unit
11,500 - 10,200	Fluted Point Paleoindian Tradition
10,200 - 9,500	Late Paleoindian Tradition
10,000 - 6,000	Early and Middle Archaic Traditions
6,000 - 4,200	Late Archaic: Laurentian Tradition
6,000 - 2,000	Late Archaic: Small-stemmed Point Tradition
4,500 - 3,700	Late Archaic: Moorehead Phase
3,900 - 3,000	Late Archaic: Susquehanna Tradition
3,000 – 450	Ceramic Period

**Note: RCYBP equals radiocarbon years before present; AD equals calendar years.*
All dates are estimates.
Source: Spiess 1990 and pers. comm. 1999.

Paleoindian Period (ca. 11,500-9,500 years ago). The earliest Pre-contact inhabitants in the region, and throughout North America, are referred to as Paleoindian people. Paleoindian people are believed to be the first people to migrate into North America and, in their pursuit of large game, rapidly colonized the continent (Martin 1973). The hallmark of Paleoindian people is the fluted spear point, which was presumably used to hunt large game species, some of which are now extinct. These spear points are lanceolate in shape and possess a long, groove-like scar

caused by a flake struck from their base on both faces. In Maine, the Paleoindian period dates from approximately 11,500 to 9,500 years ago when much of the landscape was still vegetated in tundra and/or woodlands. Paleoindian people living in the region are characterized as highly mobile hunters and gatherers reliant mainly on caribou that presumably were abundant in the environment of that time (Spiess, Wilson, and Bradley 1998). They crafted their tools from very fine-grained, colorful rocks obtained from a limited number of sources in the region, and they camped in locations typically removed from present day water bodies (Spiess, Wilson, and Bradley 1998). These locations were rarely occupied during later cultural periods and are often strategically located above some form of low-lying terrain that may have been suitable habitat for caribou and other game animals. Their campsites are typically indicative of short-term habitations by small groups of people, perhaps in some cases by even a single, extended family. A Paleoindian period archaeological site radiocarbon dated to more than 10,000 years ago has been reported on the Kennebec River north of the Shawmut Project (Will et al. 2001) and Late Paleoindian remains have been identified downstream (Spiess 1990).

The end of the Paleoindian period, and subsequent transition into the Early Archaic period, is poorly understood. Archaeological evidence indicates that during the later Paleoindian period, fluted spear points were replaced by smaller, unfluted points. Other point styles emerge in the region, most notable of which are long, slender lanceolate points with a distinctive parallel flaking technology (Will and Moore 2002; Cox and Petersen 1997; Doyle et al. 1985). These cultural changes coincide with the transformation of the environment from more open, woodlands to closed forests. By the Early Archaic period, the archaeological record contains a dramatically different material culture than that recovered from sites dating to the preceding Paleoindian period.

Archaic Period (ca. 9,500-3,000 years ago). The Archaic period represents the longest cultural period in the region, spanning around 6,500 years. This time frame is indicative of persistent cultural adaptations, as inferred from artifact assemblages, which lasted over several millennia. Although Early and Middle Archaic people probably continued a nomadic hunter and gatherer lifestyle, their subsistence and settlement patterns were different from those of the Paleoindian people. This is suggested by the location of most Early and Middle Archaic sites along present-

day water bodies, and the presence of food remains of aquatic species, particularly beaver, muskrat, and fish.

Archaeological assemblages dating to the Early and Middle Archaic periods in Maine are different from their predecessors, and somewhat unique to the Maine region, particularly with respect to the Early Archaic period. Tools were typically produced from local stone, often collected in cobble form, and lack the finely crafted, chipped stone spear points that characterize the Paleoindian period. Rather, flakes and crudely fashioned unifacial tools dominate the assemblages. In addition, a new technology using pecking and grinding techniques appears for the first time in the archaeological record (Robinson 1992). This new technology produced a suite of ground-stone tools that became more elaborate through time. By the Middle Archaic period, chipped-stone spear points become increasingly more abundant and the first cemetery sites occur. These cemetery sites reveal mortuary practices that included the sprinkling of graves with red ocher, and the offering of grave goods, such as gouges, slate spear points, and stone rods (Robinson 1992; Moorehead 1922; Willoughby 1898). Commonly referred to as the "Red Paint People," sites dating to their tradition have typically been found east of the Kennebec River with some sites displaying a strong focus on maritime resources.

The close of the Late Archaic period is characterized by another archaeological tradition known as the Susquehanna Tradition (Bourque 1995; Sanger 1979). It is widespread in Maine and New England. The people of the Susquehanna Tradition appear to have been more focused on a terrestrial economy than a marine economy. They largely abandoned the use of red ocher in their graves, and often cremated their corpses rather than buried them intact. Diagnostic tool forms include large, broad-bladed chipped stone spear points. Sites related to this and other traditions in the Late Archaic period (e.g. Laurentian) are known from the middle and lower Kennebec River.

The relationships between the perceived Late Archaic cultural groups continue to be a source of debate among Maine archaeologists. At the root of the argument is whether the various archaeological assemblages of the Late Archaic reflect local, long-term cultural adaptations, or movement of people into the region with a different culture and way of life. Whatever the origins of the cultural changes observed, they again roughly coincide with increasing changes in the

environment that provided more favorable habitat for deer populations and possibly other modern species as well.

Ceramic Period (ca. 3,000-450 years ago). The introduction of pottery manufacture and use in Maine defines the onset of what Maine archaeologists call the Ceramic period (Sanger 1979). In other parts of the Northeast, this cultural period is referred to as the Woodland period. The differences between the two terms is mainly that hunting and gathering for food remained the primary means of subsistence throughout much of Maine and the Maritimes, while a reliance on horticulture and a tendency toward larger, more permanent settlement patterns developed in other regions during the same time period. Ceramics first appear in the archaeological record of Maine approximately 3,000 years ago and they persist until contact with Europeans when clay pots were replaced in favor of iron and copper kettles that were traded for beaver pelts and other animal furs.

Ceramic period sites are abundant in Maine, along both the coast and in the Maine interior (Sanger 1979). Along the coast, they are most visible in the form of shell middens, which have attracted the attention of professional and amateur archaeologists since the late 19th century (Wyman 1868). Shell midden sites contain discarded shells of clams, oysters, mussels, and quahogs, bones of both terrestrial and marine animals, as well as broken pottery sherds and discarded stone and bone tools. Sites in the interior are most common along waterways, ponds, and lakes. Assemblages from the interior differ from coastal sites in that bone assemblages are poorly represented due to differences in preservation.

The picture that emerges from Ceramic period sites is one showing long-standing cultural adaptation to the diversified use of local resources. In addition, the presence and nature of artifact forms, and certain types of stone recovered from Ceramic period sites indicate trade and communication with peoples far to the north, south, and west. By the end of the period, historical and archaeological evidence suggests horticulture was practiced in southern Maine (Moore and Mack 2015; Will et al. 1995a; Champlain 1904). The Ceramic period ends with European contact approximately 450 years ago. At this time, most of the artifacts attributable to prehistoric inhabitants of Maine disappear from the archaeological record. Ceramic period sites are well documented along the Kennebec River.

4.10.1.2 Historic Period

The first permanent European settlement of the Kennebec River in the Project area began in 1770s. In 1771, a small group of pioneers from Massachusetts progressed by ship up the Kennebec River to the head of tide near Gardiner. From there they made their way upriver on the eastern side to Winslow, in the area of Fort Halifax and eventually to present day Fairfield, where they established a small settlement (Fairfield 2014). A few years later, during the American Revolution, in September 1775, Colonel Benedict Arnold and his troops traveled up the Kennebec River and passed through the Project area on their way to the ill-fated Battle of Quebec (Roberts 1953). Following the Revolutionary War, the Kennebec River valley in the vicinity of the Project, including the towns of Fairfield and Skowhegan developed as trade and agricultural towns, with farms producing hay, grain and potatoes.

The Kennebec River was utilized as a major transportation route for the timber industry beginning in the early nineteenth century (Calvert 1986). The abundant waterpower allowed log driving companies and related sawmills to flourish and spurred considerable industrial and commercial development along the river banks. By the 1880s, the town supported a number of industrial villages including Somerset Mills nearest the dam. The village supported a number of other industries and stores, including a marble works and black smith shop, as well as a series of professional and private residences. A branch of the Maine Central Railroad ran parallel to the river, connecting Waterville and Skowhegan and facilitating trade (Varney 1881). Falls on the Kennebec at Fairfield, Shawmut and Skowhegan were soon utilized as waterpower for mills. Fairfield alone had eight sawmills, three planning mills, a gristmill, a canned corn factory, plaster mill, three carriage factories, a sled factory, two door, sash and blind factories, a cabinet and box factory, coffin factory, a clothing factory, a marble works and a tannery (Fairfield 2014). The current Shawmut Dam was built in 1914 by the Shawmut Manufacturing Company. Historic maps (Colby 1883) show the dam originating at the edge of the commercial center of Somerset Mills (part of Fairfield) adjacent to two large sawmills. The dam crossed the river to connect with the town of Benton on the eastern shore.

4.10.2 Pre-contact Archeological Resources

4.10.2.1 Phase IA Archaeological Investigation

The Licensee conducted a Pre-contact period Phase IA archaeological investigation in 2017 (Will 2017). The Phase IA investigation identified that there were more than a dozen Pre-contact period archaeological sites that may or may not be within the Project APE. The Phase IA investigation recommended a Phase IB investigation to relocate the previously recorded sites to determine whether the sites are located within the APE, to evaluate their erosion status, and to make recommendations as to whether Phase II investigation of any sites found to be in the APE would be appropriate. By letter dated September 11, 2017, the SHPO concurred with the Licensee's proposal for Phase IB Investigation.

4.10.2.2 Phase IB Archaeological Investigation

The Phase IA research concentrated on identifying areas where survey for Pre-contact period archaeological sites might be located and contacting numerous landowners for permission to test for archaeological sites on their properties. Seventeen locations were identified as sensitive for Pre-contact period archaeological investigation. Eight sensitive areas were not accessed due to a lack of landowner permission.

A Phase IB scope of work was approved by the Maine Historic Preservation Commission (MHPC) to complete a survey for Pre-contact period archaeological sites within the Shawmut Project. The Pre-contact archaeological Phase 1B field survey was completed in October 2019. A total of 230 test holes and 14 test units were excavated during the survey. In total, four Pre-contact period sites were discovered during the Phase IB archaeological survey of the Shawmut Project. These sites have been recommended for further survey to determine their National Register eligibility.

4.10.3 Historic Archaeological Resources

4.10.3.1 Historic Archaeological Resources Phase I Survey

A historic period archaeological resources survey was conducted in support of the relicensing of the Project in accordance with the RSP. Study objectives were to evaluate areas in the APE that

had not been previously evaluated for historic period archaeological resources and to make recommendations about whether any additional historic period archaeological sites that were found are eligible or potentially eligible for listing to the NRHP. Background research prior to the survey had identified five known historic period archaeological sites in, or in close proximity to, the Project area.

4.10.3.2 Historic Archaeological Resources Phase I Survey

The Licensee conducted a Phase 0 archaeological sensitivity assessment and a Phase I archaeological reconnaissance survey for Post-Contact (historical) period resources for the Project. The Project APE for these studies is located along the Kennebec River between the towns of Fairfield and Skowhegan, approximately 21.3 river kilometers. The archaeological sensitivity assessment and reconnaissance survey were conducted in accordance with federal and state legislation. The field survey for the Phase 0 archaeological sensitivity assessment was conducted during September 2017; the field survey for the Phase I archaeological reconnaissance survey was conducted between October and November 2019.

During the Phase 0 archaeological sensitivity assessment, the archaeologists conducted background environmental and cultural research, and a pedestrian survey of the Project APE. The pedestrian survey (along with limited use of shovel test pits to identify stratigraphy) identified 23 river bank areas and 5 river islands that appeared to have high sensitivity for the presence of historical period archaeological resources. Based on these results a series of archaeologically sensitive areas with a high probability for the presence of Post-Contact (historical) resources within the Project APE were recommended for subsurface archaeological testing (Phase I). These included areas associated with initial Euro-American settlement of the region, the 1775 Benedict Arnold Expedition to Quebec, two historical river ferry crossing locations, and previously identified site ME 151-003 (a presumed fortification).

The Phase I archaeological reconnaissance survey consisted of two distinct field methodologies, shovel test pit survey (supplemented with excavation units for deeper testing purposes) and metal detection survey. The primary goal of the testing was the identification of significant historical resources in areas that had been previously determined to have the potential to be affected by significant bank erosion. A total of 76 shovel test pits and 2 excavation units were excavated

within the 7 testing areas, recovering a total of 223 historical artifacts. A total of 43 areas were surveyed via metal detection with at least 1091 buried metal signals identified; of these signals 379 were ground-truthed. A total of 163 historical artifacts were recovered from the metal detecting.

One newly identified historical resource was discovered; the site of a river ferry crossing. This resource type appears to be particularly limited, as ferry sites were often destroyed by later development. Its extent and eligibility for listing on the NRHP has not been determined. Additional archaeological investigations are recommended for this site.

Previously identified site ME 151-003 was investigated and determined to not be a historical fort or other military earthen works, but instead, part of a late nineteenth to early twentieth century industrial site, possibly associated with the Good-Will Hinkley School and the Maine Central Railroad's Skowhegan Branch.

Metal detection survey investigation of areas identified as possible locations of camps associated with troop movement in the 1775 Arnold Expedition to Quebec resulted in the identification of several scatters of historical artifacts that may represent either the location of structures that are no longer present or general refuse disposal. No conclusive determination could be made as to their actual cultural origin at this time.

4.10.3.3 Historic Architectural Resources

An architectural survey of the Shawmut Project APE was conducted in August 2016 (Price 2016). The Shawmut Project facilities were surveyed at the intensive level and the remainder of the Project was surveyed at the reconnaissance level to document previously unidentified resources. Previously identified historic resources in the APE included the 1775 Arnold Trail to Quebec, which was listed to the NRHP in 1969 and the Shawmut Project facilities, which had been surveyed in 2010 but no formal determination of eligibility was made at that time.

The survey identified five architectural resources 50 years or older within the Project APE, including the previously identified Arnold Trail and the Shawmut dam and powerhouse. The newly recorded resources include the 10 log driving piers immediately upriver from the Shawmut Project, and two Maine DOT 1930s-era reinforced concrete slab bridges that cross

small tributaries within the Project boundary. Architectural resources within the Project APE are summarized in Table 4-39.

Table 4-39 Summary of Architectural Survey Results for Resources

Site/Facility	Findings/Recommendation
Arnold Trail to Quebec	Listed in the NRHP
Shawmut Project (concrete gravity dam, concrete headworks structure, concrete forebay structure, 1913 powerhouse, 1982 powerhouse, and tailrace)	Recommended eligible for listing in the NRHP
10 Log Piers	Recommended as contributing resource to the Shawmut Project
MDOT Bridge No. 2225	Recommended not eligible for listing in the NRHP
MDOT Bridge No. 2508	Recommended not eligible for listing in the NRHP

Benedict Arnold Trail

The Benedict Arnold Trail to Quebec is 194-miles-long and stretches from Fort Popham at the mouth of the Kennebec River north to the Canadian border at Coburn Gore. This resource is associated with the documented path Benedict Arnold and his troops took in the fall of 1775 during the American Revolution. The Benedict Arnold Trail was listed in the NRHP in 1969. The section of the Benedict Arnold Trail to Quebec that lies within the Shawmut Project APE does not include any extant architectural or landscape resources.

Shawmut Hydroelectric Project and Ten Log Driving Piers

The Shawmut Hydroelectric Facility is recommended as eligible for listing in the NRHP under Criterion A at the local level of significance for its association with the early twentieth-century history of hydroelectric power and industrial development along the Kennebec River in Maine. The facilities include a concrete gravity type dam, concrete headworks structure, concrete forebay structure, the 1913 powerhouse, the 1982 powerhouse, and a tailrace. The facilities are in good condition.

The ten log driving piers in the river are recommended as contributing resources to the Shawmut Project, as they are functionally and historically related to the dam's operation and design, which

includes a log sluice formerly used to pass logs through the dam and down the river. The timber-crib and stone piers range in condition from poor to good.

Maine Department of Transportation Bridge No. 2225 and Bridge No. 2508

The two surveyed bridges in the Project APE do not have any unusual or distinctive features, nor are they associated with any significant historical events. They are located in sparsely developed settings that do not have the consistency or concentration of buildings that might define a potential historic district. Thus, the bridges are not recommended as eligible for listing in the NRHP.

4.10.4 Environmental Analysis

The Licensee is not proposing any changes to the Shawmut Project or any changes in the operation of the Project that would affect any of the identified archaeological or architectural resources found within the Project APE. The Project will continue to operate as run-of-river with minimal impoundment fluctuation and relatively stable downstream flows. The Licensee is not proposing the construction of any new Project facilities or recreation facilities, or ground disturbing activities that have the potential to impact eligible cultural resources.

The Licensee is proposing the removal of two small parcels of land at the upper end of the Project impoundment. Removal of these areas from the Project boundary would have no impact on the archaeological sites or historic structures that have been determined or recommended as eligible for listing because these areas do not contain any sites identified through cultural resource investigations.

To protect eligible cultural resources at the Project, the Licensee is proposing to implement an HPMP, which provides background information on cultural resources at the Project, including maps of the APE and archaeological and historic sites, preservation goals and priorities, potential effects of continuing operation and maintenance of the Project over the term of a new license, and consultation requirements (Appendix E-9). Four (4) Pre-contact archaeological sites located within the Project APE have been recommended for additional survey to determine if they are eligible for NRHP listing and incorporation into the HPMP (if determined eligible). One (1)

historic period archaeology site has been recommended for further survey to determine NRHP eligibility.

With respect to the Architectural Survey Report and Finding of Effects Report for the Project, one NRHP-listed (Benedict Arnold Trail) and two NRHP-eligible historic sites (Shawmut Hydroelectric Project, 10 Kennebec Log Driving Piers) are located at the Project and are incorporated into the HPMP. With the implementation of the HPMP, none of these sites would be impacted by the continued operation of the Shawmut Project, as proposed.

4.10.5 Proposed Environmental Management Measures

The Licensee has developed a draft HPMP for the Shawmut Project (Appendix E-9). The HPMP would ensure that appropriate consultation occurs prior to any future activity that may affect the historic properties associated with the Project. The draft HPMP is being filed with MHPC, the Tribes, and FERC under separate cover as "Privileged" because it contains confidential archaeological site location information. The draft HPMP addresses the NRHP-eligible historic properties that need to be considered when evaluating eligibility, as well as includes provisions to address any historic properties subsequently identified during the term of a new license.

4.10.6 Unavoidable Adverse Effects

Continued operation of the Shawmut Project would result in no unavoidable adverse effects on cultural resources.

4.10.7 References

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5.0 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the 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. A list of existing FERC-approved state of Maine and federal plans was obtained from the Commissions website as of December 2019. FERC currently lists 31 comprehensive plans for the state of Maine. Of the 31 plans listed, 20 are potentially relevant to the Project. Exhibit H provides a review of the proposed relicensing in consideration of any existing FERC approved comprehensive management plans.

6.0 DEVELOPMENTAL ANALYSIS

6.1 Cost and Value of Development Resources Associated with the Project

This section identifies estimated costs specific to proposed PME measures. Overall project cost and value information is provided in Exhibit D of this license application.

6.2 Cost of Proposed PME Measures

Table 6-1 identifies the Licensee's estimated costs associated with the proposed PME measures. As appropriate, both annual operational and maintenance and one-time costs have been estimated for these measures.

Table 6-1 Estimated Costs for Proposed PMEs for the Shawmut Project

Proposed PME Measure	Implementation Date	Capital Costs (2019 $)	Annual Costs (2019 $)
Continued operation of Project in run-of-river mode with impoundment operated within 1 foot of elevation 112.0'.	2022	No change from current conditions	No change from current conditions
Implement Project Operations Monitoring Plan	2022	$5,000	$5,000
Modify the Shawmut Project boundary to remove 2 small parcels of land.	2022	$5,000	N/A
Continue to provide public recreation access and maintain the existing 2 Project recreation sites (Hinckley Boat Launch, Canoe Portage)	2022	N/A	$5,000
Implement Recreation Management Plan (RMP)	2022	$5,000	$5,000
Implement Historic Properties Management Plan (HPMP)	2022	$5,000	$5,000
Phase II Archaeology Studies, as necessary	2021	$120,000	N/A
Implement SPP fish passage measures.			
(1) Forebay Fish Guidance Boom	2022	$500,000	$15,000

Proposed PME Measure	Implementation Date	Capital Costs (2019 $)	Annual Costs (2019 $)
(2) Downstream Fish Passage Studies	2023-2025	N/A	$100,000 (in each of 3 years)
(3) Upstream Fish Passage Studies	2-years at undetermined date	N/A	$100,000 (in each of 2 years)
(4) New eelway, if necessary	2022	$150,000	$5,000
(5) Annual reporting	2022	N/A	$5,000
Continued operation of upstream and downstream fishways.	2022	N/A	$50,000

APPENDIX E-1

DLA CONSULTATION COMMENT/RESPONSE SUMMARY

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Exhibit E – Appendix E-1
Summary Response to Comments on Draft License Application

No	Commenter	Comment	Response
1	FERC 11/30/2018	In the draft license application, you indicate that additional information will be provided in the final license application.[1] This information and the information requested in Appendix A should be included in your final license application or the Commission may find that the application is not ready for environmental analysis, pursuant to 18 CFR § 5.22 of the Commission's regulations. _____ [1] This information includes the Baseline Fish Assemblage Study results; the Phase 1B Archaeological Investigation results, and any Phase II Investigation results; revised Exhibit G drawings; a list of unscheduled outages and lost generation; average annual inflow; draft license application (DLA) comment responses; and the non-Project recreation facilities overlap summary.	Acknowledged. The Licensee has completed the Fish Assemblage Study, the Phase 1B Precontact Archaeology Study, and the Phase 1 Historic Archaeology Study. The results of these studies are summarized in Exhibit E and the study reports for all three are included in appendices to the final license application (FLA). The two archaeology studies are included in Volume III which is being filed as Privileged. Exhibit G drawings showing the proposed revised Project boundary are being filed as part of the FLA.
2	FERC 11/30/2018	In Scoping Document 2 (SD2), we identified migratory fish, including Atlantic salmon, American shad, alewife and blueback herring, American eel, as well as recreation resources, as resources that could be cumulatively affected by the continued operation and maintenance of the project. In Section 4.1.1, Cumulative Effects, of the DLA, though, you indicate that SD2 identified four resources for cumulative effects analysis, including migratory fish, recreation resources, aquatic habitat, and wetlands. While you identified the latter two resources as cumulatively-affected resources in the DLA, they are not mentioned in SD2. We also note that these resources are not further addressed in your DLA's subsequent sections on cumulative effects. Therefore, please expound on the discussion of these resources as being cumulatively affected in the FLA. If the inclusion of the resources was a mistake, please remove reference to these resources, as cumulatively affected resources, in the FLA.	The reference to aquatic habitat and wetlands as resources being cumulatively affected was an error. Scoping Document 2 (SD2) clearly and correctly identifies migratory fish and recreation resources as those that could be cumulatively affected by the relicensing of the Shawmut Project. The erroneous reference to the other resources has been removed from the FLA.

No	Commenter	Comment	Response
3	FERC 11/30/2018	To facilitate our review of project effects on environmental resources at the project, please submit the digital files (i.e., GIS2 data layers) specified below that you used to create the maps in the DLA and study reports. Any GIS data layer(s) documenting occurrence of federally-listed species, or their habitats, or showing the locations of cultural or historic sites, should be filed with the Commission as "Not for Public Disclosure, Privileged." Please provide the following, if available: a. Project boundary, as revised by removing the two parcels; b. Project facilities, including: (i) access roads; and (ii) existing project recreation sites and amenities; c. Habitat types/land cover, including wetlands, as shown on figure 4-1, sheets 1-11 of the Initial Study Report; d. Locations of non-native invasive plant occurrences, as shown on table 6-3 of the Initial Study Report; e. Observed state species of special concern, as shown on table 6-7 of the Initial Study Report;	The Licensee will, in support of the FLA and following submittal of the FLA, separately submit the electronic files containing the GIS data layers which show the information for the maps and study reports included in the FLA, including the locations of: a. Project boundary, as revised by removing the two parcels; b. Project facilities, including: (i) access roads; and (ii) existing project recreation sites and amenities; c. Habitat types/land cover, including wetlands; d. Locations of non-native invasive plant occurrences. However, as it was not specified in the study plan, the detailed locations of observed state species of special concern were not recorded by specific location on a map, except for the long-leaved bluet which occurs in Community 9 in Figure 4-1 Sheet 11 of 11.
4	FERC 11/30/2018	Exhibit A does not provide all of the information that is required by section 4.51(b) of the Commission's regulations. To address this deficiency, Exhibit A should be revised to describe the: (1) respective heights of each section of the dam (i.e., earthen embankment, gated spillway, abutment, stanchion spillway, bulkhead, and cut-off wall); (2) height of the stanchion spillway bays; (3) dimensions of the sluiceway at the west end of the stanchion spillway; and (4) the minimum hydraulic capacity of turbine units 7 and 8.	Exhibit A has been revised and updated to include additional detailed information on the Project facilities, as applicable .(it is noted that the Shawmut Project does not have a stanchion spillway or some of the other sections referenced in the request). Details, including dam section heights (elevations) and dimensions are also provided in Exhibit F.
5	FERC 11/30/2018	In Section 3.2 of Exhibit E, you indicate that the Shawmut impoundment extends about 11 miles upstream of Shawmut Dam, and that the project boundary extends about 12.3 miles upstream of Shawmut Dam. Please explain, in the FLA, why the project boundary extends an additional 1.3 miles upstream of the headwaters of the Shawmut impoundment.	The FLA has been revised to ensure a consistent description of the impoundment length, which is approximately 12 miles. The proposed Project boundary extends a short distance upstream at elevation 114' (two feet above normal full headpond similar to much of the project), and is approximately 12.3 miles upstream of the dam.

No	Commenter	Comment	Response
6	FERC 11/30/2018	In Section 3.2.3 of Exhibit E, you propose to remove two parcels of land from the existing project boundary. One parcel, which you estimate to have an area of 2.2 acres, is located on the east shore of the river. The other parcel, which you estimate to have an area of 26.4 acres, is located on the west shore. Please modify Exhibits A and E to provide: (1) the total acreage for the existing and proposed project boundary; (2) the exact acreage of the two sites proposed to be removed from the project boundary; and (3) a description of the site-specific circumstances justifying each of the two proposed revisions.	Exhibits A and E have been revised to include the total acreage for the existing and proposed project boundary. The exhibits also include justification for the proposed changes in the project boundary.
7	FERC 11/30/2018	The Exhibit G drawings should be revised to show the proposed project boundary. The Exhibit G drawings should provide the site names and locations of all project recreation facilities. The revised Exhibit G drawings to be filed with the FLA must be stamped by a registered land surveyor as required by Section 4.39(a) of the Commission's regulations.	Revised Exhibit G drawings have been developed as requested and are included in the FLA.
8	FERC 11/30/2018	In Sections 4.7.1.1 and 4.7.1.3, Wildlife and Botanical Resources, you describe the study area for identifying botanical and wildlife resources as extending approximately 1,200 feet downstream of the dam. However, the maps of the study area in your 2017 study report depict the study area extending approximately 4,000 feet downstream of the dam, roughly corresponding to the project boundary. Please reconcile this discrepancy in the FLA.	The 1,200 feet downstream of the dam was used for the botanical and wildlife resources based on aerials and representative habitat. Below 1200 downstream of the dam, the habitat is open water, flowing river habitat similar to that found in the first 1200 feet downstream of the dam.
9	FERC 11/30/2018	In Section 2.1.4 of Exhibit A, pages A-3 and A-4, you describe the trash racks at each of the project's powerhouses. You indicate that the 1912 Powerhouse has trash racks with a clear bar spacing of 1.5 inches, and that the 1982 Powerhouse has trash racks with a clear bar spacing of 3.5 inches. To facilitate staff review of the project's effects on fish entrainment and turbine mortality, please include in the FLA: (a) the overall dimensions of each set of trash racks at each of the two powerhouses; (b) the number and width of the individual bar racks; and (c) an estimate of the intake velocity for both the intake trash racks and the draft tube trash racks, along with the calculations used to develop the estimate(s).	Exhibit A of the FLA has been revised to include additional detail on trashrack and bar configuration to the extent that it is available. This information for the existing structures is also discussed in the Exhibit E. As proposed in the Species Protection Plan (filed with FERC December 31, 2019), Licensee is planning to install a fish boom in the intake in front of the units 7 and 8 powerhouse to reduce entrainment and to provide guidance and sweeping flows to the downstream fish passage facility as part of the proposed action. The SPP proposal is discussed in Exhibit E.

No	Commenter	Comment	Response
10	FERC 11/30/2018	You propose to describe, in an operations monitoring plan, how you plan to monitor and report on maintenance of the pond level within 2 feet of normal pond elevation of 112 feet U.S. Geological Survey (USGS) Datum. The plan would include information on how you intend to maintain impoundment levels using the project's gates, adjust unit flows, and inflate/deflate the flashboards. Please file your draft operations monitoring plan with the FLA.	A draft Project Operations Monitoring Plan has been included in the FLA, as an appendix to Exhibit E.
11	FERC 11/30/2018	On page E-3-7 of Exhibit E, you state that you anticipate developing an operations and maintenance plan for any upstream and downstream fish passage facilities that you may propose after completion of the fish passage feasibility assessment. We will need to assess the benefits and costs of your proposed fish passage operations and maintenance measures as part of our environmental analysis. Therefore, please include the proposed fish passage facility operations and maintenance plan(s), together with any updated proposals and costs for new or modified fish passage facilities, in the FLA.	A fish passage operations plan has been developed in conjunction with the development of a Species Protection Plan (SPP) for the Shawmut Project. The Fish Passage Operations and Maintenance Plan was developed in consultation with federal and state fishery agencies and was filed with FERC on December 31, 2019 as part of the final fishway design and as required by the Project's current license.

No	Commenter	Comment	Response
12	FERC 11/30/2018	On page E-4-36 of Exhibit E, you refer to a pending license amendment application for the Shawmut Project, as well as a fish passage feasibility assessment that is currently underway for four projects on the lower Kennebec River. The feasibility assessment will include an evaluation of potential upstream and downstream fish passage alternatives for the Shawmut Project. You anticipate completing the evaluation by the end of 2018. Please file the results of the feasibility assessment with the FLA, or as soon as possible following its completion. If the feasibility assessment is completed after the filing of the FLA, and if the results of the feasibility assessment cause you to modify your proposed action for fish passage facilities or operations at the project, then you must update all applicable exhibits of your FLA to reflect those modifications. In addition, please include with your updated proposed action the conceptual designs of any new or modified fish passage facilities, including documentation of consultation with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Maine Department of Marine Resources, Maine Department of Inland Fisheries and Wildlife, and Kennebec Coalition	The fish passage feasibility assessment was completed and filed with the FERC on 7/1/2019. Following the feasibility assessment, and after discussions with the consulted parties, Brookfield concluded to move forward with construction of the previously authorized upstream fish lift at the Shawmut Project. Accordingly, the Licensee plans to install a volitional fish lift at the Shawmut Project as currently authorized by the FERC Project license. Design of the facility was completed in 2019 and the final fishway design plans were filed with FERC December 31, 2019. Construction will occur in 2020, and the fish lift is expected to be operational in 2021. The Licensee proposes, under the new Project license, to operate the fish lift in accordance with the provisions of the SPP which was filed with FERC on 12/31/2019. The Licensee anticipates that provisions of the SPP will be incorporated into the new FERC license for the Shawmut Project.

No	Commenter	Comment	Response
13	FERC 11/30/2018	On page E-4-61 of Exhibit E, you refer to the conceptual engineering design work that you have completed for upstream and downstream fish passage facilities at Shawmut Dam. You also refer to a Computational Fluid Dynamic (CFD) model and a river herring radio telemetry study that you completed to inform the design and location of an upstream fish passage facility at Shawmut Dam. To facilitate our review of fish passage issues at the Shawmut Project, please provide copies of the CFD model and river herring radio telemetry study reports as part of your FLA.	The CFD modeling and radio-telemetry study were undertaken as part of the siting and engineering considerations for the design of the fishway that is being constructed during 2020 and 2021 under the existing license. The results of both the model and the study were shared with the fishery management agencies during design and planning meetings to inform the final design of the fishway. No final report was prepared for the river herring telemetry study, however the study results are discussed in Exhibit E of the FLA.

No	Commenter	Comment	Response
14	FERC 11/30/2018	While the DLA provides some analysis of the effects of project operation on downstream migrating juvenile Atlantic salmon and adult American eel, there is little analysis of project effects on other diadromous fish species such as American shad and river herring, which are stocked in the Kennebec River upstream of the project. For example, your analysis of project effects on American shad and river herring appears to be limited to the following statement on page E-4-62 of Exhibit E: "The Licensee also provides downstream passage for American eels, American shad, and river herring at the dam; high passage success rates are expected based on previous studies." However, you provide no information, or analysis, to support this conclusion. Therefore, please include in the FLA a thorough discussion of how project operation affects juvenile and adult (post-spawn) river herring and American shad during downstream migration. The analysis should include:(a) a specific description of project operation (e.g., flow routing and turbine operation) through the full range of hydrologic conditions during the downstream passage season for these species and life stages;(b) an estimate of injury and mortality rates for each species and life stage passing through the various downstream passage routes (e.g., sluice ways, deep gates, spillways) that are available during the requisite migration period;(c) a comparison of fish body length and width, as well as swimming abilities, to the physical and hydraulic characteristics of the powerhouse trash racks (e.g., bar spacing and approach or through-screen velocities) and proximity to a surface bypass route to evaluate entrainment potential; and(d) an expected turbine injury and mortality rate for each species and life stage. If there are no site-specific data available on injury and mortality rates through the project's various passage routes (e.g., spillways, Francis-type turbine, Propeller turbine), then an estimate should be derived from studies performed at other dams and hydroelectric projects with similar downstream passage characteristics.	As discussed in Exhibit E, the SPP prepared for the Shawmut Project and filed with FERC 12/31/2019 was developed in consultation with state and federal fishery agencies. While the ESA listed species that the SPP is intended to cover is Atlantic salmon, all measures, facilities, operation and maintenance procedures included in the SPP are being designed and implemented to also benefit the other anadromous species including American shad and river herring. The Licensee is proposing in the SPP, to install a fish guidance boom that is expected to improve downstream passage for Atlantic salmon as well as other anadromous species. In support of the SPP that was filed with FERC 12/31/2019, the Licensee completed studies and agency consultation to determine ways to improve downstream passage, including evaluations of turbine mortality rates for Atlantic salmon smolts. At Shawmut, turbine mortality was evaluated for units 7 and 8, as rack spacing for units 1-6 was determined to be sufficiently narrow (1.5 inches) to exclude salmon smolts. The results of these evaluations are discussed fully in Exhibit E, and details can be found in the SPP and Draft BA filed with FERC December 31, 2019. The Licensee also proposes to conduct site specific studies to evaluate the passage routes and effectiveness of downstream fish passage at Shawmut as part of the post construction monitoring of the improvements to downstream passage measures.

No	Commenter	Comment	Response
15	FERC 11/30/2018	On page E-4-44 of Exhibit E, you indicate that you are authorized to lower the impoundment down to an elevation of 108 feet for maintenance activities. On page E-4-60 you state that: "Continued operation of the Shawmut Project is not expected to adversely affect aquatic habitat, including EFH [Essential Fish Habitat] for Atlantic salmon. The Licensee operates the Shawmut Project in a run-of-river mode except during routine maintenance operations." However, in the DLA you do not describe the frequency or duration of planned maintenance drawdowns, any proposed limits on the timing of these activities to protect sensitive aquatic resources such as Endangered Species Act-listed Atlantic salmon, or any corresponding effects of maintenance drawdowns on aquatic resources. Therefore, please include in your FLA a description of: (1) the types of activities performed during maintenance drawdowns; and (2) the general frequency and duration of maintenance drawdowns, as well as a general description of the extent and variability of the drawdown between the 108-foot lower limit and 112-foot normal operating level. Additionally, please describe any seasonal limitations or preferences for the maintenance drawdowns if they exist.	The Exhibit B description of project operations and the draft Operations Monitoring Plan included with the FLA (Appendix to Exhibit E) provides further descriptions of the types of activities performed during maintenance drawdowns. There are currently no seasonal limitations or preferences for the drawdowns, rather they are planned on an as needed basis..

No	Commenter	Comment	Response
16	FERC 11/30/2018	The cumulative effects analysis for migratory fish in the DLA (pages E-4-62 and E-4-63) generally acknowledges that accumulation of effects from this project, together with other dams and diversions within the Kennebec River Basin between the Brassua Hydroelectric Project and the river mouth at Merrymeeting Bay, has affected migratory fish. The analysis also points out that historic fish passage agreements implemented at the Lockwood, Hydro Kennebec, Shawmut, and Weston Projects have been designed to restore access to riverine habitat for migratory fish. The analysis, however, does not fully describe the actions that have cumulatively affected migratory fish in the basin. For example, the analysis does not identify all major dams and diversion structures on the Kennebec River. It also does not identify major tributaries with historically accessible migratory fish habitat, nor does it indicate whether any have fish passage obstructions or if any such obstructions have upstream or downstream passage facilities. The analysis does not identify any other actions within the geographic scope that might have cumulatively affected migratory fish resources. Therefore, please revise the cumulative effects analysis to include the following:(a) identify all dams and hydroelectric projects on the mainstem Kennebec River and major tributaries, their location (preferably by river mile) and a description of whether they currently operate any upstream and downstream fish passage facilities; (b) describe other actions within the geographic scope of analysis that have cumulatively affected migratory fish (e.g., land use practices, industrial development, fish harvest); and(c) describe any existing plans and activities for migratory fish restoration, including a discussion of migratory fish stocking goals, locations, and habitat conditions within the basin.	The cumulative effects discussion in the FLA (Exhibit E), has been revised and expanded to include additional information about the migratory fish and fish habitat in the Kennebec River basin, as well as the actions that have cumulatively affected migratory fish in the basin.

No	Commenter	Comment	Response
17	FERC 11/30/2018	Sections 4.7.1.1 and 4.7.1.2 of Exhibit E identify terrestrial habitat communities and wetland cover types in the project boundary. The acreages of each habitat and cover type are not provided. Please include the acreages of each habitat and wetland cover type.	Exhibit E of the FLA has been revised to include additional detail on wetland and cover type acreages at the Project.
18	FERC 11/30/2018	Section 4.7.2 of Exhibit E briefly mentions the vegetation management practices that you apply within the project boundary (trimming and mowing around project facilities, access road, and recreational facilities). The FLA should describe your vegetation management practices, including your: (1) vegetation maintenance schedule (i.e., activities performed annually, seasonally, as-needed, etc.); (2) procedures for managing vegetation in sensitive habitats (i.e., wetlands, riparian habitat, etc.); and (3) procedures applied when rare, threatened, or endangered plants or animals are encountered during maintenance activities, such as the federally threatened northern long-eared bat, and the state-listed long-leaved bluet.	The FLA includes a description of the Licensee's vegetation management practices at the Shawmut Project. Since there is very limited land within the Project boundary, vegetation management is limited primarily to periodic mowing around the Project facilities (powerhouse, access road) including the canoe portage and Hinckley boat launch recreation sites. Such vegetation management is done on an as needed basis and does not occur on a regular schedule. The Licensee does not manage vegetation in wetlands or riparian habitats, which are left in a natural state. No changes of the management of these areas are expected or proposed, and no effects from continued operation of the Project on species that use these habitats will occur.
19	FERC 11/30/2018	At several points in Exhibit E, you refer to “trace amounts” of species (silky dogwood, stunted silver maple, purple loosestrife) being observed or present in vegetation communities in the project boundary. Please estimate the quantity of these species in more precise terms, describing their abundance within the project boundary, such as the number and size of species patches or area occupied by, and density of species, as appropriate.	As described in Exhibit E, the Licensee conducted a wetland, wildlife, and terrestrial habitat study at the Project in accordance with the approved study plan. The study conducted was a reconnaissance level study that produced general maps of various vegetative cover types, and observations of the species make-up of these communities. The study described the presence of certain species of note in certain locations, but did not included detailed mapping or estimates of density or abundance of particular species. Therefore, the study results do not allow for detailed description of individual species locations or estimates of the area occupied by a particular species.

No	Commenter	Comment	Response
20	FERC 11/30/2018	The FWS IPaC Trust Resource report that you cite in Section 4.8.1 is over three years old and no longer valid. Please generate, and cite in the FLA, a current IPaC report for the project area. Include the resources it lists in your evaluation of potential project effects.	The Licensee has run an updated IPaC report for the Shawmut Project, and the results have been included in the FLA. There are no changes to the listed species within the Project area.
21	FERC 11/30/2018	Please describe and discuss any effects that construction, operation, and maintenance of your proposed fish passage facilities would have on wildlife and their habitats.	The construction impacts to fish and aquatic habitat associated with the installation of the previously authorized upstream fish lift are discussed in detail in the 2013 ISPP and Biological Assessment and 2016 Biological Opinion for the Project. Impacts to terrestrial resources are expected to be minor, as the fish lift is going to be constructed in an area immediately adjacent to the powerhouse. Laydown and equipment storage areas will be contained within the existing Project boundary in the parking lot area immediately adjacent to the Project dam. Continued operation of the upstream and downstream fish passage facilities under a new Project license would not have impacts on wildlife or their habitats.
22	FERC 11/30/2018	Section 4.9.1.4 of Exhibit E describes formal Project recreation facilities and indicates that their locations are shown on Figure 4-13. While Figure 4-13 shows an overview of the formal recreation facilities, specific maps for each facility are not included. The FLA should include additional figures showing the formal recreation facilities, and their amenities, to scale.	Exhibit E of FLA has been revised to include detailed Project recreation site figures, including the location of the Project boundary relative to the location of recreation site facilities and amenities. The figures are provided in FLA Exhibit E, and as applicable, the draft Recreation Facilities Management Plan appended to Exhibit E.
23	FERC 11/30/2018	Table 4-31 of Exhibit E lists eligible historic properties to be addressed in the Historic Properties Management Plan (HPMP). However, no other reference to an HPMP is made. The FLA should contain a copy of the HPMP.	A copy of the proposed HPMP is included as an Appendix to Exhibit E.

No	Commenter	Comment	Response
24	FERC 11/30/2018	Your Exhibit E does not include a developmental analysis. You should include a developmental analysis in Exhibit E of your FLA. For specific guidance on how to prepare the developmental analysis, see Chapter 4 of the document: Preparing Environmental Documents, Guidelines for Applicants, Contractors, and Staff on the Commission's webpage. Section 4.3 of the developmental analysis should include the anticipated capital, as well as annual operation and maintenance, costs for all proposed environmental measures described in the license application.	The Exhibit E of the FLA has been revised to include a developmental analysis of the proposed PME measures.
25	Kennebec Coalition	KC is requesting and EIS be done. Evaluation of the Environmental Impacts from Relicensing the Shawmut Project Requires a Basin-wide Environmental Scope that Takes Into Account the Impacts from All Four Dams. We submit that a basin wide evaluation of alternatives, ranging from removal or decommissioning to alternative structures or passage facilities, that Brookfield is now committed to undertake, is such a major federal action.	An EIS is not needed for the Shawmut Project relicensing. Nearly all of the other Kennebec River Basin Projects have been relicensed since passage of the 1986 Electric Consumers Protection Act (ECPA) and have, as a result, been through a thorough environmental review, including an EIS that was performed by FERC in 1995 for 11 Kennebec River basin projects. The Shawmut Project is operated as run of river, and therefore has no impact on river flows or hydrology. In addition, migratory fish and fish passage (resources determined by FERC to be cumulatively affected by the Shawmut relicensing) have been fully addressed at the Shawmut Project through the development of an SPP, with supporting draft Biological Assessment that covers the Lockwood, Hydro Kennebec, Shawmut, and Weston projects. As a result, the cumulative effects of the Shawmut Project on migratory fish passage were addressed and evaluated through the development of the 2013 ISPP, BA and subsequent Biological Opinion (BO), and have been further addressed through the development of the SPP and Draft BA that were filed with FERC 12/31/19.

No	Commenter	Comment	Response
26	Kennebec Coalition 12/3/2018	The draft application for new license's discussion of proposed actions states that FERC uses the existing operations of the facility "to establish baseline environmental conditions with other alternatives." Draft Application for New License, at E-3-1. While we concur with this as a general principle, we note that the basin wide circumstances considered by Brookfield must also include the existing operations of each of the four dams.	Exhibit E of the FLA has been revised to include more information about hydroelectric projects located throughout the basin, as requested by FERC.
27	Kennebec Coalition 12/3/2018	Here, the draft application for new license does not contain any developed "operations and maintenance plan associated with any upstream and downstream fish passage measures for diadromous species." The Kennebec Coalition's position is that whatever plans are proposed cannot be proposed or evaluated in a vacuum.	The Licensee has developed an SPP for its lower Kennebec River projects, including the Shawmut Project, that details proposed measures and operations to be undertaken for upstream and downstream passage of Atlantic salmon, American shad, and river herring. The Licensee operates upstream passage for American eel at the Project, as described in FLA Section Exhibit E. The SPP was filed with FERC on 12/31/19. The Fish Passage Operation and Maintenance Plan was filed with FERC on December 31,2019 as required by the current FERC license and Section 401 water quality certification
28	Kennebec Coalition 12/3/2018	The inaptly described "Environmental Analysis" in the Draft License Application at pages E-4-1 through E-4-127 is devoid of any analysis that meets the statutory and regulatory environmental impact analysis criteria, especially in light of recent precedent explaining and applying such criteria in American Rivers, supra, 895 F.3d 32 (D.C. Cir. 2018). There is, for example, no effort to assess the incremental (and demonstrably damaging) effect of the impoundments as cumulative impacts of the relicensing decision. As a final example, the draft application for new license does not address the subject of how fish passage facilities plans or operations at Shawmut will meet performance standards for upstream and downstream passage of diadromous fish species (or even what those performance standards will be) for both ESA-listed and for non-listed species, to achieve the goal of fish restoration to the Kennebec River.	Exhibit E of the FLA has been revised and expanded to include additional detailed discussion of the cumulative effects of the Project on migratory fish. In particular, there is more information provided on cumulative effects to migratory fish associated with the Licensee's proposed SPP which was filed with FERC 12/31/19, and which will ensure continued safe, effective and timely passage for Atlantic salmon, as well as American shad and river herring at the Shawmut Project. In addition, the draft BA that was filed with the SPP analyzes the effects of proposed fish passage measures (including performance standards) on the lower Kennebec River.

No	Commenter	Comment	Response
29	Kennebec Coalition 12/3/2018	In addition to our general concurrence with the staff comments, the Kennebec Coalition draws particular attention to the points made in Staff Comment ¶ 16, which raise much of the same issues that the Kennebec Coalition describes above involving gaps in the requirements of a complete cumulative effects analysis for migratory fish. The Kennebec Coalition accordingly concurs with FERC staff comments that the cumulative effects analysis (pages E- 4-62 and E-4-63 of the draft application) would require complete revision for any final license application.	See above response.
30	Kennebec Coalition 12/3/2018	The Draft Application for New License's draft EA (page E-3-8) devotes very little attention to the request of numerous stakeholders, including the Kennebec Coalition, that the Commission assess as an alternative the decommissioning and removal of the Shawmut dam. We urge the Commission, based on the American Rivers analysis, to conclude that relicensing of the Shawmut Project would not be consistent with the applicable NEPA standards, or with the ESA and other environmental impacts standards within the regulatory criteria of the Commission, and that the final order in this proceeding should require removal of the Shawmut hydropower dam.	Scoping Document 2 for the Shawmut Project did not at that time identify Project decommissioning and dam removal as a reasonable alternative to be considered by FERC as part of its NEPA review. Rather in SD2 FERC staff specifically noted that they did not consider project retirement to be a reasonable alternative to relicensing the Shawmut Project. There are no new circumstances or information that now supports consideration of project retirement.

No	Commenter	Comment	Response
31	USFWS 11/302018	Because considerable information is still pending, the Service believes that the current DLA does not accurately portray the situation at the Project. This is no fault of the Licensee, simply the fact that new developments have arisen that could influence the operations of the Project. For these reasons the Service is not providing specific comments at this time. The Service suggests that once the additional information is disseminated, the Licensee and the Resource Agencies discuss the proposed Project operations anticipated in a Final License Application.	Acknowledged. The Licensee has been working continuously with the USFWS and other federal and state agencies throughout the relicensing and SPP consultation efforts to ensure that the information included in the FLA reflects the most recent resource study results and that relicensing proposals for the Shawmut Project to address resource issues.
32	NMFS 12/3/2018	A Commission-required fish assemblage study that the licensee has not yet conducted.	The requested fish assemblage study was conducted in July-August 2019. Results of the study are provided in a study report which is included as an appendix to Exhibit E of the FLA, and are discussed in Exhibit E.
33	NMFS 12/3/2018	Development of a Species Protection Plan for endangered Atlantic salmon via ongoing Endangered Species Act consultation with the Licensee for the Shawmut Project and three other hydroelectric projects on the mainstem of the Kennebec River. The Species Protection Plan is not required but rather that it can be a helpful format for addressing all measures that the Licensee proposes to carry out to minimize, mitigate and monitor effects of the project on Atlantic salmon. Regardless of whether the Licensee develops a Species Protection Plan, the DLA [FLA] must include a thorough description of how the Licensee proposes to minimize, mitigate and monitor effects of the project on Atlantic salmon.	An SPP for the lower Kennebec River Projects, including the Shawmut Project, was filed with FERC on 12/31/19. The ongoing and new proposals for fish passage measures to be implemented or continued under the new license term are described in Exhibit E of the FLA.
35	NMFS 12/3/2018	Considering that the DLA is incomplete, and that significant information is still pending in this proceeding, we consider the DLA to be a placeholder -- an outcome of the Commission's regulatory requirement to adhere to ILP filing dates. As such, we are not providing specific comments on the DLA at this time and will provide substantive comments when there is a complete DLA or license application to comment on.	Acknowledged. The Licensee has been working continuously with the NMFS and other federal and state agencies throughout the relicensing and SPP consultation efforts to ensure that the information included in the FLA is consistent with the information and proposals included in the SPP that was filed with FERC 12/31/19.

No	Commenter	Comment	Response
36	MDEP 12/3/2018	The water quality studies provide data sufficient to assess attainment of Maine's water quality standards in the Project impoundment and downstream of the Project dam in an evaluation of the Project's impact on the waters of the Kennebec River.	Acknowledged.
37	MDEP 12/3/2018	Based on the results of the lake trophic state sampling and information contained in the draft application as well as initial and revised study results, the Department concludes that Brookfield has provided sufficient information to demonstrate that the project impoundment meets applicable Class B and Class C water quality standards and is free of culturally induced algal blooms which impair it use or enjoyment.	Acknowledged.
38	MDEP 12/3/2018	Based on the results of DO and temperature sampling conducted in the impoundment and tailwater, the Department concludes that Brookfield has provided sufficient information to demonstrate that the project outlet stream meets the applicable Class B dissolved oxygen standard under critical water quality conditions, and that that the measured concentrations in the Shawmut impoundment meet applicable Class C water quality standards.	Acknowledged.
39	MDEP 12/3/2018	Based on the results of benthic macroinvertebrate sampling conducted by the Licensee following MDEP protocols, the Department concludes that Brookfield has provided sufficient information to demonstrate that the benthic macroinvertebrate community in the Kennebec River below the Shawmut dam meets Class B aquatic life standards under current and proposed minimum flow conditions.	Acknowledged.

No	Commenter	Comment	Response
40	MDEP 12/3/2018	In lieu of conducting a habitat and aquatic life study the applicant proposed to submit three years of impoundment elevation and inflow/outflow data. The proposed data set was submitted on March 22, 2016, in response to an Additional Information Request from FERC. Review of the submitted data set, along with data collected during the macroinvertebrate study, suggests that run-of-river operations do not negatively affect the quality of aquatic habitat downstream of the Shawmut dam. Based on the information provided in the draft application and in the initial study report, the Department concludes that Brookfield has provided sufficient information to demonstrate that the project meets Class B aquatic life and habitat standards.	Acknowledged.
41	MDEP 12/3/2018	The Final License Application should include final reports and data summaries for all the studies requested by various stakeholders.	The studies conducted by Licensee for the Shawmut relicensing have been previously reported in the Initial Study Report and the Updated Study Report and are incorporated by reference into the FLA. Those studies that were completed subsequent to the USR are reported in Exhibit E of the FLA and the study reports are included as appendices; these include the Fish Assemblage Study, a Phase 1B Precontact Archaeology Study, and a Phase 1 Historic Archaeology Study.

APPENDIX E-2

RELICENSING CONSULTATION DOCUMENTATION

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Appendix E-2: Consultation Documentation

Note: Some consultation documentation on studies is not included, due to their previous inclusion in the ISR, etc., and is not repeated in the attached Consultation Documentation.

Brookfield

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New England Regional Operations Center
Brookfield White Pine Hydro LLC
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Hallowell, ME 04347

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September 21, 2015

VIA E-FILING

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

Shawmut Hydroelectric Project (FERC No. 2322)
Notice of Intent to File License Application, and
Pre-Application Document

Dear Secretary Bose:

Pursuant to Section 15(b)(1) of the Federal Power Act, 16 U.S.C. § 808(b)(1), Brookfield White Pine Hydro LLC (White Pine Hydro) herewith electronically files with the Commission, the Notice of Intent to File a License Application (NOI), and the Pre-Application Document (PAD) for the relicensing of the Shawmut Hydroelectric Project (FERC No. 2322). The current license for the Shawmut Hydroelectric Project (Project) expires on January 31, 2021.

In accordance with the Commission's regulations, 18 C.F.R. Sections 5.5(c) and 5.6(a)(1), White Pine Hydro is providing a copy of the NOI and PAD to appropriate federal and state agencies, Indian tribes, local governments, and members of the public likely to be interested in the proceeding, as set forth on the attached distribution list. In addition, White Pine Hydro is providing two courtesy paper copies of the NOI and PAD to Commission Staff in the Office of Energy Projects and Office of General Counsel – Energy Projects, as required by the Commission's filing guidelines.

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

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

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

If there are any questions or comments regarding the NOI or PAD, please contact me by phone at (207) 629-1817 or by email at Frank.Dunlap@brookfieldrenewable.com.

Sincerely,

Frank H. Dunlap
Licensing Specialist

Attachment: NOI and PAD for the Shawmut Hydroelectric Project

cc: Distribution List
K. Maloney, White Pine Hydro
R. Dewechter, White Pine Hydro

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

GOVERNOR

PATRICK C. KELIHER
COMMISSIONER

January 8, 2016

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

RE: Shawmut Project (P-2322-060)
Scoping Document 1

Dear Secretary Bose:

The Maine Department of Marine Resources (MDMR) is writing to provide comments on Scoping Document 1 (SD1) for the Shawmut Project that was distributed electronically on November 20, 2015. We offer the following comments:

Scope of Cumulative Effects Analysis and Resource Issues

We concur with the identification of Atlantic salmon, American shad, alewife, blueback herring, and American eel as resources that could be cumulatively impacted by the continued operation and maintenance of the Shawmut Project. We also concur with the geographic scope and temporal scope that have been identified in SD1.

An Interim Species Protection Plan (ISPP) to mitigate impacts on Atlantic salmon by operation of the Lockwood Project, Shawmut Project, and Weston Project and a separate ISPP to mitigate impacts by the Hydro-Kennebec Project requires the licensees to construct a new volitional upstream fish passage component for the existing Lockwood fishway in 2015, a new upstream fish passage facility at Hydro-Kennebec Project in 2015, a new upstream fish passage facility at Shawmut Project in 2017, and a new upstream fish passage facility at Weston Project in 2019. Thus, the ongoing restoration of anadromous species in the Kennebec River depends on safe, timely, and effective upstream (and downstream) passage at each of four dams for alosines and at each of four to six dams for Atlantic salmon. As described in Appendix A, the existing interim fishway (lift, trap, and truck facility) at the Lockwood Project is not effective at passing American shad, and the licensee's proposal to add an exit flume to the existing lift will essentially end the restoration of American shad to its historic range in the Kennebec River. The effectiveness of the upstream passage facility at the Lockwood Project has never been tested for alewives, blueback herring, American shad or Atlantic salmon. Furthermore, the upstream passage facilities will need to meet passage performance standards for Atlantic salmon, but to date these standards have not been developed. We request that the Commission carefully analyze

this situation in the Environmental Analysis or Environmental Impact Statement, whichever is most appropriate.

Proposed Studies

A new upstream passage facility required at the Shawmut Project by the ISPP will not be operational until 2018 (assuming no unexpected delays). Its construction has the potential to impact the current interim upstream eel passage facility and the effectiveness of the existing interim downstream passage facility for both anadromous and catadromous species. However, the typical period for conducting relicensing studies for the relicensing will have passed. Effectiveness testing of upstream and downstream passage facilities for alewives, blueback herring, American shad and American eel will have to be incorporated into the new license for the Shawmut Project.

Request for Information and Studies

The abundance and distribution of diadromous fisheries resources in the Kennebec River has changed dramatically since a restoration program was initiated by MDMR in 1986, most notably following the removal of Edwards Dam in 1999. We have attached a summary of restoration activity that has occurred since 1986, and how anadromous species have or have not responded.

If you have any questions, please contact Gail Wippelhauser at 207-624-6349 or by email at gail.wippelhauser@maine.gov.

Sincerely,

Patrick C. Keliher, Commissioner

cc: Gail Wippelhauser, Oliver Cox, Paul Christman, DMR
John Perry, Jason Seiders DIFW
Kathy Howatt, DEP
Steven Shepard, USFWS
Sean McDermott, Jeff Murphy, NOAA

1. The Kennebec River historically supported large numbers of American eel and spawning populations of Maine's 12 native anadromous fishes. Six anadromous species (shortnose sturgeon, Atlantic sturgeon, rainbow smelt, Atlantic tomcod, adult striped bass, and sea-run brook trout) likely did not migrate beyond Taconic Falls where Lockwood Project is located. Three anadromous species (alewife, blueback herring, and American shad) migrated into the Sandy River, as far as Norridgewock Falls (above Weston Project) on the mainstem Kennebec River and into the east and west branches of the Sebasticook River. The catadromous American eel was able to ascend to The Forks (confluence of the Kennebec and Dead rivers) and Atlantic salmon ascended as far as Indian Pond. Historical records do not describe the upstream limit of sea lamprey, but they currently are present below the Lockwood Project.

2. After Edwards Dam was constructed in 1835 at the head-of-tide, anadromous fishes were extirpated from their entire upstream habitat. This situation remained unchanged for about 150 years.

3. The first phase of restoration of diadromous species in the Kennebec River began in 1986 when the owners of the Lockwood, Hydro-Kennebec, Shawmut, Weston, Fort Halifax, Benton Falls, and Burnham projects, collectively the Kennebec Hydro-Developers Group (KHDG), and the State of Maine signed a settlement agreement that delayed upstream passage requirements at the KHDG projects and provided funds to the Department of Marine Resources (DMR) for restoration. Between 1986 and 1999, DMR stocked approximately 677,000 river herring (primarily alewives) into historic, inaccessible spawning habitat above Edwards Dam, an additional 26,770 into other historic inaccessible habitat in the Kennebec drainage, and 62,400 into other river systems.

4. The second phase of restoration began in 1999 when the KHDG, State of Maine, U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the Kennebec Coalition (Natural Resources Council of Maine, Atlantic Salmon Federation, Trout Unlimited, Trout Unlimited – Kennebec Chapter, and American Rivers) signed a settlement agreement (1998 Agreement) that provided for the removal of Edwards Dam, included a schedule or triggers for upstream and downstream passage at the KHDG projects, and provided additional funding for the restoration of anadromous species.

5. In accordance with the 1998 Agreement, the following actions occurred between 1999 and 2009:

    a. Edwards Dam was removed in 1999;
    b. DMR provided upstream fish passage at three non-hydropower dams (Sebasticook Lake outlet dam, Guilford Dam, and Plymouth Pond outlet dam) by 2003, which triggered the requirement for upstream passage to be operational at the Benton Falls Project and the Burnham Project within two years;
    c. Upstream fish passage (interim lift, trap, and truck facility) became operational at the Lockwood Project in 2006;
    d. Upstream fish passage at the Benton Falls Project (fish lift) and the Burnham Project (fish lift) became operational in 2006, a delay of one year; and
    e. Upstream fish passage at Fort Halifax, required to be operational by 2003, was delayed until 2009 when the dam was removed.

6. In actions separate from the 1998 Agreement, Madison Paper Industries and 17 parties signed a settlement agreement in 2002 that contained provisions for upstream and downstream passage for American eels and Atlantic salmon at the Abenaki and Anson projects on the Kennebec River, and the Madison Electric Works Project on the Sandy River was decommissioned and the dam removed in 2006.

7. Since removal of the Fort Halifax Dam in 2008, the abundance of river herring (alewife and blueback herring) has increased dramatically in the Sebasticook River (Table 1).

Table 1. Annual trap counts of river herring (collective term for alewife and blueback herring), American shad, and Atlantic salmon at three hydropower project within the Kennebec River watershed. The counts at Fort Halifax and Benton Falls do not include the number of river herring that were commercially harvested.

Site and year	River herring	American shad	Atlantic salmon
Lockwood			
2006	4,094	0	15
2007	3,448	18	16
2008	131,201	0	21
2009	45,969	0	24
2010	76,745	39	5
2011	37,847	17	60
2012	179,358	5	5
2013	103,242	0	7
2014	115,667	1	18
2015	88,337	27	30
Fort Halifax			
2000	125,586	0	0
2001	135,937	0	0
2002	152,895	0	0
2003	131,633	0	0
2004	143,697	0	0
2005	81,576	0	0
2006	46,960	0	0
2007	459,765	0	0
2008	401,059	0	0
Benton Falls			
2009	1,327,915	8	3
2010	1,626,872	3	0
2011	2,751,473	54	0
2012	1,703,521	163	0
2013	2,271,678	114	1
2014	2,378,906	27	0
2015	2,157,983	47	0

8. The 17-mile section of the Kennebec River that was restored to free-flowing river by the removal of Edwards Dam is more productive than the impoundments located upstream and the tidal freshwater habitat located downstream. Following the removal of Edwards Dam, Yoder et al. (2004) conducted a fish assemblage study in the Kennebec River in which 1-km transects from Bingham to Merrymeeting Bay were sampled by boat electrofishing. Their study showed that the average fish biomass (kg/km) and number of fish/km was greatest in the reach between Augusta and Waterville (Table 2).

   Table 2. Summary of biological data in the Kennebec River (from Yoder et al. 2004), during boat electro fishing samples taken in the summer and fall, 2002.

Reach	Biomass (kg/km)	Numbers (fish/km)
Bingham to Madison	13.22	342.3
Madison to Waterville	36.4	290.4
Waterville to Edwards	107.4	639.9
Edwards to Merrymeeting Bay	64.2	553.0

9. Shortnose sturgeon, Atlantic sturgeon, American shad, striped bass, and blueback herring have recolonized the Kennebec River since the removal of Edwards Dam. Shortnose sturgeon (Wippelhauser et al. 2015), Atlantic sturgeon (Wippelhauser et al. in prep), and American shad (Wippelhauser, DMR, unpublished data) currently spawn in below the Lockwood project. In addition, a popular recreational fishery for American shad and striped bass has developed in the Kennebec River between the confluence of the Kennebec River and the Sebasticook River and the Lockwood Project.

10. Atlantic salmon restoration in the Kennebec River in its initial stages, and will progress in a phased approach. Early life stages of Atlantic salmon (initially fry, currently eyed eggs) and adult returns have been stocked annually into the Sandy River watershed for just 12 years (Table 3). Stocking in the Sandy River will continue until fish passage is completed at the lowermost four mainstem dams on the Kennebec River.

Table 3. Number of early life stages of Atlantic salmon stocked, total number of adult returns, and proportion of total returns determined to be naturally reared.

Year	Number of fry stocked	Number of eggs stocked	Total number of adult returns	Proportion returns naturally reared
2003	39,000			
2004	55,000	12,000		
2005	30,000	18,000		
2006	6,500	41,800	15	
2007	15,400	18,000	16	0.50
2008		245,500	21	0.38
2009		166,494	24	0.42
2010		599,849	5	0.60
2011		859,893	60	0.72
2012		920,888	5	0.80
2013		691,857	7	0.86
2014		1,164,000	18	0.89
2015		274,538	30	0.94

11. The restoration of anadromous species on the mainstem Kennebec River above the Lockwood Project has been disappointing. Although American shad are present in the river within 1,000 feet of the Lockwood Project powerhouse, the interim upstream passage is ineffective at passing American shad. In the past 10 years, just 107 American shad have been lifted at Lockwood, although it has successfully lifted nearly 786,000 river herring and 189 Atlantic salmon (Table 1). In comparison, 416 American shad have been lifted at the nearby Benton Falls Project since 2009. Although some Atlantic salmon and blueback herring have utilized this upstream facility, its effectiveness for these species has not been tested.

12. In February 2014, representatives from MDMR, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Atlantic Salmon Federation began consulting with the Lockwood Project Licensee to identify studies and/or operational measures that we hoped would lead to the improvement of upstream passage of American shad at the Project. In 2014, these included making additional bathymetry measurements in the tailrace, running the fishlift with full attraction flow (170 cfs), and using a floating underwater camera to observe American shad behavior in the tailrace. In 2015, the Licensee again ran the fishlift with an attraction flow of 170 cfs and used a floating underwater camera to make observations of American shad behavior. In addition the Licensee agreed to 1) conduct a survey of station and in-river sounds that might negatively impact American shad, 2) hire a consultant to develop a 2D hydraulic model of the tailrace and spillway, and 3) conduct a radio telemetry study to elucidate American shad behavior in the tailrace and bypass reach and determine whether operational changes would improve upstream passage. It is our understanding that the three studies were completed, and the Licensee has indicated the study reports will be available soon.

References

[1]Wippelhauser, G.S., G.B. Zydlewski, M. Kieffer, J. Sulikowski, and M.T. Kinnison. 2015. Shortnose Sturgeon in the Gulf of Maine: Use of Spawning Habitat in the Kennebec System and Response to Dam Removal. Shortnose sturgeon in the Gulf of Maine: use of spawning and wintering habitat in the Kennebec System and response to dam removal.

[2]Wippelhauser, G.S., J. Sulikowski, G.B. Zydlewski, M. Kieffer, and M.T. Kinnison. In Preparation. Movements of Atlantic sturgeon of the Gulf of Maine inside and outside the geographically defined DPS.

[1]Yoder, C.O., B. H. Kulik, and J. Audet. 2005. Maine rivers fish assemblage assessment: Interim report. Kennebec River 2002 and 2003, Androscoggin River 2003, and Sebasticook River 2003.

[1] Copies of these references are attached.
[2] A copy will be provided when the manuscript has been submitted.

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426
January 19, 2016

OFFICE OF ENERGY PROJECTS

Project No. 2322-060 - Maine
Shawmut Hydroelectric Project
Brookfield White Pine Hydro LLC

Mr. Frank H. Dunlap
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, Maine 04240

Reference: Comments on Pre-Application Document (PAD), Comments on Preliminary Study Plan, and Requests for Additional Information

Dear Mr. Dunlap:

We have reviewed the Shawmut Hydroelectric Project Pre-Application Document, the transcripts of the scoping meetings held on December 16, 2015, and participated in a project environmental site review on December 16, 2015. We have recommendations on your preliminary study plans (enclosed in Schedule A).

We have also determined that additional information is needed to adequately assess project-related effects on environmental resources. Please provide the additional information requested in Schedule B, unless otherwise indicated, with your proposed study plan due on March 4, 2016.

Please include in your proposed study plan a master schedule that includes the estimated start and completion dates of all field studies, when progress reports will be filed, who will receive the reports and in what format, and the filing date of the initial study report. All studies, including fieldwork, should be initiated and completed during the first study season, and the study reports should be filed as a complete package. If, based on the study results, you are likely to propose any plans for measures to address project affects, drafts of those plans should be filed with your Preliminary Licensing Proposal (or draft application).

Schedule A
Project No. 2322-060

If you have any questions, please contact Dustin Wilson at (202) 502-6528, or via email at dustin.wilson@ferc.gov.

Sincerely,

Stephen Bowler, Chief
South Branch
Division of Hydropower Licensing

Enclosures: Schedules A & B

cc: Mailing List
Public Files

Schedule A
Comments on Preliminary Study Proposal, Shawmut Project No. 2322-060

Baseline Water Quality Sampling Study

1. The PAD, in section 5.2.8, *Existing Water Quality Data*, describes the Maine Department of Environmental Protection's existing water quality sampling program. In addition, section 5.2.8 provides information on dissolved oxygen (DO) and water temperature on the Kennebec River for a sampling site located downstream from Shawmut Dam. However, no water quality information is provided for the Kennebec River upstream of Shawmut Dam (including the project impoundment).

To fill this data gap, Brookfield White Pine Hydro proposes to conduct baseline water quality sampling in the project impoundment and in the Kennebec River downstream from Shawmut Dam. The sampling will use a typical riverine sampling approach that includes collecting water quality data (i.e., DO, water temperature, and Cholorphyll a) during the early morning and late afternoon hours for a 3-day period in the summer, when temperatures are high and flows are low. The baseline water quality study should be designed so that the data collected, particularly in the impoundment, is sufficient to allow Commission staff to analyze the project-specific and cumulative effects of DO and water temperature on fish movement in the Kennebec River and through the project area. For example, the data collected should allow staff to evaluate whether existing or proposed project operation affects water quality in the impoundment in such a way that it acts as a migration barrier to, or otherwise hinders, anadromous fish movement in the Kennebec River (specifically, Atlantic salmon). Also, the data should allow staff to identify any potential periods of stress from low DO or high water temperature that may affect the fish and aquatic community in the project impoundment.

Wildlife, Botanical, and RTE[1] Habitat Surveys

2. As indicated in section 6.2, *Preliminary Issues, Studies, and Measures by Resource*, of the PAD, Brookfield White Pine Hydro proposes to conduct reconnaissance-level surveys to document wildlife and botanical resources, including riparian, wetland, and littoral habitats, in the project area and to search for RTE species or unique habitat. While section 5.5.3 and Table 5.5-1 of the PAD, *Invasive Plants and Noxious Weeds*, refer to non-native plants that are likely to occur, or possibly could occur, in the vicinity of the Shawmut Project, it does not describe the locations and sizes of these populations within the project boundary. Staff of the Commission and other agencies will need sufficient, project-specific information for analysis of potential project effects on these natural resources.

[1] Rare, Threatened, and Endangered.

Please ensure that your proposed studies provide sufficient detail for staff to accurately describe the existing botanical and wildlife species and habitats in the project area, and assess potential project-related effects on those resources. This information should include, but not be limited to detailed descriptions, with locations (where appropriate), of : (1) botanical and wildlife species and habitats including RTE species and habitats; (2) common and non-native, invasive species; and (3) state RTE botanical and wildlife species and habitats. The survey area should include areas where there is: (1) regular project facility maintenance activities (e.g., repairs to project equipment, off-road driving, use of temporary lay-down areas for materials/equipment); (2) vegetation management activities (e.g., mowing, trimming, tree removal, plantings, herbicide use) at the project; and (3) project-related recreation activities (e.g., use of hiking and canoe portage trails, types of parking areas, trash collection facilities, campsites, etc.) affecting or potentially affecting botanical and wildlife species and habitats.

Recreation Study

3. The PAD, in section 6.2.8.2, *Recreation and Land Use – Proposed Studies*, refers to plans to conduct an inventory of existing recreational facilities and assess any necessary improvements to the facilities. In addition to the proposed inventory, the recreation study plan should also address the condition of the project recreation facilities, including any erosion due to project-related recreational use of the canoe portage trail and it's put-in and take out.

Schedule B
Comments on Preliminary Application Document and Additional Information, Shawmut Project No. 2322-060

Responses to the following comments should be filed along with your Preliminary Licensing Proposal (PLP), unless otherwise indicated.

General Comments

1. Brookfield White Pine Hydro's mailing list should be updated. The address for the Advisory Council on Historic Preservation has changed and is 401 F Street, NW, Suite 308, Washington, D.C. 20001-2637. Dr. John Eddins remains the contact.

2. The PAD, in section 4.1, *Overview*, states that the impoundment is 1,310 acres at normal full pond elevation; however, section 5.8.7, *Land Use and Management of Project Lands*, states that the normal full pond acreage is 1,341 acres. Section 4.1 states that the impoundment extends approximately 12 miles upstream; however, section 4.3, *Project Boundary*, states that the impoundment extends approximately 12.3 miles upstream. To ensure that Commission staff has complete information, please correct these discrepancies.

Project Facilities

3. The PAD, in section 4.2.2, *Headworks Structure*, refers to headgates that are fitted with trashracks. However, there is no description of the trashracks. Therefore, please provide a detailed description of the trashracks, including their dimension(s) and bar spacing.

4. The PAD, in section 4.2.6, *Tailrace*, refers to the project's tailraces as excavated riverbed located downstream from the powerhouses. The tailrace associated with the 1982 powerhouse is described as 300 feet long by 45 feet wide by 12 feet deep. There is no such description for the 1912 powerhouse. Therefore, please provide the dimensions for the 1912 powerhouse tailrace.

5. The PAD, in section 4.2.7, *Transmission Lines*, describes the project's transmission facilities, which include three step-up transformers located adjacent to Shawmut Dam and the two powerhouses. There was no mention of generator leads or any other primary lines being part of the project. However, during the December 16, 2015, Environmental Site Review, staff observed the presence of generator leads that extend from the two powerhouses to the step-up transformers. Please provide the length of each of these generator leads.

Project Operation

6. The PAD, in section 4.4, *Current and Proposed Project Operations*, indicates that

the maximum hydraulic capacity of the turbines is 6,755 cubic feet per second (cfs). However, Table 4.5-1 in the PAD and section 5.2.3, *Streamflow, Gage Data and Flow Statistics*, indicate that the maximum hydraulic capacity is 6,444 cfs. Please clarify this discrepancy. In addition, section 4.4 of the PAD does not provide the maximum and minimum hydraulic capacity for each turbine, as required by 18 CFR § 5.6 (d)(3)(iii)(C). Please provide the minimum and maximum hydraulic capacities for each turbine at the Shawmut Project.

7. Section 4.1 of the PAD states that the impoundment experiences little fluctuation in surface elevation. In order to determine actual fluctuation, include historic data on reservoir levels to describe the daily, monthly, and annual elevations and fluctuations while operating under "run-of-river" operation in any study plans which will be developed.

8. Little information on existing maintenance of project facilities and vegetation, or on potential recreation effects on vegetation and habitat was provided in the PAD. Please provide: (1) regular project facility maintenance activities (e.g., repairs to project equipment, off-road driving, use of temporary lay-down areas for materials/equipment); (2) vegetation management activities (e.g., mowing, trimming, tree removal, plantings, herbicide use) at the project; and (3) project-related recreation activities (e.g., use of hiking and canoe portage trails, types of parking areas, trash collection facilities, campsites, etc.) affecting or potentially affecting botanical and wildlife species and habitats.

Water Resources

8. The PAD, in section 5.2.3, *Streamflow, Gage Data and Flow Statistics*, refers to a U.S. Geological Survey streamflow gage (Gage #01049265) on the Kennebec River in North Sidney, ME. Please provide the location of this gage and the distance in river miles.

Fish and Aquatic Resources

9. The PAD, in section 5.3.3.3, *Diadromous Species Status*, refers to annual reports summarizing the status of fish passage at projects on the Kennebec River. These reports are issued as part of the Kennebec Hydropower Developers Group (KHDG) fish passage agreement. To assist Commission staff in describing current and historical fish passage restoration efforts on the Kennebec River, please file electronic copies of these reports.

10. Also in section 5.3.3.3, the PAD refers to the Lockwood fish lift and transport system, and indicates that this fish passage facility serves as the Shawmut Project's means of interim upstream fish passage. However, the PAD does not describe this facility or its operation in great detail. Because the Lockwood fish lift provides the interim means of upstream fish passage at the Shawmut Project, such a description would

assist Commission staff in its cumulative effects analysis of fish passage in the Kennebec River Basin. Therefore, please provide: (1) a brief description of the upstream fish lift, including when it was constructed, its designed capacity, what species it is designed to pass, and how it is operated; (2) photos of the facility; and (3) the location of the facilities, relative to Lockwood Dam and Powerhouse, on a map.

11. Section 5.3.3.3 of the PAD indicates the National Marine Fisheries Service (NMFS) listed the Gulf of Maine Distinct Population Segment of Atlantic salmon, which includes the Kennebec River run, as endangered in 2009. The PAD also indicates that Brookfield White Pine Hydro filed a proposed Interim Species Protection Plan (SPP) and draft Biological Assessment with the Commission in February 2013, which NMFS reviewed prior to issuing its Biological Opinion (BO). According to the PAD, the interim SPP is valid until 2019, which affords Brookfield White Pine Hydro time to study existing measures at its Weston (P-2325), Shawmut, and Lockwood (P-2574) Projects to protect migrating salmon, and to develop long-term protection measures at those projects, which would be included in a final SPP. As stated in the PAD, the final SPP must be filed with the license application. In addition, if available, a draft of the plan must be included with the PLP Proposal filed in September 2018.

12. The PAD, in section 5.3.4, *Fishery Studies Conducted by the Licensee*, generally describes the results of several fish-related studies, including: (1) an American eel upstream passage evaluation; (2) American eel radio-telemetry study; and (3) an Atlantic salmon downstream bypass evaluation. In addition, The PAD discusses a 3-year effort as part of the Interim SPP to evaluate Atlantic salmon whole-station survival. To assist Commission staff in its project-specific and cumulative effects analysis of fish passage needs at the Shawmut Project and in the Kennebec River Basin, please provide electronic copies of the final reports associated with each of these studies.

13. The PAD, in section 5.3.5, *Fishery Management Plans*, refers to several fish management plans that are currently not included in, but will need to be added to, the relicensing record for the Shawmut Project. Please provide electronic copies of the following:

(a) Maine Atlantic Salmon Commission. 2005. ATS 2015: Maine Atlantic Salmon Commission's 10-Year Strategic Plan. 34 pp.

(b) Maine Department of Marine Resources (MDMR). 2006. Kennebec River Atlantic Salmon Interim Restoration Plan. 12 pp.

(c) MDMR. 2008. Kennebec River Anadromous fish Restoration: Annual Progress Report – 2008.

(d) MDMR. 2009. Kennebec River Anadromous fish Restoration: Annual Progress Report – 2009.

(e) MDMR. 2012. Kennebec River Anadromous fish Restoration: Annual Progress Report – 2012.

(f) National Marine Fisheries Service, et al. 2011. Atlantic Salmon Recovery Framework (53 pp) and Implementation Plan (71 pp). March 2011.

Geology and Soils

14. The PAD, in section 5.1.5, *Erosion*, states that there are a few areas classified in the "moderate" category, indicating that some erosion may occur. The PLP and final license application should include descriptions of these areas, and a map or maps that clearly depict the areas in relationship to the Shawmut Project boundary.

Recreation and Land Use

16. The PAD, in section 5.8.7, *Land Use and Management of Project Lands*, indicates that project operations and maintenance activities may include vegetation management. For Commission staff to adequately assess project-related effects on wildlife and botanical resources, including rare, threatened, and endangered (RTE) species, as well as non-native, invasive species, please provide a detailed description of any existing vegetation management practices that Brookfield White Pine Hydro uses to control vegetation within the project boundary.

17. The PAD (figure 5.8-1) depicts existing project area recreation facilities. To gain a clear understanding of the location of each site, please provide revised, detailed maps that depict each site and its location in relation to the project boundary. Also, please specify whether each recreation site is a project or non-project site. Further, section 5.8.3, *Existing Project Area Recreation Facilities*, of the PAD does not mention how the portage trail is maintained. Therefore, please describe your operation and maintenance activities, including associated costs, for the canoe portage trail. Please ensure that all project recreation facilities are enclosed within the project boundary. Please provide this information in the PLP.

18. The PAD, in section 5.8, *Recreation and Land* Use, (page 5-96 through page 5-97) discusses the 2009-2014 Maine Statewide Comprehensive Outdoor Recreation Plan (SCORP). However, the PAD does not contain any information, from the SCORP or other sources, regarding anticipated changes in demand for outdoor recreation in the project area. Therefore, please provide information in the PLP on anticipated changes in outdoor recreation needs in the project area, and, to the extent possible, describe how project recreation facilities would be able to accommodate these changes.

Cultural Resources

19. The PAD, in section 5.9, *Cultural Resources*, refers to the following cultural resources surveys and reports: (a) Mack and Will (2010); (b) Lahti (2001); (c) John Mosher and Leith Smith (2010); (d) TRC (2010); (e) Henry (2010); and (f) Spiess (2013). To ensure Commission staff has sufficient information for its analysis, please file the aforementioned surveys and reports with the Secretary of the Commission, and include "Project No. 2322-060, Privileged" on the cover page of each document.

20. The PAD, in section 5.9.1.3, *Prior Cultural Resource Investigations Within The Project Area*, refers to a Phase I archaeological survey conducted by John Mosher and Leith Smith (2010). However, Commission staff cannot discern the location of the two referenced parcels of land, which total 35 acres, in relationship to the Shawmut Project boundary. Also, the discussion does not include any conclusions. The PLP and final license application should clarify the locations of the two parcels in the Mosher study, and contain a general discussion of all cultural resource surveys and reports, and their conclusions.

21. The PAD, in section 5.9.2.1, *Identification of Historic Sites In The Vicinity Of The Project*, refers to a National Register of Historic Places eligible site as Benton-Clinton Agricultural Historic District, and as Clinton-Benton Agricultural District. The PLP and final license application should include the correct name of the historic district, and clarify what portion of the historic district is situated within the project boundary.

22. Section 5.9.2.1 of the PAD notes the Maine Historic Preservation Commission (Maine HPC) determined the National Register-eligibility of the Shawmut Dam was unresolved, but it had concurred that project modifications, as proposed in 2010, would have no impacts on the Clinton-Benton Agricultural District properties within the APE [area of potential effects], or the Benedict Arnold Trail to Quebec. The discussion in the PAD includes reference to a letter dated February 7, 2011 from Kirk Mohney to Sarah Verville, but a copy of the letter is not included. The PLP and final license application should contain documentation of consultation between Brookfield White Pine Hydro and Maine HPC and/or interested Indian tribes regarding cultural resources. If the National Register-eligibility of Shawmut Dam remains unresolved at the time White Pine Hydro files its license application with the Commission, the license application should explain why the matter is unresolved.

23. Section 5.9.2.1 of the PAD also refers to the Arnold Expedition. The PLP and final license application should include the estimated length of "the portion of the Kennebec River within the Shawmut Project area that falls within the route of Colonel Benedict Arnold's march up the Kennebec River". Also, the PAD notes that "the entire route of the Arnold Expedition....is listed on the National Register." The pertinent portion of the expedition's route in relationship to the project boundary should also be included in the PLP and the final license application.

January 19, 2016

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

Re: Scoping comments on the Shawmut Project (P-2322)

Dear Secretary Bose:

These comments are on behalf of the Atlantic Salmon Federation, the Natural Resources Council of Maine, and Trout Unlimited, which are signatories to the 1998 Kennebec Hydro Developers Group (KHDG) Agreement.

FERC incorporated the terms of the KHDG Agreement into the licenses of the Shawmut Dam and the three other dams between Waterville and Skowhegan. The purpose of the KHDG Agreement is clear. It states:

> This Agreement is intended to accomplish the following purposes: to achieve a comprehensive settlement governing fisheries restoration, for numerous anadromous and catadromous species, that will rapidly assist in the restoration of these species in the Kennebec River after the termination on December 31, 1998 of the existing agreement between the State of Maine and the Kennebec Hydro Developers Group…

The KHDG Agreement has failed. In the 17 years since the signing of the Agreement, there has been no sea-run fisheries restoration above Waterville, let alone rapid restoration. FERC and the applicant must consider the failure to comply with the KHDG agreement as well as the Endangered Species Act (ESA) listing as part of the licensing project. We object to any efforts to consider fish passage as a separate issue from the rest of the license. The KHDG agreement is a term of the Shawmut Project license.

Scoping Document-1 (SD-1) also contains insufficient information and study proposals on other issues, such as wetland resources, socio-economic impacts, and recreation.

We urge FERC to incorporate, at a minimum, the following key concerns as part of its scoping process for the Shawmut Project:

1. The failure of the fishlift at Lockwood, the first dam on the Kennebec River, is critical to consideration of the Shawmut Project.

The Maine Department of Marine Resources (DMR) stated the following in a letter to FERC on September 14, 2015: "...interim upstream passage (trap, lift and transfer) at the Lockwood Project continues to be ineffective at passing American shad. In the past 10 years, just 107 American shad have been lifted at the Lockwood Project."[1] This is despite the documented

[1] Patrick C. Keliher, Commissioner, Maine Department of Marine Resources. 2015. Letter to Secretary Bose re Notice of application for amendment of Licenses to incorporate interim fish passage plan an soliciting comments,

presence of very large numbers of shad below the Lockwood Dam. Whatever FERC requires as part of its licensing process at Shawmut will be irrelevant if it does not also require effective fish passage at Lockwood and HydroKennebec, which is between Lockwood and Shawmut.

2. Atlantic salmon in the Kennebec are listed under the Endangered Species Act (ESA).
The Kennebec run of Atlantic salmon historically consisted of hundreds of thousands of fish[2]. In 2015, only 28 fish[3] entered the Lockwood fishlift. This run is close to extinction. FERC needs to act rapidly to restore it.

3. The ESA requires detailed and careful scrutiny of the harmful effects of the Shawmut impoundment, and the other Kennebec impoundments, especially on Atlantic salmon.
Between Lockwood and the confluence of the Sandy River, over 80% of the river is impounded–roughly 30 river miles of impounded waters. In its two Kennebec-focused biological opinions, NOAA Fisheries (NOAA) stated the following about the threat of impoundments to Atlantic salmon:

> Impoundments created by these dams limit access to habitat, alter habitat, and degrade water quality through increased temperatures and lowered dissolved oxygen levels. Furthermore, because hydropower dams are typically constructed in reaches with moderate to high underlying gradients, significant areas of free-flowing habitat have been converted to impounded habitats in the Kennebec and Androscoggin River watersheds.[4]

Ironically, NOAA also stated that "these moderate to high gradient reaches, if free-flowing, would likely constitute the highest value as Atlantic salmon spawning, nursery, and adult resting habitat within the context of all potential salmon habitat within these reaches".[5]

4. Sea-run fish restoration has failed above multiple large dams on other northeastern rivers.
To get a high percentage of fish over four large dams on the Kennebec would require very high passage efficiency at each dam. There is no evidence that anyone has achieved these sorts of efficiencies for shad or Atltanic salmon and plenty of evidence to the contrary. For example, Excelon Corp. has objected strongly to a U.S. Fish and Wildlife Service proposal to require a fishlift with 85-percent efficiency at the Conowingo Dam on the Susquehanna River. The

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motions to intervene, and protest. Shawmut (FERC No. 2333-054), Weston (FERC No. 2325-077) and Lockwood (FERC No. 2574-075) Projects. September 14. P. 2.

[2] Maine Agriculture,1867 REPORT OF COMMISSIONERS NATHAN FOSTER AND CHARLES ATKINS 114 (Jan. 16, 1868); Saunders et al.,MAINE'S DIADROMOUS FISH COMMUNITY: PAST, PRESENT, AND IMPLICATIONS FOR ATLANTIC SALMON RECOVERY 539 (2006).

[3] Keliher, *op. cit.*, P. 2.

[4] National Marine Fisheries Service. 2013. Endangered Species Act Biological Opinion. Amendment of the Licenses for the Lockwood (2574), Shawmut (2322), Weston (2325), Brunswick (2284), and Lewiston Falls (2302). P. 46; National Marine Fisheries Service. 2012. Endangered Species Act Biological Opinion. Proposed Amendment of License for the Hydro-Kennebec Project (FERC No. 2611) Pp. 35-36.

[5] Ibid.

company has stated that failure to meet this target is "is virtually assured given that no other hydroelectric facility on the Atlantic coast has achieved these efficiencies."[6] The long term passage rate at the Holtwood Dam, the next dam up on the Susquehanna is only 32 percent, and the highest passage rate ever there is 63 percent.[7] An 85-percent passage rate, which Excelon says is unachievable, would result in only 50 percent of fish being able to navigate four dams, not a good number for a fisheries restoration program. At 63 percent efficiency, only 16 percent of fish make it over all four dams, which is a dismal rate of passage.

We are unaware of any successful shad, river herring or Atlantic salmon restoration efforts over large, multiple dams. The failed effort on the Susquehanna – as well as on the Connecticut and Merrimack Rivers -- show that simply requiring large upstream fish passage facilities will not work on the Kennebec to fulfill the requirements of the KHDG Agreement or the ESA.

Salmon and other sea-run fish not only have to navigate the upstream fishlifts themselves, which are significant sources of injury and mortality, but they must also successfully navigate the impoundments between the dams. FERC needs to determine the impacts of the Shawmut impoundment and the other impoundments between Waterville and Skowhegan on the river's ability to support sea-run fish. This analysis must consider the cumulative effects of elevated temperature, increased predation, lower dissolved oxygen and other impediments on the ability of sea-run fish to move through or utilize the impoundments. Salmon, of course, must be able to navigate all of the impoundments to get to their first available spawning habitat in the Sandy River. This may be impossible given: high temperatures in the impoundments during warm months and the delays the fishlifts will cause in salmon migration; increased predation; lower water quality; and other stressors. Maine Inland Fisheries and Wildlife (IFW) has identified temperature as a serious stressor for trout in the Shawmut impoundment[8].

The applicant has provided no evidence in Scoping SD-1 – and neither the applicant nor NOAA provided evidence in the Kennebec ISPPs or Biological Opinions – that Atlantic salmon, shad, or river herring can pass multiple, large dams via fishways or that juveniles of these species can survive downstream passage through/over multiple dams. Rapid restoration of these and other sea-run species is already a requirement in the existing Shawmut license, which incorporates the KHDG agreement. We ask that FERC and the applicant provide evidence that any proposed upstream and downstream fish passage at Shawmut will work considering the cumulative impacts of the three other fish passage facilities migrating fish will need to navigate.

We also request that FERC perform a cumulative impacts study on the effects of multiple dams and impoundments on migratory fish.

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[6] Karl Blankenship. 2015. Judge to hear arguments over fish passage at Conowingo Dam; Exelon challenges biologists' recommendations for upgrades and offers an alternate plan. In the Bay Journal. November 5. Accessed at: http://www.bayjournal.com/article/judge_to_hear_arguments_over_fish_passage_at_conowingo_dam

[7] Ibid.

[8] Maine IFW. 2013. PowerPoint presentation on Kennebec Fisheries Management. Slide 16.

- Goals and objectives of the study: To characterize cumulative impacts of multiple dams impoundments on migratory fish.
- Relevant public interest considerations: Migratory fish are a critical public resource in Maine. They provide forage for groundfish, bait for the lobster industry, and food for people and many wildlife species. Maine's groundfishing industry is in trouble. Restoration of sea-run fish, which again are a major food source for groundfish, is a critical component to bringing the groundfishing industry back to life.
- Existing information and need for more information: There is existing information on temperature because Maine IFW has done temperature monitoring in the Kennebec. However, there is likely a need for more temperature information to address sea-run fish specifically. There is also information in the literature on the many problems associated with impoundments and fish passage at large dams such as: migration delays, upstream and downstream mortality, delayed mortality, increased predation, and decreased water quality. FERC and the applicant will need to review all of this information. SD-1 indicates no such review has occurred to date.
- Nexus to project operations and how the study results will inform licensing: The licensee currently does meet the requirements of the KHDG agreement, which is incorporated into the existing license. The licensee also fails to comply with the ESA. The proposed study will help determine how to comply with both, which must be a requirement in the upcoming license.
- Proposed study methodology: FERC and the licensee should discuss the existing temperature database with Maine IFW and collect any additional necessary temperature data needed. FERC and the licensee will also need to gather information in the literature and do any additional necessary field studies to estimate cumulative impacts of multiple dams and impoundments on sea-run fish. These include: migration delays, upstream and downstream mortality, delayed mortality, increased predation, and decreased water quality. FERC and the licensee will need to combine field data and literature data to justify any fish passage regime in the next Shawmut license. Estimates of downstream cumulative impacts can be carried out based primarily on field data now by tracking the fate of juvenile fish released above all four dams.
- Anticipated level of effort: The level of effort will be high, but any license that does not account for cumulative impacts will not be credible or legal.
- Why proposed alternative studies are not adequate: Licensee is not proposing cumulative impact studies.

5. Decommissioning the Shawmut Project and other Kennebec dams that are preventing the restoration of Atlantic salmon and other sea-run fish, as the ESA and KHDG Agreement require, must be an alternative to the licensee's proposed action.

Again, we know of no successful restoration of Atlantic salmon or any other Atlantic sea-run species above four large dams. The National Academy of Sciences stated the following concerning Atlantic salmon restoration in its 2004 study of the issue:

> Dams appear to be the single most important class of impediments to salmon recovery that can be influenced by human actions in the short and medium terms… There is an urgent need to reverse the decline of salmon populations in Maine if they are to be saved… A program of dam removal should be started.

FERC must consider decommissioning and removal of the Shawmut Project as part of the relicensing process. SD-1 (Pp.9-10) specifically states that the licensee will not consider decommissioning and that no party has requested it. We are requesting the consideration of decommissioning and removal.

6. An Environmental Impact Statement (EIS) is more appropriate for the Shawmut Project than an Environmental Assessment.

FERC cannot view the environmental impacts of the Shawmut Project in isolation from the impacts of the Lockwood, HydroKennebec, and Weston Projects. As the information in these comments makes very clear, all of these projects are "connected actions," "cumulative actions," and "similar actions" within the meaning of the applicable NEPA regulations as described in 40 C.F.R. 1508.25(a). For example, "connected actions" include actions that are "interdependent parts of a larger action and depend on the larger action for their justification." 40 C.F.R. 1508(a)(1)(iii). While not mentioned in the draft Scoping Document, these four Projects are the object of two virtually identical Biological Opinions issued by the National Marine Fisheries Service (see footnote 4 cited above) and are subject to a "connected" plan mandating construction of fish passage at three of the four Projects, minimal passage studies, an inclusive Interim Species Protection Plan (ISPP"), and various other requirements. These provisions were adopted in the HydroKennebec Project license without any opportunity for comment by the KHDG signatories submitting these comments, and were proposed for the other Projects without giving the signatories opportunity for advancing alternatives such as decommissioning, which as the previous and following comments indicate should be a major consideration given the failure to pass shad and the documented impact on Atlantic Salmon, as endangered species. In these circumstances, the environmental review of the Shawmut Project must acknowledge and take into account in the analysis and environmental review the interdependent nature of all four projects involved.

In a similar context, the U. S. Court of Appeals for the District of Columbia Circuit , noting a "clear physical, functional and temporal nexus between the projects" there involved held "that in conducting its environmental review of the Northeast Project without considering the other connected, closely related projects…FERC impermissibly segmented the environmental review in violation of NEPA." Delaware Riverkeeper Network, et al., v. Federal Energy Regulatory Commission, No. 13-1015 (Slip Op.) June 6, 2014, at p.6. That reasoning applies equally here and there must be a non-segmented analysis of the environmental impact of the four projects to avoid a violation of NEPA. Moreover, while we recognize that FERC Staff typically prepares an environmental assessment in licensing actions, an environmental impact statement "is required for those actions determined by Commission staff to be a major federal action significantly affecting the quality of the human environment" (FERC Guidelines for Preparing Environmental Documents, September, 2008, at v). This is such an action.

7. The Shawmut Project has socio-economic impacts, and FERC and the licensee should examine them as part of the scoping process.

For example, the Shawmut Project and the other dams between Waterville and Skowhegan block the migration of sea-run fish. These dams would kill juvenile sea-run fish migrating downstream if runs existed, thereby decreasing the size of the runs. The dams also hinder upstream migration of elvers and kill adult eels migrating downstream to spawn. The lower numbers of anadromous

and catadromous fish in the Kennebec result in reduced forage for groundfish and many other marine species. All of this has socio-economic costs that FERC must consider, such as the loss of groundfishing jobs, reduced revenues for municipalities with river herring harvesting rights, and decreased availability of local seafood for Maine consumers. SD-1 (P. 13) specifically states that the applicant will not study socio-economic impacts. We request that FERC and the applicant study socio-economic issues.

- Goals and objectives of the study: To characterize the costs and benefits of the Shawmut project.
- Relevant public interest considerations: The public owns the water, fish and wildlife in the River, not the applicant. The goal of the economic impact study is to characterize the full suite of economic impacts of the project on these public resources, not simply the private profit of the dam owner.
- Existing information and need for more information: There is existing information on dam impacts on property values[9] and ocean fisheries[10], but more information will be necessary.
- Nexus to project operations and how the study results will inform licensing: FERC needs to understand whether the public costs of the Shawmut Project exceed the public benefits in order to determine the best licensing alternatives.
- Proposed study methodology: FERC and the licensee will need to need to estimate the dam impacts on commercial fisheries, recreational fisheries, wildlife populations, tourism and other economic activities the dam impacts.
- Anticipated level of effort: High
- Why proposed alternative studies are not adequate: Licensee is proposing to ignore socio-economic issues.

8. FERC and the licensee need to study impacts on wetlands and associated plant and animal communities the Shawmut Project affects.

Wetlands associated with the Shawmut Project are found throughout the project area and include shoreline areas, side channels, coves, and backwaters. No comprehensive information exists on the plant and animal communities contained in the project's wetlands. Reports from landowners along the impoundment and recreational users the wetlands within the Project Area provide habitat for a diversity of plant and animal species.

SD-1 (P. 13) proposes only to conduct reconnaissance level habitat surveys to document the botanical resources in the Project Area and to search for rare, threatened or endangered species.

We request that FERC and the licensee study these resources in significantly more detail.

Due to the lack of baseline data in the Project Area, licensee should perform a more detailed study that provides: 1) Mapping of wetlands throughout the Project Area; 2) Documentation of

[9] See, for example: Lynne Lewis, et. al. Dams, dam removal, and river restoration: A hedonic property value analysis. Contemporary Economic Policy Vol. 26, No. 2, April 2008, 175–186.

[10] See, for example: Ted Ames. 2004. Atlantic cod stock structure in the Gulf of Maine. Fisheries. Volume 29, Number 1.

wetland botanical resources; 3) Seasonal (spring, summer, and fall) surveys of bird (specifically waterfowl and shorebirds), amphibian, reptile, and aquatic mammal wetland use in the Project Area; and 4) Surveys for rare, threatened or endangered species.

- Goals and objectives of the study: To characterize the wetland, vegetation, and wildlife resources in the Project area.
- Relevant public interest considerations: The Kennebec River and its associated wetlands are important ecologically for a host of plant and animal species. They are also important for many traditional activities, such as trapping and waterfowl hunting.
- Existing information and need for more information: There is a lack of information on wetland botanical resources, erosion, amphibians and reptiles, aquatic mammals, and rare, threatened and endangered species.
- Nexus to project operations and how the study results will inform licensing: The project affects a huge array of wetland-dependent species. FERC and the licensee need to understand how any future operations will affect these species.
- Proposed study methodology: The licensee should perform: 1) Mapping of wetlands throughout the Project Area; 2) Documentation of wetland botanical resources; 3) Seasonal (spring, summer, and fall) surveys of bird (specifically waterfowl and shorebirds), amphibian, reptile, and aquatic mammal wetland use in the Project Area; and 4) Survey for rare, threatened or endangered species.
- Anticipated level of effort: A full year of surveys.
- Why proposed alternative studies are not adequate: Licensee is not proposing sufficient characterization of Project impacts on wetland resources.

9. SD-1 does not provide sufficient information to support its claims that the Shawmut Project operates as a run-of-river facility.

SD-1 contains very little information regarding project operations. SD-1 (P. 1) states that: "White Pine Hydro proposes to continue operating the project as a run-of-river facility maintaining a full pond elevation of approximately 112 feet U.S. Geological Survey (USGS) Datum." SD-1 (P. 8) also states that: "White Pine Hydro operates the Shawmut Project in run-of-river mode maintaining the impoundment at about elevation 112.0 feet USGS Datum, whereby water flowing into the project impoundment equals water flowing out and reports that little fluctuation is experienced during normal operations. After maximum flow to the turbines has been achieved, excess water is spilled through the existing sluice. When flows exceed the capacity of the sluice, sections of the rubber dam are deflated, and/or the hinged flashboards are dropped, to pass additional water."

Based on at least one period during the spring of 2015, it appears that actual operations may deviate substantially from run-of-river under at least some river conditions. In late May and early June, a citizen enquiry from Richard Behr to Kathy Howatt at the Maine Department of Environmental Protection asked about flow fluctuations observed in the lower Kennebec River at the USGS Sidney gage, several miles downstream of the Shawmut Dam (and also downstream of the Hydro Kennebec and Lockwood hydroelectric projects). Ms. Howatt's correspondence with Kevin Bernier at Brookfield is attached. Mr. Bernier noted that:

"Kathy - we've reviewed the gage data for the last few months and see that flows from the Madison and North Sidney gages (along with the four lower Kennebec River hydro facilities – see attached graph) are for the most part trending together. Please note that they will not always be the same since there may be significant inflows from intervening tributaries, such as the Sebasticook River. However, the May 27 to June 2 time period that you inquired about (which is also outlined in the box on the attached graph) illustrates the operation of the rubber dam sections at Shawmut to manage pond levels and flows during high inflow periods. The rubber dam cannot be operated in a partially inflated condition – it has to be either fully inflated or fully deflated. Thus, at certain flows when water needs to be spilled at Shawmut, the rubber dam needs to be operated to manage river flows and pond levels, i.e., the rubber dam is deflated to release the high flows and then re-inflated after an appropriate period of time to minimize impoundment drawdown. This process is repeated as necessary to maintain the pond level as consistently as feasible during these periods, which are generally higher inflow periods when river flows exceed turbine capacity."

A graph attached to the email shows substantial flow fluctuations below the Shawmut Dam during this period. Although the scale of the figure attached to the email is difficult to interpret, it shows repeated fluctuations during this period from well below 10,000 cfs to more than 15,000 cfs. The graph shows seven fluctuations during the identified period. Based on Mr. Bernier's email this appears to be a common practice during periods of higher flow. Mr. Behr has also reported observing similar flow fluctuations at the USGS Sidney gage during periods of low flow. We have attached Mr. Behr's email exchange with Ms. Howatt at DEP and its accompanying graph to this submission.

The licensee should provide information regarding the magnitude, frequency, and timing of operations that deviate from the run-of-river operations described in SD1. The simplest way to do this would be to provide data on Shawmut headpond elevation and Shawmut Dam discharge for the past ten years, highlighting periods when operations deviated from run-of-river operation.

10. The licensee should provide additional information on recreation and a recreation study.

SD-1 provides very little information on the Shawmut Project's recreational facilities, their use by the public, and whether these facilities are adequate to support this use. In particular, we are concerned that two access sites to the project tailrace that are owned and operated by the state of Maine are not mentioned: (1) The state owns property adjacent to the canoe portage, and acquired this property for the specific purpose of providing shore, wading, and small boat access to the Kennebec River below the project. In order to access the river, anglers and other river users must leave the state-owned property and cross the project boundary. Continued access by these river users, including wading and launching hand-carried and small trailered boats into the project tailwater, is important. (2) The state has also acquired property on the east shore of the Kennebec River in Benton to provide shore and wading anglers access to the river below the project. These two facilities should be fully described. FERC should take note of the fact that without continued public access across lands within the Project Boundary, these access sites will be useless to the public. Coordination between the licensee and the state to ensure the future utility of these sites is essential and should be documented.

In section 4.2.5 of SD-1, the licensee identifies two recreation-related resource issues: (1) "Effects of continued project operation on recreational use on the Kennebec River." (2) "Adequacy of existing public access and recreational facilities in the project boundary to meet current and future recreation needs." We believe one specific sub-issue should be added: Adequacy of access for small boats (for example, trailered canoes, drift boats, and inflatable rafts) to the project tailwater.

The licensee does not propose any studies related to recreation resource issues, but does propose to "Conduct an inventory of existing recreational facilities at the project and assess any necessary improvements to the facilities." It is important that the scope of this inventory include both licensee-owned-and-operated facilities and facilities owned by others that provide access within the project boundary and to the project tailwater, including the two state-owned facilities mentioned above.

We also believe a recreation study is necessary to determine whether existing facilities are adequate.

- Goals and objectives of the study: To characterize existing recreational use of the project impoundment, tailwater, and licensee-owned, public, and private recreational facilities, including informal access sites frequently used by the public, and to determine whether these facilities are adequate to meet public demand.
- Relevant public interest considerations: The Kennebec River is an important recreational resource. The Shawmut tailwater has historically supported a very high quality fishery for stocked brown trout, characterized by trophy fish. Access to this resource requires crossing the project boundary.
- Existing information and need for more information: See discussion above. SD1 does not describe several important facilities commonly used by the public, and the applicant proposes no studies to address whether existing facilities are adequate.
- Nexus to project operations and how the study results will inform licensing: The licensee has described some but not all of the recreation facilities commonly used by the public within the project boundary. Adequacy of these facilities is acknowledged by the licensee to be a resource concern. Additional information, including data on existing use of all facilities, is necessary to determine whether existing facilities are adequate.
- Proposed study methodology: Licensee should (1) thoroughly document, photograph, and map all commonly-used access points to the project impoundment and the project tailwater upstream of the Route 95 bridge; (2) monitor use via vehicle counts at formal and informal access sites and conduct angler, boater and other user counts on the project tailwater and impoundment; (3) evaluate the adequacy of each facility and any improvements needed, specifically including whether improvement are necessary to allow for small trailered boat access to the project tailwater. Vehicle and user counts should occur during the May-November period when angler, boater, and hunter use is highest. Study design should include a mix of observations on weekdays, weekends, and holidays, and include observations in the early morning and evening when angling and hunting activity is highest.

- Anticipated level of effort: A single season (May-November) with regular observations (several times per week, spread throughout the week and ranging from early morning to evening) should be adequate.
- Why proposed alternative studies are not adequate: Licensee is not proposing any studies related to recreation issues.

Conclusion

We are frustrated that the 1998 KHDG Agreement has failed to restore sea-run fish above Waterville. The Agreement was supposed to result in rapid restoration of sea-run fish above Waterville but has instead resulted in no restoration there at all more than 17 years later. In the same period of time, Atlantic salmon in the Kennebec have been listed under the ESA, dwindled in number, and hover near extirpation. The four dams between Waterville and Skowhegan also continue to block shad from nearly 30 percent of their ancestral habitat in the Kennebec watershed. The Lockwood fishlift has failed to pass shad or salmon in significant numbers since its construction in 2006, but FERC has taken no action to remedy this.

We urge FERC to act decisively to ensure that the KHDG Agreement does not continue to fail above Waterville and that the Kennebec Atlantic salmon run does not go extinct.

We also believe that SD-1 contains insufficient review of existing information and fails to provide adequate study plans to obtain additional information. We urge FERC to require the licensee to provide the information and carry out the studies that we have requested.

Sincerely,

Nick Bennett
Staff Scientist
Natural Resources Council of Maine
3 Wade Street Augusta, ME 04330
(207) 430-0116 (direct)
(207) 485-8742 (cell)
nbennett@nrcm.org

Nick Bennett

From: Jeffrey Reardon <JReardon@tu.org>
Sent: Wednesday, January 13, 2016 8:59 PM
To: Jeffrey Reardon
Subject: FW: FW: Kennebec River Flows?
Attachments: Kennebec flows.png

From: Richard Behr [mailto:richardsbehr@gmail.com]
Sent: Sunday, December 20, 2015 9:39 AM
To: Jeffrey Reardon; Greg Ponte
Subject: Fwd: FW: Kennebec River Flows?

Hi Jeff,

Here is the first of the emails and the response from Brookfield. I believe i have one more i can forward.

Richard S. Behr

207-441-0678
Specializing in Drift Trips on Maine's
Premier Smallmouth Bass Rivers
www.threeriversguideservice.biz

---------- Forwarded message ----------
From: **Behr, Richard S** <Richard.S.Behr@maine.gov>
Date: Mon, Aug 25, 2014 at 7:27 AM
Subject: FW: Kennebec River Flows?
To: "richardsbehr@gmail.com" <richardsbehr@gmail.com>

Richard S. Behr
Environmental Hydrogeology Specialist
Maine Certified Geologist, #GE343
Maine Department of Environmental Protection
Augusta, Maine 04333

richard.s.behr@maine.gov<mailto:richard.s.behr@maine.gov>

207-441-2847
From: Howatt, Kathy
Sent: Thursday, June 19, 2014 4:22 PM
To: Behr, Richard S

Subject: FW: Kennebec River Flows?

Dick,
I consulted with Brookfield's compliance section and got back the following response to your question regarding flows in the lower Kennebec.
Kathy

Kathy Davis Howatt
Hydropower Coordinator, DLRR
Maine Department of Environmental Protection
207-446-2642
kathy.howatt@maine.gov<mailto:kathy.howatt@maine.gov>

From: Bernier, Kevin [mailto:Kevin.Bernier@brookfieldrenewable.com]
Sent: Thursday, June 19, 2014 3:05 PM
To: Howatt, Kathy
Subject: RE: Kennebec River Flows?

Kathy - we've reviewed the gage data for the last few months and see that flows from the Madison and North Sidney gages (along with the four lower Kennebec River hydro facilities – see attached graph) are for the most part trending together. Please note that they will not always be the same since there may be significant inflows from intervening tributaries, such as the Sebasticook River. However, the May 27 to June 2 time period that you inquired about (which is also outlined in the box on the attached graph) illustrates the operation of the rubber dam sections at Shawmut to manage pond levels and flows during high inflow periods. The rubber dam cannot be operated in a partially inflated condition – it has to be either fully inflated or fully deflated. Thus, at certain flows when water needs to be spilled at Shawmut, the rubber dam needs to be operated to manage river flows and pond levels, i.e., the rubber dam is deflated to release the high flows and then re-inflated after an appropriate period of time to minimize impoundment drawdown. This process is repeated as necessary to maintain the pond level as consistently as feasible during these periods, which are generally higher inflow periods when river flows exceed turbine capacity.

I hope this answers your question, and please let me know if you have any further questions. Thanks.

Kevin Bernier

Senior Compliance Specialist

Brookfield Renewable Energy Group

1024 Central Street, Millinocket, ME 04462

T 207 723-4341 ext. 118 C 207 951 5006

kevin.bernier@brookfieldrenewable.com<mailto:kevin.bernier@brookfieldrenewable.com>

www.brookfieldrenewable.com<http://www.brookfieldrenewable.com>

-----Original Message-----
From: Howatt, Kathy [mailto:Kathy.Howatt@maine.gov]
Sent: Wednesday, June 18, 2014 2:13 PM
To: Bernier, Kevin
Subject: FW: Kennebec River Flows?

Kevin,

Attached is a graph of the discharge at a USGS gauge in Madison and the discharge at a USGS gauge in North Sidney. The questions is why do daily flows at the Sidney gauge vary so much between May 27 and June2 while the upriver gauge at Madison seemed to be fairly steady. Thanks, Kathy

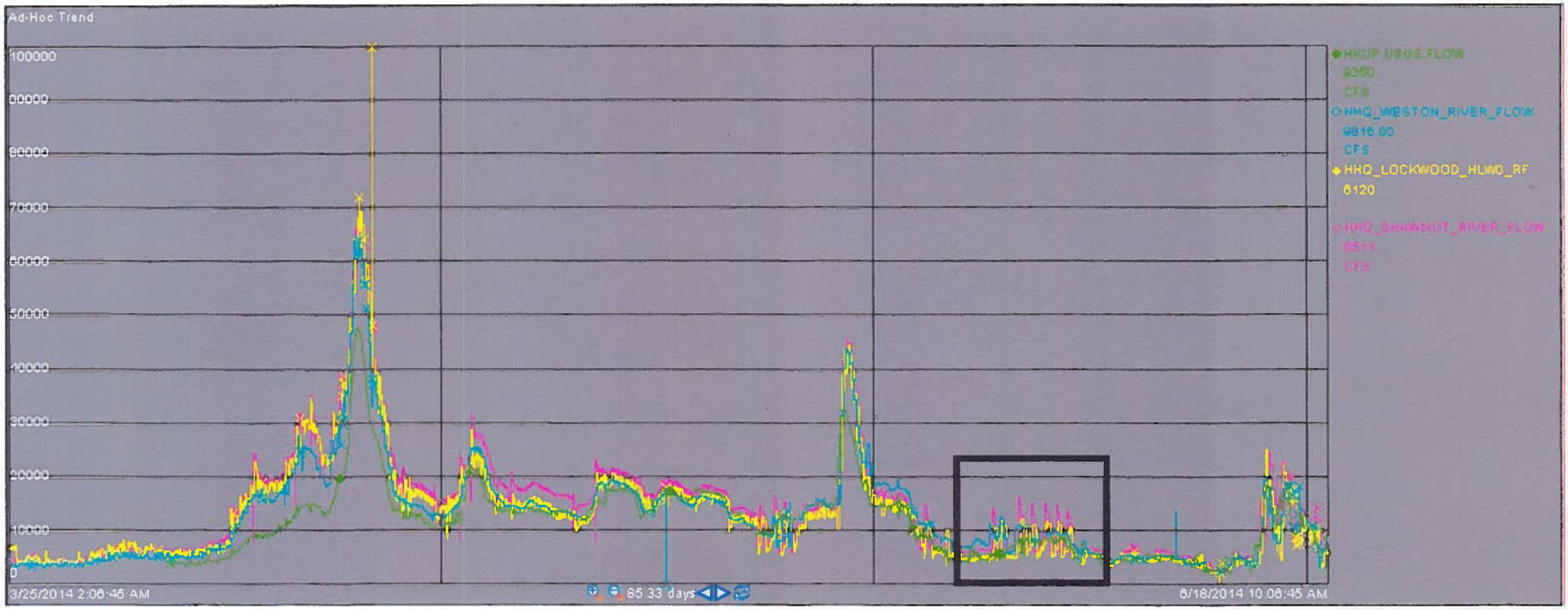
Kathy Davis Howatt

Hydropower Coordinator, DLRR

Maine Department of Environmental Protection

207-446-2642

kathy.howatt@maine.gov<mailto:kathy.howatt@maine.gov>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6120
HHQ_SHAWNUT_RIVER_FLOW
8511
CFS

Landis Hudson, Yarmouth, ME.
January 19, 2016

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

Re: Scoping comments on the Shawmut Project (P-2322)

Dear Kimberly D. Bose,

We are writing with regard to the Shawmut Dam Hydroelectric Project (FERC N. 2322-060) and its relicensing.

Maine Rivers is a statewide advocacy organization whose mission is to protect, restore and enhance the ecological health of Maine's river systems. We are currently involved in extensive restoration work in the Kennebec watershed and we have maintained a long interest in the health of this river and the life it supports.

We note that the Shawmut impoundment reaches some 12 miles in length and covers 1,300 acres. The operation and maintenance of this project has an impact on migratory fish, including Atlantic salmon, American shad, alewife and blueback herring, and American eel.

The scoping document produced by Brookfield White Pine Hydro LLC notes that the geographic scope for these migratory fish includes the Kennebec River Basin, from the upstream Brassua Hydroelectric Project (FERC Project No. 2615) on the Moose River to the mouth of the Kennebec River at Merrymeeting Bay and the Atlantic Ocean. As noted in the scoping document: "Activities within this basin that may cumulatively affect these migratory fish species include the construction and operation of dams within the river basin, which have resulted in migratory barriers and loss of spawning habitat."

Hydroelectric dams are known to impact Atlantic salmon and other migratory fish through habitat alteration, fish passage delays, and entrainment and impingement. We are here to voice our grave concerns regarding the lack of evidence for success in efforts restore sea-run fish above the multiple large dams on this river system. Further, we note the failed efforts from other river systems, including the Connecticut, Merrimac and Susquehanna Rivers.

Passage at the Lockwood, Hydro Kennebec, Shawmut and Weston dams is uniquely important to the survival and recovery of Atlantic salmon and other co-evolved migratory fish species. Dams in this watershed, including the Shawmut Dam, have eliminated or degraded large reaches of suitable spawning habitat. Just above Weston, the Sandy River enters the Kennebec. The Sandy River is considered one of the finest habitats for the spawning of Atlantic salmon.

We therefore urge FERC to include consideration of the impacts of the Shawmut impoundment together with the impacts of the other mainstem impoundments on the restoration of sea-run fish, and including the perilously small population of endangered Atlantic salmon. This consideration should include an EIS to assess the potential decommissioning of the Shawmut project, and its linkage to the upstream and downstream projects that prevent the restoration of sea-run species.

And finally, the deeply troubling fish passage deficiencies in the Kennebec River have been noted publicly for some time, including on Maine Rivers website and in publications. On August 8, 2013 the Kennebec Journal published “MAINE COMPASS: Dam owners should help finance Kennebec fish run restoration” by Clinton B. “Bill” Townsend which noted:

The Lockwood and Shawmut dams should be removed so that Atlantic salmon migrating downstream from the Sandy River as juveniles or upstream as adults would need to get past only two dams. (Accessed on 1.19.16 at http://www.centralmaine.com/2013/08/08/dam-owners-should-help-finance-kennebec-fish-run-restoration_2013-08-07/)

A version of that article has been posted on the Maine Rivers website for more than two years. It is accessible at http://mainerivers.org/kennebec-river/.

Sincerely,

Landis Hudson
Executive Director

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

January 19, 2016

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

RE: FERC 2322, Shawmut Project Pre-Application Document Comments

Dear Secretary Bose:

The Maine Department of Environmental Protection (MDEP or Department) received and reviewed the Notice of Intent (NOI) to File License and Pre-Application Document (PAD), dated September 21, 2015, and Scoping Document 1, dated November 20, 2015 for the Shawmut Project (FERC 2322). MDEP staff attended an agency scoping meeting and project facilities site visit on December 16, 2015, and reviewed appropriate project documents to prepare the following comments and recommendations.

The proposed relicensing is subject to Water Quality Certification provisions of Section 401 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act). By Executive Order of the governor of the State of Maine, the Maine Department of Environmental Protection is the State certifying agency for projects located wholly or partially in organized towns and cities, and as such has jurisdiction over the Shawmut Project.

The existing Shawmut Project consists of a 1,480-foot-long, 24-foot-high concrete gravity dam with a crest elevation of 108.0 feet USGS Datum, with 380 feet of hinged flashboards four feet high and a 730-foot-long section topped with an inflatable bladder composed of three sections, each 4.46 feet high when inflated, and a 25-foot wide sluice with a crest elevation of 104.0 feet USGS Datum. The dam creates an impoundment of 1,310 acres at elevation 112.0 feet USGS Datum, extending approximately 12 miles upstream. There are two powerhouses containing eight turbine/generator units, which generate on average 53,689 MWh of electricity annually. The tailrace is approximately 300 feet long, 45 feet wide, and 12 feet deep. The Shawmut Project operates in a run-of-river mode whereby water flowing into the project impoundment should equal water flowing downstream from the project.

MDEP understands that at this time there are no proposed changes in facilities or operation of the Shawmut Project.

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Comments on PAD

The Department appreciates the effort of Brookfield White Pine Hydro LLC and their consultants to prepare a Pre-Application Document (PAD). The PAD provides an understanding of the project, the surrounding resources, and dam operation. The PAD also provides the agencies information from which issues related to dam relicensing can be readily identified. After review of the available documents, the Department has the following comments on the PAD:

1. **Section 3.1 [General Description of the Watershed] Overview** states:

   The Kennebec River originates at Moosehead Lake, and flows southerly 145 miles to Merrymeeting Bay.

   However, the Kennebec River in fact flows 166 miles to the ocean at Popham Beach.

2. **Section 5.2.3 Streamflow, Gage Data and Flow Statistics** states:

   The calculated mean annual daily inflow for the Project is 3,746 cfs for the period January 2004 to September 2014 as prorated from USGS 01049265 gage at the Kennebec River at North Sidney, Maine (USGS 2015). Annual and monthly flow duration curves based on daily flow records for the gage are presented in Appendix D.

   USGS gage 01049265 is located approximately 13 miles downstream of the Shawmut Dam. Additionally, the USGS gage is approximately 7.25 and 6.25 miles downstream of the Hydro Kennebec and Lockwood Dams respectively, and approximately 5.5 miles downstream of a major tributary, the Sebasticook River.

   How are these factors and other inflows/outflows along this 13-mile river reach accounted for in prorating inflow to the Shawmut Dam and developing annual and monthly flow duration curves for the Project from USGS gage 01049265? Using this USGS gage does not seem appropriate given its geographic location from the Shawmut Project. Brookfield White Pine Hydro LLC should provide further information to justify the use of USGS gage 01049265 for the Shawmut Project.

3. **Section 6.1 Known or Potential Effects of Relicensing** states:

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

   It is not just *new* changes that need to be evaluated, but any part of the Project not meeting water quality standards.

4. **Section 6.2.2.2 Proposed Studies** states:

   Licensee proposes to conduct baseline water quality sampling employing a typical riverine sampling approach of early morning/late afternoon DO, temperature, and Chlorophyll a sampling during a three-day period of high temperature and low flow conditions in the summer, in the impoundment and downstream of the dam. Sampling of the benthic macroinvertebrate communities downstream of the project will also be conducted to confirm water quality classification conditions.

   Additional baseline water quality parameters will need to be measured to verify attainment of water quality classification standards. Furthermore, the frequency and duration of sampling listed by the licensee does not conform to the DEP Sampling Protocol for Hydropower Studies – November 2014.

   Details on the parameters that will need to be measured above and below the dam are included below and the Department's established sampling protocols for water quality certification are attached to this comment letter.

Water Quality Classifications and Standards

Water Quality Standards and the water quality classifications of all surface waters of the State have been established by Maine Legislature (Title 38 M.R.S.A. §§ 464-467). The following classifications apply to the waters affected by the Shawmut Project:

Main stem of the Kennebec River from the Fairfield-Skowhegan boundary to the Shawmut Dam, Class C; from the Shawmut Dam to its confluence with Messalonskee Stream, excluding all impoundments, Class B.

Class B waters must be of such quality that they are suitable for 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; navigation; and as habitat for fish and other aquatic life. The habitat for Class B waters must be characterized as unimpaired.

The dissolved oxygen content of Class B waters may not be less than 7 parts per million or 75% of saturation, whichever is higher, except that for the period from October 1st to May 14th, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean dissolved oxygen concentration may not be less than 9.5 parts per million and the 1-day minimum dissolved oxygen concentration may not be less than 8.0 parts per million in identified fish spawning areas.

Discharges to Class B waters may not cause adverse impact to aquatic life in that the receiving waters must be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community.

Class C waters must be of such quality that they are suitable for the designated uses of drinking water after treatment; fishing; agriculture; recreation in and on the water; industrial processes and cooling water supply; hydroelectric power generation; navigation; and as habitat for fish and other aquatic life.

The dissolved oxygen content of Class C waters shall be not less than 5 parts per million or 60% of saturation, whichever is higher, except that in identified salmonid spawning areas where water quality is sufficient to ensure spawning, egg incubation and survival of early life stages, that water quality sufficient for these purposes must be maintained. In order to provide additional protection for the growth of indigenous fish, the following standards apply:

(1) The 30-day average dissolved oxygen criterion of a Class C water is 6.5 parts per million using a temperature of 22 degrees centigrade or the ambient temperature of the water body, whichever is less, if:

(a) A license or water quality certificate other than a general permit was issued prior to March 16, 2004 for the Class C water and was not based on a 6.5 parts per million 30-day average dissolved oxygen criterion; or

(b) A discharge or a hydropower project was in existence on March 16, 2005 and required but did not have a license or water quality certificate other than a general permit for the Class C water. This criterion for the water body applies to licenses and water quality certificates issued on or after March 16, 2004.

(2) In Class C waters not governed by subparagraph (1), dissolved oxygen may not be less than 6.5 parts per million as a 30-day average based upon a temperature of 24 degrees centigrade or the ambient temperature of the water body, whichever is less. This criterion for the water body applies to licenses and water quality certificates issued on or after March 16, 2004.

The Department may negotiate and enter into agreements with licensees and water quality certificate holders in order to provide further protection for the growth of indigenous fish. Agreements entered into under this paragraph are enforceable as Department orders according to the provisions of Title 38 M.R.S.A §§ 347-A - 349.

Discharges to Class C waters may cause some changes to aquatic life, except that the receiving waters must be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.

Antidegradation

The State's antidegradation policy provides that water quality certification may be approved only if the applicable standards of classification of the affected water body are met and existing in-stream uses and the level of water quality necessary to protect those existing uses are maintained and protected. The policy also provides that, where the actual quality of any classified water exceeds the minimum standards of the next highest classification, that higher water quality shall be maintained and protected.

Water Quality Certification Data Requirements

In **Section 6.2.2.2 Proposed Studies**, Brookfield White Pine Hydro LLC proposes to conduct baseline water quality sampling in the impoundment and downstream of the dam. It has been the Department's practice to determine the metrics, methods, timing, and duration of water quality monitoring necessary to ensure that the water quality studies meet data quality objectives. The Department requests that Brookfield White Pine Hydro LLC design the water quality studies to include the following parameters and adhere to the Department's established sampling protocols in support of water quality certification.

Impoundment Trophic State Data - Dam height at the Shawmut Project suggests the potential for stratification to occur within the impoundment. Brookfield White Pine Hydro LLC will need to supply the data identified in the "Trophic State Study" under "Lakes, Ponds, and Impoundments" in DEP Sampling Protocol for Hydropower Studies – November 2014, which is attached to this comment letter.

Temperature and Dissolved Oxygen Monitoring – The PAD identified temperature and dissolved oxygen data collection as part of the baseline water quality study; Brookfield White Pine Hydro LLC proposed, and the Department supports, a water quality study that includes temperature and dissolved oxygen monitoring. Data must be collected in accordance with the Department's "Temperature and Dissolved Oxygen Study" under "Rivers and Streams" in DEP Sampling Protocol for Hydropower Studies – November 2014, which is attached to this comment letter.

Benthic Macroinvertebrate Monitoring - Assessment of the macroinvertebrate community is critical to determine whether current in-stream flow releases are affecting attainment of Classification Standards for habitat and aquatic life in the river below the dam. Brookfield White Pine Hydro LLC proposed to include benthic macroinvertebrate monitoring in the baseline water quality study. To ensure data meets WQC compliance objectives, the study plan must be developed in accordance with the Department's "Methods for Biological Sampling and Analysis of Maine's Rivers and Streams", which is attached to this comment letter.

Impoundment Aquatic Habitat Study - The purpose of this study is to determine the effect of impoundment drawdowns on the impoundment's littoral zone and the ability of the impoundment to support fish and other aquatic life. Brookfield White Pine Hydro LLC will need

to provide the Department with three years of impoundment elevation and inflow/outflow data for the Shawmut Project or conduct the impoundment aquatic habitat study following the "Habitat Study" protocol under "Lakes, Ponds, and Impoundments" in DEP Sampling Protocol for Hydropower Studies – November 2014, which is attached to this comment letter.

Outlet Stream Aquatic Habitat Study - This study evaluates whether current in-stream flow releases are affecting attainment of habitat standards for fish and other aquatic life in the river below the dam. It is the Department's position that there must be both sufficient quality and quantity of habitat for aquatic organisms to meet aquatic life and habitat standards. The Department has found that, generally, flows providing wetted conditions in a weighted average of 3/4^{ths} of the cross-sectional area of the affected river or stream, as measured from bankfull conditions, are sufficient to meet aquatic life and habitat standards. Brookfield White Pine Hydro LLC will need to provide the Department with three years of impoundment elevation and inflow/outflow data for the Shawmut Project or conduct the impoundment aquatic habitat study following the "Habitat and Aquatic Life Studies" protocol under "Rivers and Streams" in DEP Sampling Protocol for Hydropower Studies – November 2014, which is attached to this comment letter.

The following study is not required for the baseline water quality sampling in support of the water quality certification:

Fish Sampling for Mercury Analysis - This study is required for impoundments that are operated with drawdowns equal to or greater than ten feet. Based on current drawdowns and run-of-river operations, and because MDEP understands that no changes are proposed in project facilities or operation that would increase project capacity or change drawdowns, this study is not required for the Shawmut Project.

In addition to meeting requirements of the water quality certification process, MDEP supports study requests prepared by other natural resource agencies, including but not limited to, US Fish and Wildlife (USFWS), Maine Department of Inland Fish and Wildlife (MDIFW), and Maine Department of Marine Resources (MDMR).

Thank you for the opportunity to comment on the Pre-Application Document and Scoping Document 1 for the Shawmut Project. Please direct any questions regarding these comments to Michael.OConnor@maine.gov or 207-441-1732.

Sincerely,

Michael O'Connor
Project Manager
Maine Department of Environmental Protection

Encl: DEP Sampling Protocol for Hydropower Studies – November 2014
DEP Methods for Biological Sampling and Analysis of Maine's Rivers and Streams

Cc: Frank Dunlap (Brookfield White Pine Hydro LLC) by email and surface mail
John Perry (MDIFW) by email
Jason Seiders (MDIFW) by email
Oliver Cox (MDMR) by email
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CHANDLER E. WOODCOCK
COMMISSIONER

January 19, 2016

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

RE: Comments on Pre-Application Document and Scoping Document 1 and Additional Study Requests for the Shawmut Dam Hydroelectric Project (FERC No. 2322-060)

Dear Secretary Bose,

The Maine Department of Inland Fisheries and Wildlife (MDIFW) has reviewed the Shawmut Hydroelectric Project Pre-Application Document and "Scoping Document 1 for the Shawmut Dam Hydroelectric Project" (SD1). Our comments are described below, as well as additional studies requested by MDIFW. All study requests follow the Study Plan Criteria 18 CFR § 5.9(b).

Section 4.4 of the PAD describes current and proposed operation of the Project. The Licensee proposes to maintain operations as run-of-river, and maintain a headpond elevation of approximately 112' USGS datum. MDIFW notes that when examining USGS gauge data for the North Sidney location, there are peaks and valleys that would be difficult to explain as run of river or contributions by tributary streams. It would be useful to provide more detailed information regarding flows from the Project, using greater precision than monthly means. Additionally, MDIFW notes that there is no mention of any exceedance of the 112' headpond elevation, and no description of any downward variance experienced over time. Those data would be useful in determining whether variations in Project impoundment elevation create habitat disturbances to resident fish species.

In Section 6.2.3.2 of the PAD, the Licensee characterizes the fisheries in the vicinity of the Project in the following manner:

> *"Given the existing data documenting high quality nature of existing fish and aquatic communities and associated habitat, and existing recent data that describes fish and aquatic communities in the project area, no additional fish community or aquatic community studies are being proposed. In consideration of the fisheries use of the tailwaters area, Licensee is proposing a fisheries habitat assessment of the tailwater area."*

MDIFW disagrees with these statements. The brown trout fishery in the tailwater, once nationally renowned for high catch rates and quality size fish, has been in a state of severe decline since the late 1990's. MDIFW has spent considerable time and resources studying the Project tailwater in an attempt to determine the cause of this decline, and we have provided some of that information to the Licensee

for inclusion in the PAD. We will draft a report in 2016 detailing the results of a comprehensive, multi-year study and we will provide that to the Licensee in support of their relicensing effort.

MDIFW records indicate that brown trout stocked above the Project contributed to the tailwater fishery during the period that most anglers and biologists would consider the best years of the fishery (1980's through the late 1990's). While compiling information related to the collapse of the brown trout fishery, it became obvious that we lack sufficient data related to fisheries above the Project and any potential impacts the Project may have on these fisheries resources. The existing "recent" data related to the fisheries above the Project, referred to in the PAD, are approximately 13 years old. MDIFW notes that 13 years can equate to several generations of productivity for some fish species, and a determination of "high quality" is impossible to make with these data. MDIFW would never describe these fisheries as high quality given that the tailwater fishery is in a state of severe decline and we lack recent data regarding the resources above the Project.

MDIFW notes that proposed fisheries related studies are limited to a habitat assessment of the Project tailrace. While this study may provide valuable information, it will not provide enough information related to the inland fisheries resources for MDIFW biologists to adequately assess potential Project impacts – either positive or negative. MDIFW respectfully requests the following studies to obtain information that is currently unavailable, is critical to resource managers, and will provide a better understanding of potential Project impacts. The following is a list of studies requested by MDIFW:

1. Fish Assemblage Study
2. Bass Population Study
3. Brown Trout Telemetry Study
4. Comprehensive Angler Creel Survey
5. Public Recreation Study

Study 1: Fish Assemblage Study

1) Study goals and objectives.

This study will document the current fish assemblage in the Project impoundment and the flowing water section of the Kennebec River located in Skowhegan (including the area upstream of the Project Boundary). Specific goals and objectives include:

- Document species assemblage.
- Assessment of relative species abundance and a comparison of changes over time.
- Collection of biometric data (age and growth) to characterize fish population dynamics.

2) Relevant resource management goals.

This study will provide MDIFW with information critical to managing sport fish populations in the Kennebec River. The Kennebec River is a complex fishery resource due to the high degree of hydroelectric development and associated flow issues, and the constant threat of invasive fish species. Recent fish assemblage data is critical to making informed fisheries management decisions. The

Skowhegan/Fairfield section of the Kennebec River is managed as a two-tier fishery: it is managed for cold water species (trout), and warm water species (bass). Managing both types of fisheries in the same riverine habitat is difficult, especially when adding the above mentioned variables.

The brown trout fishery in the Shawmut tailwater was once nationally renowned. It should be noted that the brown trout fishery in the Project tailwater experienced a significant decline in the early 2000's. MDIFW biologists have conducted various studies to understand why this once renowned fishery has essentially collapsed, and we provided a great deal of information to the Licensee during the development of the PAD. There are still significant information gaps that need to be addressed, and this study would address a portion of that void.

3) The Maine Department of Inland Fisheries and Wildlife is a cabinet level agency of the State of Maine. Under Maine State Law (12 MRSA, §10051), MDIFW's mandate is "…to preserve, protect, and enhance the inland fisheries and wildlife resources of the State; to encourage the wise use of these resources; to ensure coordinated planning for the future use and preservation of these resources; and to provide for effective management of these resources." MDIFW is the natural resource agency responsible for managing inland fisheries resources in the Kennebec River.

4) Existing information concerning the subject of the study proposal, and the need for additional information.

The PAD references a previous study completed by the Midwest Biodiversity Institute (MBI) during 2002 and 2003. That study provided species assemblage and relative abundance information, but at 13 years old it is quite outdated. MDIFW has limited data for the fisheries above the Shawmut Dam. To better manage the inland fisheries resources and determine potential Project impacts, there needs to be a better understanding of the status of resident fish populations in the area. Additionally, fisheries managers desperately need more information to determine the cause of the collapse in the brown trout fishery.

5) Nexus between Project operation and effects on the resource to be studied.

The operation of the Project has direct impacts on the inland fisheries resources within the Kennebec River. These impacts may vary (water levels, fish passage, thermal issues, etc.), but we certainly need a better understanding of the resident fish population before making any other determinations or management decisions. Additionally, the existence of a large impoundment where there was once flowing water creates habitat for fishes that may not otherwise inhabit this area. In this case, the presence of warm water fishes can complicate the management of preferred cold water fishes through interspecific competition and predation.

6) Explain how the proposed study is consistent with generally accepted practice in the scientific community.

MDIFW is recommending that the Licensee conduct this fish assemblage study using similar methods as the 2002-2003 MBI survey. The MBI study was peer reviewed and respected throughout the fisheries science community. Additionally, MDIFW requests that the Licensee record biometric data on the fish

collected, including the collection of fish body structures (scales, otoliths) for age determination. All of these practices are currently used by MDIFW and other fisheries resource agencies in assessing age, growth, and population dynamics.

7) Describe considerations of level of effort and cost, as applicable, and why proposed study alternatives would not be sufficient to meet the stated information needs.

This level of study is commensurate with the scale of the Project. These are basic data that MDIFW needs to make informed decisions regarding potential Project impacts to an economically and culturally important fishery resource. Currently, no studies regarding the fish community have been proposed, so these information needs will not be met unless this study is undertaken.

MDIFW is willing to collaborate with the Licensee on this study. MDIFW will analyze fish body structures (scales, otoliths), and determine fish age. Those data will be provided to the Licensee for inclusion in a final study report.

Study 2: Bass Population Study

1) Study goals and objectives.

This study will provide much needed information regarding the status of bass populations in the Project impoundment. Specific goals and objectives include:

- Collect biometric data to characterize bass population dynamics (if sufficient data are not collected during fish assemblage study).
- Assessment of bass spawning habitat, nesting areas, and differentiation by species (largemouth and smallmouth bass).

2) Relevant resource management goals.

MDIFW is tasked with managing these inland fisheries resources in a two-tiered fashion: a cold water and warm water fishery. A balance can be difficult to achieve due to interspecific competition and predation on trout by larger bass. In recent years, commercial guiding and recreational interests have sought out this section of the Kennebec River for its bass resource, making it an important component in the suite of fishing opportunities. To date, MDIFW has little information regarding the bass population in the Project impoundment and how Project operations may impact the population.

In addition to smallmouth bass (which are a riverine centrarchid), largemouth bass have established a population in this section of the Kennebec River. Largemouth bass colonization has occurred within approximately the last 20 years, and coincides with the decline in the Shawmut tailwater fishery. Largemouth bass grow to larger size than smallmouth bass, on average, and can consume large prey items in relation to their body size. Unlike smallmouth bass, largemouth bass are largely a lentic species. This means that the Project impoundment likely provides suitable habitat for all life stages of largemouth bass. Higher numbers of largemouth bass could impact smallmouth bass numbers (which are typically preferred by anglers and support a popular, longstanding sport fishery), and could

negatively impact brown trout numbers through increased predation. MDIFW documented that a percentage of brown trout stocked above the Project drop down and contribute to the tailwater fishery. If the degree of predation has increased due to largemouth bass colonization, fishery managers need this information to adjust stocking numbers accordingly. Again, largemouth bass colonization coincides with the decline of the tailwater fishery, but MDIFW does not know the extent of colonization or population dynamics.

Project operations may alter or disturb bass spawning habitat, depending upon the timing and duration of such events. The appropriate mapping of bass spawning habitat is needed to assess any Project related impacts to bass spawning success and recruitment.

3) The Maine Department of Inland Fisheries and Wildlife is a cabinet level agency of the State of Maine. Under Maine State Law (12 MRSA, §10051), MDIFW's mandate is "…to preserve, protect, and enhance the inland fisheries and wildlife resources of the State; to encourage the wise use of these resources; to ensure coordinated planning for the future use and preservation of these resources; and to provide for effective management of these resources." MDIFW is the natural resource agency responsible for managing inland fisheries resources in the Kennebec River.

4) Existing information concerning the subject of the study proposal, and the need for additional information.

Little is known regarding the bass population in the Project impoundment, including available spawning and nursery habitat. The most recent fish collection information available to fishery managers was collected in 2002-2003, which is now 13 years old. MDIFW has very little data related to the inland fisheries in the Project impoundment or in the Skowhegan section of the Kennebec River in general.

MDIFW has invested a great deal of time in recent years studying the Shawmut tailwater, and we have gladly provided that information to the Licensee for the development of the PAD. Our glaring data gap remains the area above the Project and any associated impacts. Again, the severe decline of the tailwater brown trout fishery has been the subject of great discussion and study, but there are areas that have yet to be studied.

5) Nexus between Project operation and effects on the resource to be studied.

The operation of the Shawmut Project has a direct impact on the bass population in the Kennebec River. The very existence of the Project creates habitat for largemouth bass, and it is likely that Project operations can alter smallmouth and largemouth bass reproductive success.

6) Explain how the proposed study is consistent with generally accepted practice in the scientific community.

MDIFW routinely studies bass populations in the manner described above. In order to effectively manage bass populations it is critical to know population dynamics (including age structure), evaluate recruitment, identify limitations to the populations (including available habitat, water level fluctuations, etc.), and to differentiate findings by species (smallmouth bass versus largemouth bass).

7) Describe considerations of level of effort and cost, as applicable, and why proposed study alternatives would not be sufficient to meet the stated information needs.

The level of effort in this type of study is commensurate with the scale of this Project. Given the economic and cultural importance associated with the inland fisheries resources in this area of the Kennebec River, this study is necessary for fishery managers to make informed management decisions. SD 1 lists only one fisheries-related study: a habitat evaluation in the Project tailrace. That study will not provide the information requested in the study requested by MDIFW.

Additionally, MDIFW is willing to collaborate on this study and lend assistance to the Licensee. MDIFW has vast experience in this type of bass assessment and we are willing to share our expertise.

Study 3: Brown Trout Telemetry Study

1) Study goals and objectives.

This study will document the movement of stocked brown trout in the river section above the Shawmut Project, and provide insight into downstream passage. MDIFW has documented that brown trout stocked in this section of the river create a recreational fishery in the Skowhegan section of the Kennebec River, as well as augmenting the Shawmut tailwater fishery by dropping down through the Project. Specific goals and objectives include:

- Collection of biometric data to characterize brown trout population dynamics (if sufficient data are not collected during fish assemblage study).
- Movements and behaviors of newly stocked brown trout.
- Movements and behaviors of older-age brown trout.
- Effects of Project operation on the movement and behaviors of stocked brown trout.
- Provide fishery managers with information related to the drop down of brown trout stocked in the Skowhegan section of the Kennebec River.
- Aid fishery managers in determining the cause of the decline in brown trout fishery in the Shawmut tailwater.

2) Relevant resource management goals.

MDIFW is responsible for managing the inland fishery resources in the Kennebec River. To date, we have little information on the status of the brown trout fishery in the Skowhegan area, and to what extent fish stocked in the Skowhegan area still contribute to the Shawmut Project tailwater fishery. In addition to the data gap for the Skowhegan brown trout fishery, MDIFW is attempting to determine the cause of the severe decline in the tailwater fishery. The Shawmut tailwater was nationally renowned during the 1990's and was characterized by multiple age classes of brown trout (good annual survival), and fish attaining quality and trophy size. A severe decline in brown trout survival began in the late 1990's and early 2000's, to the extent that only one age class of fish was supporting a very limited fishery. This decline negatively impacted the local fishing economy by suppressing angler interest and effort. The decreased effort focused on this stocked fishery has perceived impacts on wild salmonine fisheries in

northern sections of the Kennebec River. The high quality brown trout fishery attracted anglers from nearby urban areas (Skowhegan, Waterville, Augusta), and acted as a protective buffer on wild salmonine populations located further north. That is, the lack of a quality stocked fishery in the Shawmut tailwater puts additional stress on nearby wild trout populations as anglers seek other fishing opportunities.

MDIFW has collected data from anglers that show a percentage of brown trout stocked in Skowhegan drop down and augment the fishery in the Shawmut tailwater. The total contribution of Skowhegan brown trout to the Shawmut tailwater fishery is unclear, which is why a study of this nature is required. If we are to ever regain the high quality recreational fishery that Shawmut was known for, we must understand how brown trout move within this system and how operation of the Project may impact this effort.

3) The Maine Department of Inland Fisheries and Wildlife is a cabinet level agency of the State of Maine. Under Maine State Law (12 MRSA, §10051), MDIFW's mandate is "…to preserve, protect, and enhance the inland fisheries and wildlife resources of the State; to encourage the wise use of these resources; to ensure coordinated planning for the future use and preservation of these resources; and to provide for effective management of these resources." MDIFW is the natural resource agency responsible for managing inland fisheries resources in the Kennebec River.

4) Existing information concerning the subject of the study proposal, and the need for additional information.

MDIFW is requesting this study because the data do not currently exist. MDIFW has spent a great deal of time and resources studying the fisheries resources in the Shawmut tailwater, but the area above the Project still represents a data gap in regards to the brown trout fishery. MDIFW will be drafting a report of its findings from a multi-year telemetry study and fish collections in the Project tailwater, and we will gladly provide a copy to the Licensee and other interested parties upon completion.

If we are to recover the Shawmut brown trout fishery, we need to determine how the Skowhegan brown trout fishery functions, how it contributes to the Shawmut tailwater fishery, and what impacts Project operations have on both systems.

5) Nexus between Project operation and effects on the resource to be studied.

Operation of the Shawmut Project has a direct impact on the brown trout fishery in the Kennebec River, both above and below the Project. Major perceived impacts include flow, water levels, temperature, fish passage, and potential mortality. A study of this nature is necessary for MDIFW to better understand why the brown trout fishery collapsed, whether by determining it is a function of brown trout life history, or if Project operations are influencing the fishery in ways we have yet to determine.

Our multi-year study in the Shawmut tailwater has demonstrated that the operations of a run of river project can have impacts on the brown trout fishery. During a high flow event on November 26, 2014, the Hydro Kennebec Project (next dam downstream from Shawmut) opened its Bascule gates. The opening of the Bascule gates caused a sudden change in river flow and caused a significant number of

our radio tagged brown trout to travel downstream and out of the Shawmut tailwater. This type of information is critical to insightful management and it can only be gleaned from a study as described above.

6) Explain how the proposed study is consistent with generally accepted practice in the scientific community.

The proposed study is essentially a replication of recent salmonine telemetry studies, many of which have occurred at other hydroelectric projects within the Kennebec River drainage (most recently Williams Project). MDIFW recently completed a study of this nature in the Shawmut tailwater, which incorporated stationary monitoring at the next dam downstream. Radio telemetry is a highly effective means of determining salmonine movement and habits, and determining potential hydro project-related impacts to their populations.

7) Describe considerations of level of effort and cost, as applicable, and why proposed study alternatives would not be sufficient to meet the stated information needs.

This study is commensurate with the scale of the project and the importance of the resource. The fisheries study proposed in SD 1, a fisheries habitat assessment of the Shawmut Dam tailrace, will not provide the information detailed above. MDIFW needs a better understanding of the status of the brown trout fishery above the Project, how the Project may impact the brown trout fishery above and below, and how we may be able to recover the tailwater fishery.

MDIFW is willing to collaborate with the Licensee on this study. MDIFW has recent experience in this type of work. A portion of this study will entail surgically implanting radio tags into hatchery brown trout. This will require use of hatchery facilities and associated staff. MDIFW is willing to assist in the tagging efforts to offset some of the associated time and labor. MDIFW is also willing to provide at least some of the labor and equipment (electrofishing boat) necessary in collecting brown trout from the Kennebec River to be included in this study.

Study 4: Comprehensive Angler Creel Survey

1) Study goals and objectives.

This study will provide information regarding the status of the recreational fishery both above and below the Shawmut Project. Specific study goals and objectives include:

- Deriving an overall estimate of angler use.
- Deriving estimates of angler success (harvest, catch rates, etc.)
- Collection of biometric data on harvested fish.
- Determine overall status of the fishery. Findings will dovetail with above studies to give a comprehensive understanding of the fishery and potential Project impacts.

2) Relevant resource management goals.

MDIFW uses angler creel surveys to assess the overall success of our inland fisheries management programs. This type of study provides a comprehensive view of angler use and the success of stocking programs or wild fisheries. MDIFW conducted a series of public informational meetings in 2013, and public perception was that recreational fisheries were in decline in many sections of the Kennebec River. A great amount of public interest and concern focused on the decline of the Shawmut fishery. As a result of those public comments, MDIFW has been actively assessing the recreational fisheries along the Kennebec River, including collaborating on an angler creel survey related to the relicensing of the Williams Hydroelectric Project (FERC No. 2335). That study provided MDIFW with critical information related to the status of the fishery and an estimate of angler use. MDIFW drafted a report for the Licensee to incorporate into the FERC License Application. Data obtained from that effort has allowed MDIFW to make informed management decisions to improve the fishery in the Project tailwater. MDIFW anticipates the same outcome on this project: valuable management data critical to managing a recreational fishery that is currently in decline.

3) The Maine Department of Inland Fisheries and Wildlife is a cabinet level agency of the State of Maine. Under Maine State Law (12 MRSA, §10051), MDIFW's mandate is "…to preserve, protect, and enhance the inland fisheries and wildlife resources of the State; to encourage the wise use of these resources; to ensure coordinated planning for the future use and preservation of these resources; and to provide for effective management of these resources." MDIFW is the natural resource agency responsible for managing inland fisheries resources in the Kennebec River.

4) Existing information concerning the subject of the study proposal, and the need for additional information.

MDIFW conducted a limited angler creel survey in the Project tailwater and provided those data to the Licensee for development of the PAD. That said, this effort was limited due to staffing constraints and a more comprehensive study is required. To date, MDIFW has very limited data regarding the status of the recreational fishery above the Project (Skowhegan area), and only limited data from the Project tailwater. The Shawmut tailwater was once nationally renowned for its brown trout fishery, and it has suffered a severe decline since the late 1990's. In order to better understand the status of this fishery and to recover this valuable fishery resource, MDIFW needs a better understanding of its current status. The creel survey information, when combined with information gained from studies mentioned above will provide a clearer picture as to the status of the fishery, and how the Project may impact the success of this public resource.

5) Nexus between Project operation and effects on the resource to be studied.

Operation of the Shawmut Project has a direct impact on the recreational fishery in the Kennebec River. Major perceived impacts include flow, water levels, temperature, fish passage, and potential fish mortality. These variables affect the success of inland fish management above and below the Project.

6) Explain how the proposed study is consistent with generally accepted practice in the scientific community.

MDIFW uses randomly stratified angler creel surveys to assess many of its stocked and wild fisheries resources. Angler creel surveys are widely accepted as a standard method of assessing public use of the recreational fishery. MDIFW requests a roving clerk survey of both the area above the Project (impoundment and flowing water reach in Skowhegan area), and the entirety of the Project tailwater (extending downstream to the Fairfield public boat launch).

7) Describe considerations of level of effort and cost, as applicable, and why proposed study alternatives would not be sufficient to meet the stated information needs.

This study is commensurate with the scale of the project and the importance of the resource. The fisheries study proposed in SD 1, a fisheries habitat assessment of the Shawmut Dam tailrace, will not provide the information detailed above. MDIFW needs a better understanding of the status of the recreational fishery above and below the Project, how the Project may impact the fishery, and how we may be able to recover the tailwater fishery.

MDIFW is willing to collaborate with the Licensee on this study. This type of study is quite economical; requiring funding for 1-2 seasonal staff and their associated transportation. Although the Skowhegan and Fairfield sections of the Kennebec River are open to year round fishing, MDIFW seeks to survey the fishery from April – November.

Study 5: Public Recreation Study

On page 5-96 of the PAD, the Licensee describes the Skowhegan boat launch as being the "MDIFW Boat Launch". This facility is not owned or managed by MDIFW; rather, it is managed by the Somerset Woods Trustees and leased from the Maine Department of Agriculture, Conservation, and Forestry. References to MDIFW management of this facility should be corrected throughout the PAD, and the appropriate entities should be included in this relicensing process. For the purpose of clarity in our study request, MDIFW will refer to this facility as the Skowhegan boat launch.

1) Study goals and objectives.

This study will determine the amount of public recreational use experienced in the Kennebec River, both above and below the Shawmut Project. Specific study goals and objectives include:

- A comprehensive recreation inventory. This will include all facilities managed by the Licensee, facilities managed by other entities, and informal sites (including access trails). The inventory will include details regarding the condition of each facility and any improvements that are needed.
- Determine total use at all recreation sites. The findings should be expressed in terms of total user days, and should differentiate between use types (angling, canoeing, waterfowl hunting, etc.)

2) Relevant resource management goals.

In addition to responsibilities regarding inland fisheries management, MDIFW is charged with obtaining and securing public access to waters of the State of Maine. The PAD details public use at three recreation facilities within the Project Area. MDIFW is aware of other access areas that are not detailed in the PAD, but the amount and types of use are not clear. To ensure continued public access to this important resource, we must have a better understanding of access point locations, the amount of use these areas are receiving, and the types of activities taking place.

3) The Maine Department of Inland Fisheries and Wildlife is a cabinet level agency of the State of Maine. Under Maine State Law (12 MRSA, §10051), MDIFW's mandate is "…to preserve, protect, and enhance the inland fisheries and wildlife resources of the State; to encourage the wise use of these resources; to ensure coordinated planning for the future use and preservation of these resources; and to provide for effective management of these resources." MDIFW is the natural resource agency responsible for managing inland fisheries resources in the Kennebec River.

4) Existing information concerning the subject of the study proposal, and the need for additional information.

The PAD describes the amount of public use at the Hinckley Boat Launch, the canoe portage trail, and the Skowhegan boat launch. The Licensee notes that the Skowhegan boat launch has an adjacent angler access area, but no use estimates are associated with that access point. MDIFW notes that in addition to the access areas described in the PAD, there are at least three other access points that were not included in the Form 80 assessment:

- Angler access parking and trail along River Road in Benton.
- Access road and trail off River Road in Benton that allows access to East abutment of Shawmut Dam.
- Angler access trail along West side of tailrace.

If a use estimate for these areas is included, the total use estimate would certainly be higher than the one derived for the development of the Form 80 and the PAD. Additionally, it's important to identify any other informal access areas to ensure their future use, make potential improvements to ensure public and environmental safety, and determine why managed facilities are not meeting demand.

Regarding the use estimate derived for the canoe portage trail described in the PAD, MDIFW notes that the canoe portage put-in is commonly used as angler/boat access. The use of true canoe portaging and angler/boat launch use should be differentiated. Although the intended purpose of the portage put-in is for paddlers traversing the Kennebec River, heavy use by anglers and boaters should be documented in order to ensure access to those user groups in the future.

5) Nexus between Project operation and effects on the resource to be studied.

Operation of the Shawmut Project has a direct impact on public recreation both above and below the dam. In addition to the impacts associated with normal operations (water levels, flows, etc.), traditional

public access areas may be impacted by Project developments, including safety mitigations and precautions. Access areas and use types should be fully identified and studied to ensure public access to a resource of the State of Maine is maintained in perpetuity.

6) Explain how the proposed study is consistent with generally accepted practice in the scientific community.

Public recreation studies are a mainstay in FERC hydroelectric relicensing. The study methods described above--recreation site inventory and public use study--are a traditional means of determining a broad understanding of overall public recreational use associated with hydroelectric developments. This study will determine the "who, what, when, and where's" of public recreation use on the Kennebec River near the Shawmut Project. These data are basic, yet crucial to understanding how recreationalists use the area, the areas they access, and what impacts the Project may have on those activities.

7) Describe considerations of level of effort and cost, as applicable, and why proposed study alternatives would not be sufficient to meet the stated information needs.

The level of effort described above is commensurate with the scope of this Project. The Licensee is already proposing a recreation inventory (described in SD1); MDIFW is asking for additional information collection during this effort. It should be noted that MDIFW is not requesting a user contact survey which is both labor intensive and costly. Instead, we request the Licensee collect information on all recreation access points, and determine overall use by area and user type. The recreation use portion of this study can be accomplished through the use of traffic counters and associated calibration, which is not a labor intensive methodology. Determination of trail use (canoe portage, angler access trails) can be accomplished through a combination of counter calibration at known parking areas, and trail cameras placed along access trails.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

John Perry, MDIFW Environmental Review Coordinator, for

Jason Seiders
MDIFW Regional Fisheries Biologist
Sidney Headquarters

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Maine Field Office
17 Godfrey Drive, Suite 2
Orono, Maine 04473
207/866-3344 Fax: 207/866-3351

January 19, 2016

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

SUBMITTED ELECTRONICALLY

RE: Comments on the Pre-Application Document, Scoping Document 1, and Submission of Study Requests for the Shawmut Project, FERC No. 2322, Kennebec County, Maine

Dear Secretary Bose:

The U.S. Fish and Wildlife Service (Service) has reviewed the Federal Energy Regulatory Commission's (FERC) September 21, 2015 Notice of Intent to File License, the Pre-Application Document (PAD), and the November 20, 2015 Scoping Document for the relicensing of the Shawmut Project (Project), located in Kennebec County, Maine.

The licensee of the Shawmut Project is Brookfield White Pine Hydro LLC and the current license for the project expires on January 31, 2021. The Project is located on the Kennebec River in Kennebec and Somerset Counties in the towns of Skowhegan, Fairfield, Clinton, and Benton. The project consists of (1) a 1,480-foot-long concrete dam including the spillway and headworks sections; (2) a 1,310-acre, approximately 12-mile-long impoundment; (3) enclosed forebay; (4) 2 powerhouses; and (5) 8 turbine-generator units with a total authorized installed capacity of 8.775 megawatts. The project is operated in run of river mode.

We submit the following comments and recommendations under the authority of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.),* the Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 U.S.C. § 661 *et seq.),* and the Federal Power Act (FPA) (16 U.S.C. § 791a, *et seq.).*

U.S. FISH AND WILDLIFE SERVICE GOALS AND OBJECTIVES

We seek to accomplish several fish and wildlife resource goals and objectives through the Shawmut Project's re-licensing process. The Service's general re-licensing goals are to:

1. Ensure that protection, mitigation and enhancement measures are commensurate with the Project's effects and contribute to meeting State and Federal fish and wildlife objectives;

2. Recover federally proposed and listed species and prevent the listing of additional species;

3. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project;

4. Ensure that the public is afforded the opportunity for recreation on Project lands, including fishing, hunting, bird watching and other forms of outdoor recreation; and

5. Ensure that once the licensing process is complete, there is an adaptive management plan to incorporate new information and implement new management strategies over the term of the license, bringing us closer to the desired level of protection for fish and wildlife resources.

OBJECTIVES FOR AQUATIC ECOSYSTEMS

Our specific objectives for aquatic ecosystems, terrestrial resources, and threatened and endangered species are to:

1. Protect, enhance, or restore diverse high quality aquatic and riparian habitats for plants, animals, food webs, and communities in the watershed and mitigate for loss or degradation of these habitats;

2. Maintain and/or restore aquatic habitat connectivity in the watershed to provide movement, migration, and dispersal corridors for salmonids, resident fish and other aquatic organisms and provide longitudinal connectivity for nutrient cycling processes;

3. Restore naturally reproducing stocks of endangered Atlantic salmon, as well as other salmonids and resident fishes (American shad, alewife, blueback herring, American eel), to historically accessible riverine and lake habitats;

4. Provide an instream flow regime that meets the spawning, incubation, rearing, and migration requirements of salmonids and other resident fish and amphibian species, throughout the Project area, and for diadromous fish in downstream waters of the Kennebec River that may be affected by the Project's water management releases;

5. Meet or exceed Federal and State regulatory standards and objectives for water quality in the basin;

6. Minimize Project operation effects on water temperature and the potential negative effects to downstream fishery resources;

OBJECTIVES FOR TERRESTRIAL RESOURCES

7. Protect, enhance and restore wetlands, wetland functions and wetland buffer areas in the basin, and mitigate for loss or degradation due to Project impact;

8. Protect, enhance and restore terrestrial and riparian habitats and associated wildlife populations in the basin and mitigate for loss or degradation due to Project impact;

9. Reduce the effect of the fluctuation zone on wildlife habitat and seek opportunities to enhance this habitat;

10. Reduce Project induced recreation disturbance to terrestrial habitat and wildlife species;

OBJECTIVES FOR ENDANGERED, THREATENED, PROPOSED AND SENSITIVE SPECIES

11. Reduce Project effects on State and Federal threatened, endangered, proposed and sensitive species; and

12. Explore opportunities for potential protection, mitigation and enhancement measures for threatened, endangered, and proposed species.

GENERAL COMMENTS

Our comments and study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop conservation measures, reasonable and prudent measures, prescriptions, and protection, mitigation, and enhancement measures pursuant to the Service's authorities under the Endangered Species Act, the Fish and Wildlife Coordination Act, and the Federal Power Act.

One of the actions that will help achieve these goals is to install effective fish passage for the suite of diadromous fishes (Atlantic salmon, American shad, alewife, blueback herring, American eel) that exist in the Kennebec River. Installing effective fish passage requires pre and post fishway construction monitoring and evaluation studies and in most cases adjustments or additional construction to achieve passage goals. Fishway design and construction usually takes two years, combined with pre and post construction studies the whole process can take more than five years.

The new upstream fishway at Shawmut will be operational no earlier than spring 2018. This new facility will be required to undergo a study phase (likely starting in 2018 and possibly running for a few years) to determine whether it passes the target species. However, the FERC identified timeframe for conducting relicensing studies is 2016 to 2017. The required fishway studies fall outside of this identified timeframe and any fishway study results and possible resulting fishway modifications would not be incorporated into the draft license application. Therefore, any monitoring and effectiveness testing of the upstream and downstream fishways for Atlantic salmon, alewives, blueback herring, and American shad will have to be incorporated

into the license articles of the new license. This issue was also identified by Maine Department of Marine Resources (letter to FERC, January 8, 2016) which we support.

Similarly, re-locating upstream and downstream passage of American eels will need to be studied after construction of the new fishway. The current interim upstream eelway appears to pass significant numbers of juvenile eels which will need to continue. However, the proposed new fishway and possible operational changes could alter flow patterns at the project and will require reassessment and citing for a new permanent upstream eelway.

The current downstream passage for eels consists of a nighttime opening of a deep gate located centrally between the two powerhouses (passing 425 cfs) and additional shut downs of Units 7 and 8 for a six-week period between September 15 and November 15. In the past these results appeared positive but with new construction and possible operational changes, downstream eel passage will need to be reevaluated to achieve acceptable passage and survival rates.

There are many components to achieving successful upstream and downstream passage for the full suite of diadromous species. Central to achieving passage is conducting post construction monitoring and evaluation and if necessary fixing the fishways to achieve the desired results. This process will need to be clearly identified in the articles of the new license, be coordinated amongst all parties, and comprehensive regarding studies in order for overall passage to be successful.

COMMENTS ON THE PRE-APPLICATION DOCUMENT

The Service appreciates the Licensees' effort to prepare the PAD, which provides existing and relevant information intended to enable participants in the relicensing proceeding to identify issues and related information needs and to develop study requests. We provide the following specific comments to raise awareness of particular issues, and to facilitate future collaborative discussions with the FERC and the Licensee in the development of studies and of the license application.

Section 5.3.5.2 and 5.7.2. These sections provide summary information regarding the ESA listing process for the American eel. The last paragraph describes the petition to list the American eel. On October 8, 2015 the Service published a not warranted finding on the petition to list (FR 80, No 195, 2015/10/08, pp 60834-60838). As a result the American eel is currently provided no protection under the ESA.

Section 5.7.4. This section provides information regarding the ESA listing of the northern long-eared bat. On January 14, 2016, the Service published a 4(d) rule. For additional information go to FR 81, No 9, 2016/1/14, p 1900, or visit the website at: *http://www.fws.gov/midwest/nleb/* (accessed January 19, 2016).

COMMENTS ON SCOPING DOCUMENT 1 (SD1)

The Service provides the following comments on the scope of the FERC's proposed environmental analysis, and the resource issues to be addressed in the Environmental Assessment (EA) pursuant to National Environmental Policy Act, as amended (42 U.S.C. § 4321 *et seq.).*

COMPREHENSIVE PLANS

In 2005 the Service and the NOAA published the Final Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon. The citation is:

National Marine Fisheries Service and U.S Fish and Wildlife Service. 2005. Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (*Salmo salar*). National Marine Fisheries Service, Silver Spring, MD.

The Service will file this document with the FERC. In addition, the Service and NOAA expect to release an updated draft Atlantic Salmon Recovery Plan in 2016. This document will also be filed with the FERC.

MAILING LIST

Please replace the name of **Ron Joseph**, U.S. Fish and Wildlife Service, Maine Field Office, with **Field Supervisor**, U.S. Fish and Wildlife Service, Maine Field Office, 17 Godfrey Drive, Suite 2, Orono, Maine 04473.

STUDY REQUESTS

We have attached study requests (see attachment) as required by 18 CFR § 5.9(b) using the guidance that the FERC has provided for requesting studies during this phase of the relicensing process. The Licensee has also proposed studies that we support.

We request the opportunity to review and provide comments on all draft study plans. In addition, the Service will play an important role in working with the Licensee to develop the studies to assess fish passage needs.

Thank you for the opportunity to comment during the early planning stages of this Project. If you have any questions regarding this response, please contact Antonio Bentivoglio by email at *Antonio_Bentivoglio@fws.gov*, by telephone at 207/866-3344 extension 1151 or you may use the above address.

Sincerely,

Steve Shepard
Acting Field Supervisor

Attachment

cc: A. Tittler, DOI/SOL
K. Mendik, NPS
C. Stringer, BIA
R. Abele, EPA
B. Towler, RO/EN, Mike Bailey, NNFH
K. Howatt, MDEP
G. Wippelhauser and P. Christman, MDMR
S. Walker, MDIFW
R. Vanriper, MDIFW, Region E
Reading File

ES: ABentivoglio:16/01/19:207/866-3344

ATTACHMENT – U.S. FISH & WILDLIFE SERVICE STUDY REQUESTS

1. Shawmut Impoundment Tributary Stream Access

Study 1 – Shawmut Impoundment Tributary Stream Access

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The Project is run-of-river but headpond elevation changes can influences access to the three tributaries (Wesserunsett, Martin, and Carrabassett Streams) that empty into the project boundary. Wesserunsett Stream is 143mi^2 with approximately 5300 modeled salmon habitat units (HUs), Martin Stream is 85mi^2 with approximately 1900 modeled salmon HUs, and Carrabassett Stream is 53mi^2 with approximately 804 modeled salmon HUs. These streams currently support populations of brook trout and are large enough to support populations of salmon so access, at all times of the year and all flows (and headpond elevations) into these tributaries is important.

The goal of this study is to show that access into these important fisheries tributaries is not impeded during any time of the year or any headpond level.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.

U.S. Fish & Wildlife Service Shawmut Project relicensing goals 1 and 3 and objectives 1, 2, 3, and 4.

Criterion (3) – If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Not applicable.

Criterion (4) – Describe existing information concerning the subject of the study proposal and the need for additional information.

The PAD provides no information regarding access to these streams throughout the year. According to Maine Department of Marine Resources there is no information on accessibility at different headpond levels into these three streams (P. Christman 1/19/2016).

Criterion (5) – 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.

Project related flow and headpond level fluctuations have a direct affect on fish accessibility into these three streams. The study will provide information on the variability of headpond levels and observations of important fisheries resource streams and inlet accessibility during the full range of headpond fluctuation. These data will inform conclusions regarding impacts to fish (e.g., movement, stranding, spawning and

tributary access) within the project and whether modifications to the inlet stream or project operations are needed.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

Methods to conduct steam accessibility studies are well established as are analysis of headpond elevations at different flows. In the initial stage of this study the Service suggests compiling long-term headpond elevations and corresponding elevations and the inlet to the three streams. The field work will then require site visits to determine if there are passage impediments at the inlet for the range of headpond elevations at each site.

Criterion (7) – 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.

This work will require compiling flow data (Shawmut Project discharge data and headpond variability) and a single field season to conduct elevation readings at each stream inlet.

Brookfield

Brookfield Renewable Energy Group
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston ME 04240

Tel 207.755.5600
Fax 207.755.5655
www.brookfieldrenewable.com

January 19, 2016
VIA E-FILING

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

Shawmut Hydroelectric Project (FERC No. 2322)
Comments on Scoping Document I

Dear Secretary Bose:

Brookfield White Pine Hydro LLC (White Pine) is the Licensee for the Shawmut Hydroelectric Project (FERC No. 2322). The current license for the Shawmut Hydroelectric Project (Project) expires on January 31, 2021, and White Pine filed a Pre-Application Document (PAD) and Notice of Intent (NOI) for the Project with the Commission on September 21, 2015. The Commission issued Scoping Document 1 (SD 1) on November 20, 2015 and held scoping meetings and a site visit on December 16, 2015. White Pine submits the following specific comments on SD 1.

1. **Process** - White Pine currently has an application before the Commission to amend the existing Shawmut license to allow for installation of upstream fish passage facilities. As noted in Section 6.2.3.2 of the PAD, White Pine is engaged in several ongoing studies associated with diadromous fish passage on the Kennebec River, including the Shawmut Project.[1] These efforts were initiated prior to the relicensing efforts and are being undertaken separate from the relicensing process in order to maintain the current schedule for the provision of site specific upstream fish passage measures at the project. While the status of the diadromous fish passage efforts will ultimately be discussed in the final license application for the project, White Pine believes that keeping the relicensing process of Shawmut separate, to the extent practicable, from the ongoing amendment process for fish passage is key to the expedient resolution of both processes; combining the separate processes could delay implementation of the fish passage measures. A similar separation was successfully maintained for the West Buxton Project (FERC No. 2531).

2. **Environmental Assessment** - White Pine supports the Commission's proposal to prepare an Environmental Assessment (EA) for the relicensing; an EA is consistent with the Commission's regulations at 18 CFR 380.5 and 380.6. For the relicensing, the Shawmut Project is a run-of-river facility that is proposing no significant changes to either facilities

[1] These studies are being conducted under the auspices of the Kennebec Hydro Developers Group agreement, the Interim Species Protection Plan and July 19, 2013 Biological Opinion for the Project, and the current license and pending license amendment regarding fish passage at the Project.

or operations.[2] As such we do not believe that this proposed action (relicensing of the continued operation of the Project) would represent "a major Federal action significantly affecting the quality of the human environment." Further, as noted in the scoping meeting, the Commission may consider cumulative effects in either an EA or an Environmental Impact Statement.

3. **Baseline** - White Pine notes that FERC's established policy for preparing analyses under the National Environmental Policy Act (NEPA) is that the existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including potential cumulative effects. As noted in *Preparing Environmental Documents: Guidelines for Applicants, Contractors, and Staff,* "The no-action alternative is the baseline from which to compare the proposed action and all action alternatives that are assessed in the environmental document. Under the no-action alternative, for relicenses, the project would continue to operate under the terms and conditions of the current license. . . . Thus the no-action alternative would include the existing facilities and current project operation".

4. **Consideration of Alternatives** - During the scoping meeting several participants called for an assessment of dam removal as part of the relicensing. White Pine believes that consideration of a dam removal alternative is unwarranted, particularly because (1) no agency management plans identify removal of the Shawmut Project as necessary to meeting fish restoration or other environmental protection goals on the Kennebec River; (2) the Shawmut Project is located between several other upstream and downstream FERC-licensed hydropower projects and dams, none of which have been or are being considered for removal, (3) the Licensee is already preparing to implement volitional upstream fish passage facilities at the site, which, in accordance with the ISPP, will include studies to evaluate the effectiveness of the new measures; and (4) White Pine is not proposing removal as an alternative for either relicensing or fish passage.

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

Sincerely,

Frank H. Dunlap
Licensing Specialist

cc: Distribution List
K. Maloney, White Pine Hydro

[2] White Pine Hydro assumes that the Commission will prepare a separate NEPA assessment for the license amendment application that will examine the proposed fish passage installation and its environmental effects.

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Brookfield White Pine Hydro LLC Project No. 2322-060

NOTICE OF INTENT TO FILE LICENSE APPLICATION, FILING OF PRE-APPLICATION DOCUMENT (PAD), COMMENCEMENT OF PRE-FILING PROCESS, AND SCOPING; REQUEST FOR COMMENTS ON THE PAD AND SCOPING DOCUMENT, AND IDENTIFICATION OF ISSUES AND ASSOCIATED STUDY REQUESTS; AND SCOPING MEETING

(January 21, 2016)

a. Type of Filing: Notice of Intent to File License Application for a New License and Pre-Application Document (PAD) (including a proposed process plan and schedule), pursuant to 18 CFR 5.6 of the Commission's regulations.

b. Project No.: 2322-060

c. Dated Filed: September 21, 2015

d. Submitted By: Brookfield White Pine Hydro LLC (White Pine Hydro)

e. Name of Project: Shawmut Hydroelectric Project

f. Location: On the Kennebec River in the towns of Skowhegan, Fairfield, Clinton, and Benton, within Kennebec and Somerset Counties, Maine. The project does not occupy United States lands.

g. Filed Pursuant to: 18 CFR Part 5 of the Commission's Regulations

h. Potential Applicant Contact: Frank Dunlap, Licensing Specialist, Brookfield White Pine Hydro LLC, 150 Main St. Lewiston, ME 04240; (207) 755-5603; Frank.Dunlap@brookfieldrenewable.com.

i. FERC Contact: Dustin Wilson at (202) 502-6528, or email at dustin.wilson@ferc.gov.

j. Cooperating agencies: Federal, state, local, and tribal agencies with jurisdiction and/or special expertise with respect to environmental issues that wish to cooperate in the preparation of the environmental document should follow the instructions for filing such requests described in paragraph o. below. Cooperating agencies should note the Commission's policy that agencies that cooperate in the

preparation of the environmental document cannot also intervene. *See* 94 FERC ¶ 61,076 (2001).

k. With this notice, we are initiating informal consultation with: (1) the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service under section 7 of the Endangered Species Act and the joint agency regulations thereunder at 50 CFR, Part 402; and (2) the State Historic Preservation Officer, as required by section 106, National Historical Preservation Act, and the implementing regulations of the Advisory Council on Historic Preservation at 36 CFR 800.2.

l. With this notice, we are designating White Pine Hydro as the Commission's non-federal representative for carrying out informal consultation, pursuant to section 7 of the Endangered Species Act and section 106 of the National Historic Preservation Act.

m. Commission staff issued a Scoping Document 1 (SD1) on November 20, 2015, which also asked for study requests.

n. A copy of the PAD and SD1 are available for review at the Commission in the Public Reference Room, or may be viewed on the Commission's website (http://www.ferc.gov) using the "eLibrary" link. Enter P-2322 in the docket number field to access the document. For assistance, contact FERC Online Support at FERCONlineSupport@ferc.gov, or toll free at 1-866-208-3676, or for TTY, (202) 502-8659. A copy is also available for inspection and reproduction at the address in paragraph h.

Register online at http://www.ferc.gov/docs-filing/esubscription.asp to be notified via e-mail of new filings and issuances related to this or other pending projects. For assistance, contact FERC Online Support.

o. With this notice, we are soliciting public comments on the PAD and the SD1, as well as on issues and associated study requests. All comments and study requests should be sent to the address above in paragraph h. In addition, all comments on the PAD and SD1, study requests, requests for cooperating agency status, and all communications to and from Commission staff related to the merits of the potential application must be filed with the Commission. Documents may be filed electronically via the Internet. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's website http://www.ferc.gov/docs-filing/efiling.asp. Commenters can submit brief comments up to 6,000 characters, without prior registration, using the eComment system at http://www.ferc.gov/docs-filing/ecomment.asp. You must include your name and contact information at the end of your comments. For assistance, please contact FERC Online Support. Although the Commission strongly encourages electronic filing, documents may also be paper-filed. To paper-file, mail an original and five copies to: Kimberly

D. Bose, Secretary, Federal Energy Regulatory Commission, 888 First Street, NE, Washington, DC 20426.

All filings with the Commission must include on the first page, the project name (Shawmut Hydroelectric Project) and number (P-2322-060), and bear the appropriate heading: "Comments on Pre-Application Document," "Study Requests," "Comments on Scoping Document 1," "Request for Cooperating Agency Status," or "Communications to and from Commission Staff." Any individual or entity interested in submitting study requests, commenting on the PAD or SD1, and any agency requesting cooperating status must do so by March 21, 2016.

Study requests and comments on the PAD or SD1 that have been filed previously are part of the relicensing record and do not need to be refiled.

p. Although our current intent is to prepare an environmental assessment (EA), there is the possibility that an Environmental Impact Statement (EIS) will be required. Nevertheless, the scoping meetings held December 16, 2015, and the scoping meeting to be held February 9, 2016, will satisfy the NEPA scoping requirements, irrespective of whether an EA or EIS is issued by the Commission.

Scoping Meeting

Commission staff held scoping meetings December 16, 2015. The transcripts for the meetings are in the public record for this project, and are available for review through the Commission's website, using the "eLibrary" link.

Commission staff will hold a third scoping meeting in the vicinity of the project at the time and place noted below. All interested individuals and entities, particularly those who were unable to attend the December 16 scoping meetings, are invited to attend the meeting, and to assist staff in identifying particular study needs, as well as the scope of environmental issues to be addressed in the environmental document. The time and location of the meeting is as follows:

Evening Scoping Meeting

Date:	Tuesday, February 9, 2016
Time:	6:00 p.m.
Location:	Skowhegan Community Center 39 Poulin Dr. Skowhegan, Maine 04976
Phone:	(207) 474-6901

As noted in item M of this notice, SD1 was mailed to the individuals and entities on the Commission's mailing list. Copies of SD1 will be available at the scoping

meeting, or may be viewed on the web at http://www.ferc.gov, using the "eLibrary" link. Follow the directions for accessing information in paragraph n. Based on all oral and written comments, a Scoping Document 2 (SD2) may be issued. SD2 may include a revised process plan and schedule, as well as a list of issues.

Meeting Objectives

At the scoping meeting, Commission staff will: (1) initiate scoping of the issues; (2) review and discuss existing conditions and resource management objectives; (3) review and discuss existing information and identify preliminary information and study needs; and (4) review and discuss the process plan and schedule for pre-filing activities.

Meeting participants should come prepared to discuss their issues and/or concerns. Please review the PAD in preparation for the scoping meeting. Directions on how to obtain a copy of the PAD and SD1 are included in item n. of this notice.

Meeting Procedures

The meeting will be recorded by a stenographer. The transcript will be placed in the public record for the project.

Nathaniel J. Davis, Sr.,
Deputy Secretary.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

JAN 25 2016

RE: Shawmut Project (P-2322) Comments on Scoping Document 1

On November 20, 2015, you issued the Scoping Document 1 for the Pre-Application Document filed on September 21, 2015, by Brookfield White Pine Hydro LLC (White Pine Hydro) for relicensing the Shawmut Dam Hydroelectric Project (Shawmut Project) (FERC No. 2322). The Pre-Application Document contains information about the Shawmut Project and the environmental resources that are affected by the Project. Attached for filing, please find our comments. If you have any questions or need additional information, please contact Sean McDermott via email (sean.mcdermott@noaa.gov) or 978-281-9113.

Sincerely,

Louis A. Chiarella

Louis A. Chiarella
Assistant Regional Administrator
for Habitat Conservation

cc: Service List
Steven Shepard, Antonio Bentivoglio, Bryan Sojkowski, USFWS
Gail Wippelhauser, Oliver Cox, Paul Christman, MEDMR
John Perry, Jason Seiders, John Maclaine, MEDIFW
Kathy Howatt, MEDEP

National Marine Fisheries Service's Comments and Study Requests on Brookfield White Pine Hydro LLC Pre-Application Document for the Shawmut Hydroelectric Project (FERC No. 2322)

January 25, 2016

The Pre-Application Document (PAD) contains information about the Project's structure and operations and affected environmental resources. We offer the following comments based on our review of the PAD.

Section 4.0. Project Location, Facilities and Operation (Page 4-1)

This section of the PAD should include a discussion of project operations as they relate to upstream manipulation of river flow. The Shawmut Project is operated as run of river, where outflow equals inflow. Run of river operations help maintain more natural conditions, so that flows and the species dependent on flows are not impacted by artificial fluctuation. Many dams on the mainstem Kennebec are operated as run of river. Upstream of the Shawmut Project, however, is the Williams Project which is run as a re-regulation project with the goal of maintaining a constant river flow below the Project. The Williams project works in a manner to lower the impoundment during non-peak hours. The impoundment water surface elevation then increases during peak times due to increased flows from the upstream peaking stations. The result is re-regulation of instream flows. It is our understanding based on in-stream gage data that this relationship does not consistently work and flows are frequently increased and decreased downstream. Re-regulation at the Williams Project affects flows at the Shawmut Project and, therefore, upstream migrating fish and spawners within the Shawmut Project area.

The National Environmental Policy Act review completed by the Federal Energy Regulatory Commission (FERC) should include an analysis to determine if the management of the re-regulation of river flows has historically been affecting river flows in an adverse manner at the Shawmut Project in regards to fish migration and spawning.

Section 4.5.1. Current License Requirements (Page 4-5)

On February 21, 2013 the Licensee filed to amend the Shawmut license to incorporate the provisions of an Interim Species Protection Plan (ISPP) for Atlantic salmon. FERC requested consultation pursuant to section 7 of the Endangered Species Act on March 14, 2013. We issued

a Biological Opinion, considering effects of the operation of Shawmut pursuant to the ISPP on July 19, 2013. To date, the FERC has not adopted the proposed license amendment that would incorporate the ISPP for this facility. However, the licensee has conducted all of the downstream passage smolt studies and is committed to completion of all upstream Atlantic salmon studies. The ISPP expires in 2019. As noted in their January 19, 2016 letter, FERC requires the licensee file a draft of the final SPP (which we anticipate would cover the duration of any new license issued by FERC) with the PLP proposal to be filed in September 2018. Endangered Species Act section 7 consultation will be necessary to consider effects of the operation of Shawmut pursuant to a final SPP and any new license issued by FERC.

Section 5.3. Fish and Aquatic Resource Issues (Page 5-18)

We concur with the identification of Atlantic salmon, American shad, alewife, blueback herring, and American eel as resources that could be cumulatively impacted by the continued operation and maintenance of the Shawmut Project. The licensee has proposed to construct a new upstream fishway at Shawmut pursuant to Kennebec Hydropower Developer Group [1] and their ISPP. The ISPP includes studies to optimize the design of the facility and provided a schedule for construction of a new upstream fishway at Shawmut (see pages 4-5 and 5-40 of the PAD). The studies will be completed in parallel and independent of the relicensing action. We support the completion of those studies.

5.3.3.3. Diadromous Species Status (Page 5-38)

This section of the PAD states:

> *"A new timeline for upstream fish passage of anadromous fish species at Shawmut was specified as part of the 2013 Biological Opinion (BO) and Interim Species Protection Plan (ISPP) issued by NMFS subsequent to the federal listing of Atlantic salmon as an endangered species."*

We want to clarify that the ISPP was developed and provided to us by the Licensee. We issued the Biological Opinion only.

---

[1] In the Kennebec Hydropower Developer Group settlement agreement of 1998 (Agreement Between Members of the Kennebec Hydro Developers Group, the Kennebec Coalition, the National Marine Fisheries Service, the State of Maine, and the US Fish and Wildlife Service. May 1998.), the licensee agreed to build a fishway or fishways at Shawmut for alewife, blueback herring, American shad and Atlantic salmon.

Section 5.3.5.1 Fishery Management Plans, Atlantic Salmon Management Plans (Page 5-49)

This section of the PAD states:

> *"However, the section of the Kennebec River that encompasses the Shawmut Project is not included in the draft* [Atlantic Salmon Recovery Framework Implementation] *plan as one of seven listed areas that provide the best opportunities for achieving the strategy's objectives (ASRP 2015)."*

This statement is incorrect. Atlantic salmon cannot access some of the most valuable habitat in the Kennebec River (Sandy River) unless they have safe, timely, and effective passage at the Shawmut Project. Therefore, the project area is extremely important to the recovery of the species as it is an essential migratory habitat.

Section 6.2.3.2. Aquatic Resources, Proposed Studies (Page 6-4)

A new upstream passage facility at the Shawmut Project proposed within the ISPP will be operational in 2018. Effectiveness testing of upstream and downstream passage facilities for Atlantic salmon, alewives, blueback herring, American shad is necessary to ensure the facilities function as intended. Effectiveness monitoring should be incorporated into the new license for the Shawmut Project. Construction of new fishways has the potential to impact the current interim upstream eel passage facility and the effectiveness of the existing interim downstream passage facility for both anadromous and catadromous species. Monitoring of route selection, passage efficiency and survival should be incorporated into the new license as well. Licensee, therefore, will need to include and detail how it intends to monitor and study effectiveness in its future licensing documents.

Scoping Document 1, Request for Information and Studies

The abundance and distribution of diadromous fisheries resources in the Kennebec River has changed dramatically since a restoration program was initiated in 1986, most notably following the removal of Edwards Dam in 1999. In their filing dated January 8, 2016, the Maine Department of Marine Resources provided summary information pertaining to restoration activities in the Kennebec River watershed since 1986. That information summarized a significant investment in public trust resources with cultural, recreational and commercial value. That investment and the associated restoration goals should be fully considered by FERC and the Licensee throughout this licensing process.

Brookfield

Brookfield Renewable Energy Group
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston ME 04240

Tel 207.755.5600
Fax 207.755.5655
www.brookfieldrenewable.com

March 4, 2016

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

Shawmut Hydroelectric Project (FERC No. 2322) - Proposed Study Plan

Dear Secretary Bose:

Pursuant to the Commission's regulations at 18 C.F.R. Section 5.11, Brookfield White Pine Hydro LLC (White Pine Hydro) herewith files with the Commission the Proposed Study Plan (PSP) for the relicensing of the Shawmut Hydroelectric Project (FERC No. 2322). White Pine Hydro is providing a copy of the PSP to appropriate federal and state agencies, Indian tribes, local governments, and members of the public likely to be interested in the proceeding, as set forth on the attached distribution list.

White Pine Hydro will hold the Proposed Study Plan meeting required by the ILP on March 31, 2016 at 9:00 a.m. at the Skowhegan Community Center, 39 Poulin Drive, Skowhegan, Maine. Per the Commission's regulations at 18 CFR § 5.12, comments on the PSP are due 90 days from this date, or June 2, 2016.

The Commission, in the Schedule B of its January 19, 2016 letter commenting on the Pre-Application Document, made several requests for additional information to be included in the PSP. Where possible, White Pine Hydro has complied. However, several items require further research and will be included in a supplemental filing to be made on or before March 17, 2016. These Schedule B items include the following:

- Additional details on the minimum and maximum hydraulic capacity of the units;
- Historic data on reservoir levels and flows;
- Copies of prior fisheries study reports;
- Copies of agency fisheries management plans; and
- Copies of cultural resource study reports from other proposed activities in the area.

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

Sincerely,

Frank H. Dunlap
Licensing Specialist

Shawmut Project, FERC No. 2322
Proposed Study Plan

Attachment: Shawmut Proposed Study Plan

cc: Distribution List
R. Dorman, Kleinschmidt
W. Bley, TRC
D. Trested, Normandeau
P. O'Bannon, Gray and Pape

Brookfield

Brookfield Renewable Energy Group
Brookfield White Pine Hydro LLC
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March 22, 2016

VIA E-FILING

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

Shawmut Hydroelectric Project (FERC No. 2322-060)
Additional Information Filing

Dear Secretary Bose:

Brookfield White Pine Hydro LLC (White Pine Hydro or Licensee) herewith electronically files with the Commission additional information for the relicensing of the Shawmut Hydroelectric Project (FERC No. 2322).

The Commission, in Schedule B of its January 19, 2016 letter commenting on the Pre-Application Document, made several Additional Information Requests (AIR) with the responses to be included in the Proposed Study Plan (PSP). The PSP was filed on March 4, 2016. However, as noted in the PSP, several items were still in preparation when the PSP was filed. This supplemental filing provides the following additional Schedule B items:

Attachment A – Turbine Hydraulic Capacity

Item 6 of the January 19, 2016 letter requested that Licensee "*provide the minimum and maximum hydraulic capacity for each turbine*".

The maximum rated turbine capacity for the units was provided in the PAD. Licensee has reviewed the Project files to further define unit capacities. Index tests were conducted on the various units in 1982, 1984 and 1988; the results of the index tests as relates to the approximate minimum and maximum unit flows as tested are reported in Attachment A (based on lack of available data, no minimum unit flow capacities were estimated for units 7 and 8).

Attachment B – Historic Flow and Reservoir Level Data

Item 8 of the January 19, 2016 letter requested that Licensee provide "... *historic data on reservoir levels to describe the daily, monthly, and annual elevations and fluctuations while operating under "run-of-river" operation ...*".

Licensee has retrieved available operating records as applicable to this request and attaches them hereto. The attached Microsoft Excel® file includes hourly pond level and total outflow records for the Shawmut Project for the period 2001 through 2015. [1]

Also included in the Excel file are data obtained from the USGS website showing daily average flows from the Madison, Maine USGS gage for the period 2009 through 2015; these gage data have been prorated by drainage area to illustrate inflow to the Shawmut Project.[2] The above data have been plotted by quarter year intervals and are attached in PDF format.

Review of the plots illustrates that the long term operation of the Project is consistent with expectations for run-of-river operations where the pond level management targets the normal full pond elevation of 112'. Pond level variations during normal daily operations are generally within a foot of full pond which allows a margin for wave action, variable inflows and time to adjust project unit, gate and spillway settings.

The pond level is generally maintained by managing project outflow through use of the turbine-generator units, the limited gate capacity of the Project (forebay gates and former log sluice gate), the permanent hinged flashboard sections, and/or the spillway section.

The prior pin-supported flashboard system, which was in place until 2008, was designed to "fail" or release the flashboards when the headpond rose to approximately el. 113.5'. The release of the flashboards would allow higher flows to pass while helping to maintain pond levels below el. 113.5'. However, the flashboards could not be replaced and the normal full pond restored to el. 112' until the total river flow had subsided sufficiently to access the dam crest. This required a drop in headpond elevation to about a foot below the crest elevation of the dam at el. 108.0'. As such, it frequently required a substantial period of time to restore the headpond to the normal full pond elevation of 112' following flashboard failure.

The project spillway section was modified in 2008-2009 to remove the pin-supported flashboards and replace them with three inflatable rubber bladder sections. The bladder sections can only be operated in a fully inflated position or a fully deflated position; each section is capable of passing up to approximately 7,000 cfs when deflated while maintaining a pond level of approximately el. 112'. While the top elevation of the rubber bladders is 112.5' to allow a six inch freeboard above normal full pond, FERC has stated that the rubber dams "must operate in the same manner as

[1] These operation and inflow records are intended to assist FERC and stakeholders to understand the historic operating patterns of the Project. All data are Provisional and are not a final or formal report. Data are to be used for the intended purpose only; stakeholders' use of the data for purposes other than in connection with this specific AIR, or stakeholders' revision, modification or alteration in any manner shall be at each stakeholders sole risk.
[2] Gage number 01047150 was installed in 2009 and is located 26 miles upstream from the Shawmut dam. The intervening drainage between the location of the Madison gage and the Shawmut dam includes the Sandy River, Wesserunsett Stream and local drainages including Martin and Carrabassett Streams.

the wooden flashboard system authorized under the license" (i.e. maintain the same authorized normal full impoundment elevation of 112') to remain compliant with the existing project license.

The attached plots illustrate that the total project outflow varies somewhat on a short term basis as various units, gates, and spillway mechanisms are opened or closed to manage pond levels within a run-of-river mode (i.e. limit pond level variations during normal operations to within a reasonable degree). For example, three typical operational changes are observable on the plots:

- Units are turned on or off to accommodate changes in inflow and/or pond level. Units 1-6 typically operate in the approximate range of 650 cfs each, units 7-8 typically operate in the approximate range of 1,300 cfs each.

- Night time shutdown for eel passage. Since the fall of 2009, Units 7 and 8 have been shut down for 8 hours each night for a six week period between September 15 and November 15 to provide for the safe passage of downstream migrating eels. Depending on available inflow and pond level (spillage or not), these shutdowns and morning startups can change outflows by up to 2,600 cfs.

- The rubber bladder sections are deflated to accommodate changes in inflow and/or pond level. Since completion of the rubber bladder sections in the fall of 2009, and depending on the current inflow compared to the total station hydraulic capacity, management of the pond level by short term operation of the bladder sections can change short term outflow by up to 7,000 cfs per bladder.

Overall, the total project outflow closely tracks the total project inflow, as illustrated by the Madison gage data, while managing the pond level to reduce daily pond level variations to the extent reasonable. Note that the gage data is prorated by drainage area to the Project site; while the resulting data is representative over the long term it may or may not precisely calculate actual daily inflow during certain periods, particularly during natural low flow periods when the unregulated tributaries are not contributing significantly to the overall river flow.

Attachment C – Fisheries Studies;

Item 12 of the January 19, 2016 letter requested that Licensee provide copies of several fisheries studies that were referenced in the PAD; these studies are attached.

Attachment D – Fisheries Management Plans

Item 13 of the January 19, 2016 letter requested that Licensee provide copies of several fisheries management plans that were referenced in the PAD; these plans are attached.

Attachment E – Cultural Resources Documents (Privileged)

Item 19 of the January 19, 2016 letter requested that Licensee provide copies of several archaeological surveys and reports; these are attached. Note that although the Commission cited a document as "TRC 2010," the PAD does not explicitly cite the relevant report as a TRC document. The 2010 historic architectural survey conducted by TRC is cited as ("Henry 2010)" and we have attached the Henry 2010 architectural report. In accordance with Commission practice, the cultural resource documents are being provided as a separate Privileged filing to the Commission only.

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

Sincerely,

Frank H. Dunlap
Licensing Specialist

Attachment: Attachment A – Hydraulic Capacity Data
Attachment B – Historic Flow and Reservoir Level Data
Attachment C – Fisheries Studies
Attachment D – Fisheries Management Plans
Attachment E – Cultural Resources Documents (Privileged)

cc: Distribution List
K. Maloney, White Pine Hydro
R. Dorman, Kleinschmidt
W. Bley, TRC
D. Trested, NAI

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

April 6, 2016

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

RE: FERC 2322, Shawmut Project Proposed Study Plan Comments

Dear Secretary Bose:

The Maine Department of Environmental Protection (DEP or Department) received and reviewed the Proposed Study Plan (PSP) for the Shawmut Project, dated March 4, 2016, and attended the PSP meeting on March 31, 2016 and submits the following comments and recommendations on the PSP.

The Department notes that Brookfield White Pine Hydro (BWPH or licensee) is proposing to start water quality (WQ) and benthic macroinvertebrate (BMI) sampling prior to issuing the Revised Study Plan; therefore, the Department is working directly with BWPH and its consultants to update the study plans to meet Department protocols and standards before the study season begins. Copies of these comments are being sent directly to BWPH and its consultants and a meeting is scheduled for April 20, 2016 to go over the updates requested in this letter. The Department will submit a follow-up letter to FERC to verify when the updated WQ and BMI sampling plans have been finalized.

Comments on the Proposed Study Plan

1. **General Spelling Errors**:

   The words "tropic" and "sond" are used multiple times in the PSP. These words should be corrected to "trop**h**ic" and "sond**e**".

7.1 Water Quality Sampling

1. **Section 7.1.3 Background and Existing Information and Section 7.1.4 Project Nexus**:

   The PSP cites historic WQ conditions, which BWPH included in its Pre-Application Document (PAD), and states that "historical water quality data upstream, within, and downstream of the Project indicates State standards are being met" in Section 7.1.4 Project Nexus. The PAD only documents two sampling events, one upstream BMI

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website: www.maine.gov/dep

sample in 2004 and one downstream BMI and WQ sampling event in 2014. This WQ data was included on p. 5-14 of the PAD.

If additional WQ data exists near the Project, BWPH should try to locate and submit it to the Department. The Department will also look in its files to see if any additional WQ data has been collected in the Project area. Nonetheless, the WQ and BMI studies in the PSP will confirm if State water quality standards are currently being met.

2. **Section 7.1.5.1 Lake Trophic State Sampling:**

The licensee proposes to conduct lake trophic state sampling two times per month for five months from June through October 2016, which is in line with the DEP Sampling Protocol for Hydropower Studies; however, BWPH does not include total phosphorus as one of the parameters to be sampled. Total phosphorus needs to be added to the list of parameters for the lake trophic state sampling plan.

Furthermore, BWPH does not include all the parameters that need to be sampled from mid-depth of the water column in the deepest section of the Shawmut impoundment during the late summer (mid to late August depending on latitude and weather conditions). Parameters missing that will need to be sampled include nitrate, dissolved organic carbon, total dissolved aluminum, total sodium, total potassium, specific conductance, and chloride.

In addition to the missing parameters in the PSP, detection limits for the trophic state sampling parameters in Table 7.1 on p. 7-4 of the PSP do not match the DEP Sampling Protocol for Hydropower Studies and need to be updated.

A copy of the DEP Sampling Protocol for Hydropower Studies (November 2014) was included as an attachment to the Department's PAD comments submitted to FERC on January 19, 2016. The Department provided a copy of the DEP Sampling Protocol for Hydropower Studies to the licensee's consultant at the PSP meeting on March 31, 2016 and a digital copy is attached to this comment letter.

3. **Section 7.1.5.2 Water Quality Sampling:**

The licensee proposes to collect baseline WQ data between June and September 2016 at multiple locations using sondes and in-stream monitors. Information on the brand of sondes and in-stream monitors being used, sampling intervals, calibration procedures, and QA/QC measures should be included. The DEP Sampling Protocol for Hydropower Studies provides two options for monitoring temperature and dissolved oxygen. Based on the information provided in Table 7-2, it appears BWPH is proposing to measure temperature and dissolved oxygen continuously at one-hour intervals; however, this is not explicitly stated in the PSP and should be clarified.

Additionally, although a sonde can be used to measure temperature and dissolved oxygen in the tailwater below the dam, BWPH must follow the DEP Sampling Protocol for Hydropower Studies, which requires discrete measurements at three locations in a transect across the river initially to determine if one location for the sonde is sufficient.

4. **Section 7.1.5.3 Impoundment and Outlet Stream Aquatic Habitat:**

The licensee proposes to provide three years of impoundment elevation and inflow/outflow data in lieu of conducting the Habitat and Aquatic Life Studies. This data was included in the Additional Information Response (AIR) document submitted to FERC on March 22, 2016. The secondary y-scale axis for headpond/tailwater elevation (feet) in the AIR Attachment B graphs should be reformatted to provide better visualization of headpond and tailwater elevation changes. Currently, the secondary y-axis spans from 70 feet to 170 feet but the scale could easily be adjusted to 80 feet and 120 feet. Minor tick marks on the graphs would also provide clarity on elevation changes over the data record.

Additionally, the AIR notes that BWPH is using the USGS Gage at Madison to prorate inflow to the Project from 2009 through 2015. Footnote 2 lists the tributaries flowing into the Kennebec River between the USGS Gage at Madison and the Project. There is a USGS Gage on the Sandy River (01048000) that could be utilized to better characterize inflow to the project. The licensee should look into using this stream gage in addition to the USGS Gage at Madison to estimate inflow.

5. **Section 7.1.7 Deliverables and Schedule:**

The licensee proposes that the trophic state sampling will be conducted from June through October 2016. In Table 4-1 on p. 4-1 of the PSP, BWPH lists the estimated start date for the WQ and impoundment trophic state studies as June 16, 2016. Given the early spring and warm-up, the study should begin by June 1, 2016 to ensure any potential adverse WQ conditions are captured.

6. **Sampling Map**

A WQ sampling map showing the monitoring station locations for the lake trophic state sampling and baseline WQ sampling will need to be submitted to the Department to verify sampling locations.

7.2 Benthic Macroinvertebrate Survey

1. **Section 7.2.4 Methodology**

The licensee mentions that the benthic macroinvertebrate (BMI) community will be surveyed within the Project impoundment and the downstream Project area but does not

provide any information on the impoundment sampling. At the PSP meeting, the consultant noted that impoundment sampling would not be occurring. Impoundment sampling is not required at the Shawmut Project but the PSP should be updated for clarification.

2. **Sampling Map**

A BMI sampling map will need to be submitted to the Department to verify sampling locations are properly sited.

As noted above, BWPH is proposing to start the WQ and BMI sampling prior to issuing the Revised Study Plan; therefore, the Department is working directly with BWPH and its consultants to address the issues in the PSP outlined above. The Department will submit a follow-up letter to FERC to verify when the updated WQ and BMI sampling plans have been finalized.

Thank you for the opportunity to comment on the Proposed Study Plan for the Shawmut Project. Please direct any questions regarding these comments to Michael.OConnor@maine.gov or 207-441-1732.

Sincerely,

Michael O'Connor
Project Manager
Maine Department of Environmental Protection

Encl: DEP Sampling Protocol for Hydropower Studies – November 2014

CC: Frank Dunlap (BWPH) by email and surface mail
Kelly Maloney (BWPH) by email
Randy Dorman (Kleinschmidt) by email
John Perry (MDIFW) by email
Jason Seiders (MDIFW) by email
Oliver Cox (MDMR) by email
Gail Wippelhauser (MDMR) by email
Sean McDermott (NOAA) by email
Steve Shepard (USFWS) by email
Antonio Bentivoglio (USFWS) by email

DEP SAMPLING PROTOCOL FOR HYDROPOWER STUDIES November 2014

LAKES, PONDS, AND IMPOUNDMENTS

Trophic State Study

Sampling personnel must be certified annually for this sampling protocol by DEP's Division of Environmental Assessment Lakes Section.

Each basin shall be sampled at the deepest location twice each month for at least five consecutive months during one open water season as follows.

Parameter	Sampling method	Detection limits
Secchi disk transparency	water scope	0.1 meter
Temperature	profile*	0.1 C
Dissolved oxygen	profile*	0.1 mg/l
Total phosphorus	epilimnetic core	0.001 (DEP method)
Chlorophyll a	epilimnetic core	0.001
Color	epilimnetic core	1.0 SPU
pH	epilimnetic core	0.1 SU
Total alkalinity	epilimnetic core	1.0 mg/l

*Profiles shall consist of temperature and dissolved oxygen measurements taken every meter up to 15 meters, every other meter to 25 meters, then every 5 meters thereafter.

In addition, during late summer (mid to late August depending on latitude and weather conditions), water samples shall be collected and analyzed from up to three depths in the water column for the parameters below except Chlorophyll *a*. If the waterbody is thermally stratified ($\Delta T \geq 1°C/m$ at any depth below the top 3 m depth), samples will be collected from an epilimnetic core, at the top of the hypolimnion, and at one meter above the sediment. If the waterbody is not thermally stratified, only one sample is needed, that being from an integrated core from the surface to two times the Secchi disk depth or within 1 m of the bottom whichever is less.

Parameter	Detection limit
Total phosphorus	0.001 mg/l
Nitrate	0.01 mg/l
Chlorophyll a (uncorrected)	0.002 mg/l (trichromatic determination)
Color	1.0 SPU
DOC	0.25 mg/l
pH	0.1 SU
Total alkalinity	1.0 mg/l
Total iron	0.005 mg/l
Total dissolved aluminum	0.010 mg/l
Total calcium	1.0 mg/l
Total magnesium	0.1 mg/l
Total sodium	0.05 mg/l
Total potassium	0.05 mg/l
Total silica	0.05 mg/l
Specific conductance	1 ms/cm
Chloride	1.0 mg/l
Sulfate	0.5 mg/l

Additional sampling may be required due to the hydraulic or physical characteristics of a given waterbody or to the presence of significant water quality problems.

Habitat Study

For lakes, ponds, and riverine impoundments, determination of attainment of the designated use 'habitat for fish and other aquatic life' will be determined as follows. Using a depth of twice the mean summer Secchi disk transparency, determined from the Trophic State Study or historic DEP data, as the bottom of the littoral zone, the volume and surface area dewatered by the drawdown will be calculated to determine if at least 75% of the littoral zone remains watered at all times. Alternatively, studies of fish and other aquatic life communities, including freshwater mussels, may be conducted to demonstrate that the project maintains 'structure and function of the resident biological community' despite a drawdown that results in less than 75% of the littoral zone remaining watered at all times.

Fishing (Mercury Contamination) Study

To ensure that the project does not contribute to the Statewide Fish Consumption Advisory due to mercury, projects with excessive drawdowns (generally >10 feet) may be required to analyze sport fish from the project waterbody and one or more reference waters for mercury. Contact DEP for specific requirements for each project.

RIVERS AND STREAMS

Temperature and Dissolved Oxygen Study

Applicability

This rivers and streams sampling protocol shall apply to tailwater areas that are not impoundments where existing data are insufficient to determine existing and future water quality.

Sampling Stations

Sampling shall occur in the tailwater downstream from the turbine/gate outlet or dam at a location representative of downstream flow as agreed by DEP on a case by case basis. Initially, measurements of temperature and dissolved oxygen should be made along a transect across the stream at the first, second and third quarter points across the width. If there is no violation of dissolved oxygen criteria and no significant (<0.4 mg/l) difference in concentrations among the quarter points, subsequent measurements may be made at the location shown to be representative of the main flow. Otherwise, measurements should be made at the location of the lowest concentration and the location of the main flow. Sampling should also occur in any bypassed segment of the river created by the project. Additional sampling stations may be required in the upstream or downstream areas where significant point or nonpoint sources exist or where slow moving or deep water occurs. The number and spacing of any additional stations will be determined by DEP on a case-by-case basis.

Parameters

Temperature and dissolved oxygen shall be sampled at mid-depth in rivers less than 2 m deep or in a profile of 1 meter increments of depth in rivers greater than 2 m deep. In rivers where it is already known that attainment of required statutory dissolved oxygen criteria is questionable, sampling for additional parameters (e.g. BOD, nitrogen, phosphorus) may be necessary.

Frequency and Timing

Sampling should be conducted during the summer low flow high temperature period, with the ideal conditions being the 7Q10 flow (the 7 day average low flow with a 10 year recurrence interval) combined with daily average water temperatures exceeding 24 ^{o}C. Measurements of temperature and dissolved oxygen shall be made every hour with a datasonde in remote unattended mode continuously during July and August, unless high flows well above seasonal median flows occur.

Alternatively, with concurrence by DEP, sampling could be undertaken one day per week for a minimum of ten weeks throughout the summer low flow, high temperature period. Each discrete grab sampling event for temperature and dissolved oxygen would consist of a minimum of two daily runs, the first of which should occur before 7 AM and the second of which should occur after 2 PM. Sampling results will not be considered complete unless a minimum of 5 sampling days meets the following conditions: The product of the water temperature (^{o}C) and the flow duration (the percentage of the time a given flow is statistically exceeded) at the time of sampling exceeds 1500. For cycling hydropower projects, in addition to twice daily monitoring, continuous monitoring may be required at some locations for a duration equivalent to the period of one cycle of the storage and the release of flow.

For either method, a summer in which low flows and high temperatures are not experienced may result in additional sampling requirements for the next summer. Low flow conditions may occur naturally, as an unregulated river or may be artificially induced, as in the case of upstream flow regulation or flows downstream from a cycling or peaking power project or in the case of a bypassed segment which receives flow only by spillage, leakage or specific releases.

Available Data

The use of data already available is encouraged provided that adequate QA/QC procedures have been followed. Old data may not be acceptable for considerations of meeting minimum sampling requirements, but could still provide useful information. Acceptance/rejection of data will be determined on a case by case basis, but generally data more than 10 years old may be rejected.

Habitat and Aquatic Life Studies

For rivers and streams, determination of attainment of the designated use 'habitat for fish and other aquatic life' will be determined as follows. A Cross-Section Flow Study is required that measures width and depth at various flows to determine the flow at which at least 75% of the bank full cross-sectional area of the river or stream is continuously watered. At least three cross-sections representative of the river or stream must be measured. Alternately, a combination of ambient measurements in one cross-section, flow data from existing flow gages, and/or modelling may be approved by DEP.

In addition, to determine if the project 'attains the aquatic life criteria, i.e. 'maintains the structure and function of the resident biological community', biological monitoring of the benthic macroinvertebrate community must be conducted following DEP's standard protocol in Methods for Biological Sampling and Analysis of Maine's Rivers and Streams, DEP LW0387-B2002.
A copy can be found at www.maine.gov/dep/water/monitoring/biomonitoring/material.html

Brookfield

Brookfield Renewable Energy Group
Brookfield White Pine Hydro LLC
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May 27, 2015

VIA E-FILING

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

Shawmut Hydroelectric Project (FERC No. 2322)
Proposed Study Plan - Meeting Notes

Dear Secretary Bose:

Brookfield White Pine Hydro LLC (White Pine Hydro) herewith electronically files with the Commission the notes from Proposed Study Plan consultation meeting for the relicensing of the Shawmut Hydroelectric Project (FERC No. 2322). The meeting was held March 31, 2016, in accordance with the Commission's regulations, 18 C.F.R. Sections 5.11(e).

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

Sincerely,

Frank H. Dunlap
Licensing Specialist

Attachment

cc: Distribution List
W. Bley, TRC
D. Trested, NAI

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426
May 31, 2016

OFFICE OF ENERGY PROJECTS

Project No. 2322-060 – Maine
Shawmut Hydroelectric Project
Brookfield White Pine Hydro LLC

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

Reference: Staff Comments on Proposed Study Plan for Shawmut Hydroelectric Project No. 2322-060

Dear Mr. Dunlap:

We have reviewed your proposed study plan for the Shawmut Project filed March 4, 2016. Pursuant to 18 C.F.R. § 5.12 of the Federal Energy Regulatory Commission's regulations, we provide the following comments.[1]

Progress Reports

Please include in your schedule a provision for filing at least one progress report, as required by 18 C.F.R. §5.11(b)(3), for each of the proposed studies, and for any additional study that may be included in the revised study plan. This provision should describe the manner and extent to which information will be shared, and include sufficient time for technical review of the analysis. Finally, we would like to receive all progress reports distributed for the studies, and would like to be included in the review and comment period for the draft/progress reports.

[1] We provided verbal comments on the Shawmut Project proposed study plan during the March 31, 2016 study plan meeting. We expect Brookfield White Pine Hydro LLC to take those comments into consideration during development of the revised study plan, which is due to be filed on July 2, 2016.

Value of Fishery

Please modify the angler creel survey to include a provision for gathering data sufficient to estimate the value of the Shawmut Project fishery.

Area of Potential Effects

As documented in the Cultural Resources Work Group Meeting Summary filed with the Commission on May 19, 2016, the Maine Historic Preservation Commission and Commission staff agreed to a definition for "Area of Potential Effects." Please modify the cultural resource study plan to reflect that definition.

We appreciate the opportunity to comment on your proposed study plan for the Shawmut Project. If you have any questions, please contact Dustin Wilson at (202) 502-6528, or via email at dustin.wilson@ferc.gov.

Sincerely,

Stephen Bowler, Chief
South Branch
Division of Hydro Licensing

cc: Mailing List
Public Files

PAUL R. LEPAGE
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
284 STATE STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

CHANDLER E. WOODCOCK
COMMISSIONER

June 2, 2016

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

Re: Comments regarding Shawmut Hydroelectric Project (FERC No. 2322-060) – Proposed Study Plan

Dear Secretary Bose:

The Maine Department of Inland Fisheries and Wildlife (MDIFW) has reviewed the Shawmut Hydroelectric Project Proposed Study Plan and we provide the following comments:

Section 5.0 Requested Studies Not Adopted

Comprehensive Angler Creel Survey

The Licensee has elected to fund an angler creel survey outside the licensing process. MDIFW will conduct the survey and provide a summary report to the Licensee.

Brown Trout Telemetry Study

Historically, there was a nationally-renowned brown trout fishery downstream of the Project which has been supported through brown trout stocking in the headpond. While it is clear that some component of the brown trout safely passed through the Project, it was assumed that there was some degree of mortality related to brown trout passing through the turbines. While the brown trout fishery was strong, the mortality was not a major concern of our Agency. In the late 1990's the brown trout fishery collapsed and it has been unable to rebound despite MDIFW stocking measures. Our Agency's concern is twofold: first, what is the actual mortality sustained of stocked/established brown trout in the headpond that pass through the Project; and second, have there been changes in Project discharges over time that could be contributing to a greater mortality at present time over historical levels? It is our Agency's position that a telemetry study is crucial in determining the movements of stocked brown trout to ascertain how much mortality is being experienced at the Project.

Subsequent to the Proposed Study Plan Meeting that was held in Skowhegan on March 31, 2016, the Licensee has proposed to conduct a brown trout telemetry study in 2017. MDIFW will assist in

various phases of the study including study design and scoping, tagging and stocking of study fish, collection of fish "at large", and mobile tracking.

Section 7.3 Fish Assemblage Survey/Section 7.3.5.1 Impoundment Survey

MDIFW concurs with the proposed sampling methodology, with the following requested changes/additions:

- All impoundment boat electrofishing should be completed at night. Many studies have concluded that night electrofishing provides more robust fish assemblage data. MDIFW routinely conducts night electrofishing events on lakes and rivers in Maine, and does so safely.
- Tailwater electrofishing surveys should be conducted during daylight hours due to difficult navigation.
- MDIFW requests that scales be taken from all trout older than YOY, unless trout are permanently marked. If fish are permanently marked, the marks should be recorded so that MDIFW can make a determination of age.
- MDIFW requests that scales be taken from all bass older than YOY. MDIFW will provide a data sheet to the Licensee that details the stratified collection of scales by bass size class. This will provide a representative sample covering all year classes present, while preventing the collection of an unnecessarily high number of samples.

Section 7.7 Recreation Facilities Inventory and Public Recreation Use Assessment

The Licensee has proposed to conduct a recreation inventory and use assessment related to the Shawmut Project. MDIFW conducted a site visit with the Licensee on May 27, 2016, and agreed to the following locations for the use assessment:

- Hinckley Boat Launch
- Skowhegan Boat Launch
- Skowhegan Picnic Area
- Skowhegan Informal Fishing Access Area (two parking locations along Route 2)
- River Road Angler Parking Area
- East Abutment Access (anglers will be counted from west side of river due to difficulty of access)
- Canoe Portage Trail and Put-In (camera installed near put-in area)

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

John Perry, MDIFW Environmental Review Coordinator, for

Jason Seiders
MDIFW Regional Fisheries Biologist, Sidney Headquarters

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

June 2, 2016

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

RE: FERC 2322, Shawmut Project Proposed Study Plan Comments – Follow-Up to April 6, 2016 DEP Comment Letter

Dear Secretary Bose:

The Maine Department of Environmental Protection (DEP or Department) submitted comments on the Proposed Study Plan (PSP) for the Shawmut Project, dated March 4, 2016, on April 6, 2016. As noted in the comment letter, Brookfield White Pine Hydro (BWPH or licensee) is proposing to start water quality (WQ) and benthic macroinvertebrate (BMI) sampling prior to issuing the Revised Study Plan; therefore, the Department has been working directly with BWPH and its consultants to update the study plans to meet Department protocols and standards before the 2016 study season begins. This letter serves as a follow-up to the Department's initial comments on the PSP.

The licensee and its consultants met with the Department on April 20, 2016 to review DEP comments and revisions requested in the April 6, 2016 letter. The Department received updated WQ and BMI study plans on May 18, 2016. The updated study plans address the majority of the comments submitted by the Department on April 6, 2016. The Department will continue to work with the licensee and its consultants as the studies are implemented.

The Department reiterates its comment regarding **Section 7.1.5.3 Impoundment and Outlet Stream Aquatic Habitat** in the PSP:

> The licensee proposes to provide three years of impoundment elevation and inflow/outflow data in lieu of conducting the habitat and aquatic life studies. This data was included in the Additional Information Response (AIR) document submitted to FERC on March 22, 2016. The secondary y-scale axis for headpond/tailwater elevation (feet) in the AIR Attachment B graphs should be reformatted to provide better visualization of headpond and tailwater elevation changes. Currently, the secondary y-axis spans from 70 feet to 170 feet but the scale could easily be adjusted to 80 feet and 120 feet. Minor tick marks on the graphs would also provide clarity on elevation changes over the data record.

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Additionally, the AIR notes that BWPH is using the USGS Gage at Madison to prorate inflow to the Project from 2009 through 2015. Footnote 2 lists the tributaries flowing into the Kennebec River between the USGS Gage at Madison and the Project. There is a USGS Gage on the Sandy River (01048000) that could be utilized to better characterize inflow to the project. The licensee should look into using this stream gage in addition to the USGS Gage at Madison to estimate inflow to the Project.

Thank you for the opportunity to comment on the Proposed Study Plan for the Shawmut Project. Please direct any questions regarding these comments to Michael.OConnor@maine.gov or 207-441-1732.

Sincerely,

Michael O'Connor
Project Manager
Maine Department of Environmental Protection

CC: Frank Dunlap (BWPH) by email and surface mail
Kelly Maloney (BWPH) by email
Randy Dorman (Kleinschmidt) by email
Jess Wechsler (Kleinschmidt) by email
John Perry (MDIFW) by email
Jason Seiders (MDIFW) by email
Oliver Cox (MDMR) by email
Gail Wippelhauser (MDMR) by email
Sean McDermott (NOAA) by email
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July 1, 2016

VIA E-FILING

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

Shawmut Hydroelectric Project (FERC No. 2322)
Revised Study Plan

Dear Secretary Bose:

Pursuant to the Commission's regulations at 18 C.F.R. Section 5.13, Brookfield White Pine Hydro LLC (White Pine Hydro) herewith electronically files with the Commission the Revised Study Plan (RSP) for the relicensing of the Shawmut Hydroelectric Project (FERC No. 2322). A Proposed Study Plan (PSP) was filed on March 4, 2016 and a study plan meeting was held on March 31, 2016. Meeting notes were filed on May 27, 2016. White Pine Hydro received timely comments on the PSP from the Maine Department of Inland Fisheries and Wildlife, Maine Department of Environmental Protection, and the Commission. The RSP addresses the comments received.

In accordance with the Commission's regulations, 18 C.F.R. Sections 5.13, comments on the RSP are due to the Commission within 15 days of this filing.

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

Sincerely,

Frank H. Dunlap
Licensing Specialist

Attachment: RSP for the Shawmut Hydroelectric Project

cc: Distribution List
K. Maloney, Brookfield
W. Bley, TRC
D. Trested, TRC
P. O'Bannon, Gray and Pape
D. Wilson, FERC

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426
July 28, 2016

OFFICE OF ENERGY PROJECTS

Project No. 2322-060 – Maine
Shawmut Hydroelectric Project
Brookfield White Pine Hydro LLC

Mr. Frank Dunlap
Licensing Specialist
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, ME 04240

Reference: Study Plan Determination for the Shawmut Hydroelectric Project

Dear Mr. Dunlap:

Pursuant to 18 C.F.R. § 5.13(c) of the Commission's regulations, this letter contains the study plan determination for the Shawmut Hydroelectric Project No. 2322 (Shawmut Project). The determination is based on the study criteria set forth in section 5.9(b) of the Commission's regulations, applicable law, Commission policy and practice, and the record of information.

Background

On March 4, 2016, Brookfield White Pine Hydro LLC (White Pine Hydro) filed its proposed study plan (PSP) for studies on: water quality; benthic macroinvertebrates; fish assemblage; impoundment tributary access; wildlife and botanical surveys; rare, threatened, and endangered species; recreation and land use; and cultural resources and historic properties in support of its intent to relicense the Shawmut Project.

White Pine Hydro held its initial Study Plan Meeting on March 31, 2016 to discuss the PSP. Commission staff, the Maine Department of Environmental Protection (Maine DEP), and the Maine Department of Inland Fisheries and Wildlife (Maine DIFW) filed comments on the PSP on May 31, April 7, and June 2, 2016, respectively. On July 1, 2016, White Pine Hydro filed its revised study plan (RSP), which included the eleven studies listed in Appendix A.

As required by section 5.13(a) of the Commission's regulations, White Pine Hydro either revised its proposal in the RSP in response to the comments on the PSP, or

explained why the recommendations were not adopted.[1] No agency or other entity filed comments on the RSP.

Study Plan Determination

White Pine Hydro's RSP filed on July 1, 2016, which includes 11 studies, is approved. As indicated in Appendix A, all 11 studies are approved as filed. Pursuant to section 5.15(c)(1) of the Commission's regulations, the Initial Study Report for all studies in the approved study plan must be filed by August 1, 2017.[2]

Nothing in this study plan determination is intended, in any way, to limit any agency's proper exercise of its independent statutory authority to require additional studies. In addition, White Pine Hydro may choose to conduct any study not specifically required herein that it feels would add pertinent information to the record for this proceeding.

If you have any questions, please contact Dustin Wilson at (202) 502-6528, or at dustin.wilson@ferc.gov.

Sincerely,

Ann Miles
Director
Office of Energy Projects

Enclosure: Appendix A -- Approved studies

cc: Mailing List
Public Files

[1] Maine DIFW requested White Pine Hydro conduct a comprehensive angler creel survey to (a) provide an estimate of angler use, (b) derive estimates of angler success, (c) collect biometric data on harvested fish, and (d) determine the overall status of the fishery in the project area. White Pine Hydro does not adopt this requested study, but instead proposes to collaborate with Maine DIFW and fund Maine DIFW's effort to collect creel survey information. In a letter filed on June 2, 2016, Maine DIFW agreed to conduct the survey outside of the relicensing process, and provide a summary report to White Pine Hydro.

[2] In order to take advantage of the full 2017 study season, White Pine Hydro anticipates that the Initial Study Report will available in March 2017 and the Initial Study Report Meeting will be held in April 2017. *See* RSP at 6.

APPENDIX A
SUMMARY OF DETERMINATIONS ON PROPOSED STUDIES

Study	Recommending Entity	Approved	Approved with Modification
1. Baseline Water Quality and Impoundment Trophic State Study	White Pine Hydro, Maine DEP	X	
2. Benthic Macroinvertebrate Survey	White Pine Hydro, Maine DEP	X	
3. Fish Assemblage Survey[1]	White Pine Hydro, Maine DIFW, Maine DEP	X	
4. Brown Trout Telemetry Study	Maine DIFW, Maine DEP	X	
5. Impoundment Tributary Access Survey	FWS, Maine DEP	X	
6. Wildlife Resources Survey[2, 3]	White Pine Hydro, Environmental Groups[4]	X	
7. Botanical Resources Survey[2]	White Pine Hydro, Environmental Groups[4]	X	
8. Recreational Facilities Inventory and Public Recreation Use Assessment	White Pine Hydro, Maine DIFW, Maine DEP, Environmental Groups[4]	X	
9. Historic Architectural Survey[2, 5]	White Pine Hydro	X	
10. Historic Archaeological Phase I Survey[2, 5]	White Pine Hydro	X	

11. Precontact Period Archaeological Survey[2, 5]	White Pine Hydro	X	

[1] The Fish Assemblage Survey incorporates the elements of Maine DIFW's requested Bass Population Study.

[2] If the study results include location data for cultural resources or rare, threatened, or endangered species, please mark the submittal as "Do Not Release," in accordance with 18 C.F.R. § 388.112(b).

[3] When consulting with FWS on the potential occurrence of the federally threatened northern long-eared bat in the project area, you should evaluate the questions listed on the FWS's Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form, in order to consider the applicability of the FWS's *Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions*, issued on January 15, 2016. The Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form can be found at: https://www.fws.gov/midwest/endangered/mammals/nleb/s7.html.

[4] Environmental Groups consists of the Atlantic Salmon Federation, the Natural Resources Council of Maine, and Trout Unlimited.

[5] White Pine Hydro's revised study plan (RSP) states that draft archaeological survey reports for studies 9, 10, and 11 in Appendix A will be submitted to the Maine Historic Preservation Commission (Maine HPC) for review and comment. In addition to submitting the draft and final archaeological survey reports to the Maine HPC, the reports must also be submitted to those on the Shawmut Project's Restricted Service List, including Commission staff, for review and comment. The schedule for deliverables in the RSP for the three archaeological surveys should include time for this review and comment.

Brookfield

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November 30, 2016

VIA E-FILING

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

Shawmut Hydroelectric Project (FERC No. 2322)
First Quarterly Study Progress Report

Dear Secretary Bose:

Brookfield White Pine Hydro LLC (White Pine) hereby files with the Commission the following study update for the relicensing of the Shawmut Hydroelectric Project (FERC No. 2322). A Revised Study Plan (RSP) was filed on July 1, 2016 and the Commission issued a Study Plan Determination (SPD) on July 28, 2016.

In Section 3.0 of the RSP White Pine committed to developing and distributing quarterly progress reports on the conduct of studies. This letter represents the first such report. In general, most first year studies were completed as planned and White Pine is currently working on draft reports. Individual study details are as follows:

1. **Baseline Water Quality and Impoundment Trophic State Study** – Field work was completed during the 2016 field season and data analysis and reporting is in progress. Results will be included in the Initial Study Report (ISR) due in 2017. There were no significant methodology variances from the RSP.
2. **Benthic Macroinvertebrate Survey** – Field work was completed during the 2016 field season and data analysis and reporting is in progress. Results will be included in the Initial Study Report due in 2017. There were no significant methodology variances from the RSP.
3. **Fish Assemblage Survey** – Prior to initiating the fish assemblage sampling, White Pine contacted the National Marine Fisheries Service (NMFS) to inquire about the potential for incidental take of the federally endangered Atlantic salmon during boat electrofishing sampling (the Shawmut Project is located on a section of the Kennebec River which lies within the listed critical habitat for the species). White Pine also contacted FERC and confirmed that consultation under Section 7 of the Endangered Species Act is not required for relicensing studies since there is no federal action (i.e. issuance of a permit) for the conduct of a study. White Pine subsequently contacted the US Fish and Wildlife Service regarding the possibility of incidental take coverage under a Section 10 scientific permit, however, US Fish and Wildlife Service has initially determined that a Section 10 permit may not be applicable. White Pine continues to coordinate with the agencies on an appropriate avenue for incidental take coverage in the case of incidental take of Atlantic

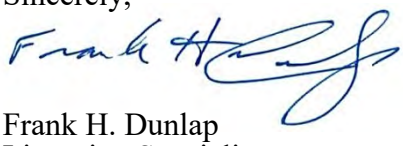
salmon during sampling. White Pine has deferred the fish assemblage study until 2017 to allow resolution of the issue of potential incidental take during the study.

4. **Brown Trout Telemetry Study** – Concurrence on the conduct of this study was reached in late spring of 2016 which was too late to conduct the study in 2016. As planned, field work for this study is expected to start during April-May 2017. As with the Fish Assemblage Survey, the field collection methods anticipate the use of boat electrofishing which has the potential for incidental take of Atlantic salmon. White Pine will continue discussion with the relevant fisheries agencies to assure the use of appropriate field methods and to assure that proper coverage is provided for any incidental take of salmon.
5. **Impoundment Tributary Access Survey** – Field work was completed during the 2016 field season and data analysis and reporting is in progress. The evaluation was conducted both at the full pond elevation and with a one foot impoundment drawdown with low natural flows in the tributaries. Results will be included in the Initial Study Report due in 2017. There were no significant methodology variances from the RSP.
6. **Wildlife Resources Survey** – Fieldwork was completed during the 2016 field season. Draft habitat maps have been completed using aerial imagery in combination with field data. Results will be included in the Initial Study Report due in 2017. There were no significant methodology variances from the RSP.
7. **Botanical Resource Surveys** – Field work was completed during the 2016 field season and data analysis and reporting is in progress. Results will be included in the Initial Study Report due in 2017. There were no significant methodology variances from the RSP.
8. **Recreation Facilities Inventory and Public Recreation Use Assessment** – Inventory and condition assessment field work has been completed, and preparation of recreation facility site maps is under way. Recreation use counts have been ongoing since June and will continue through May, 2017. A trail camera was installed at the Project tailwater access site throughout the summer to get additional information on portage trail use. The camera was removed at the end of October as planned. Recreation use count data are being reviewed and entered into a project database. Trail camera data will be reviewed and tabulated for entry into a database. Results from the initial data gathering will be included in the Initial Study Report due in 2017; results from data collection ongoing into spring of 2017 will be included in the Updated Study Report as appropriate. There were no significant methodology variances from the RSP.
9. **Historic Architectural Survey** – Background research and field survey work has been completed. Results will be included in the Initial Study Report due in 2017. There were no significant methodology variances from the RSP.
10. **Historic Archaeological Phase I Survey** – White Pine has prepared a Scope of Work for the reconnaissance survey and will submit it to the Maine Historic Preservation Commission for review. White Pine anticipates that the survey may need to be conducted in the early summer 2017 if weather conditions do not permit the survey to be conducted this December.
11. **Precontact Period Archaeological Survey** – Background research and the reconnaissance level field survey have been completed and report drafting is under way. The report will be accompanied by recommendations for Phase 1b work to be conducted in 2017. Results of the reconnaissance survey will be included in the Initial Study Report due in 2017; results of any Phase 1b field work will be reported in the Updated Study Report as appropriate. There were no significant methodology variances from the RSP.

As noted in the SPD, the Commission's Process Plan and Schedule for the Project requires that the Initial Study Report must be filed no later than August 1, 2017. Also as noted in the SPD, White Pine anticipates filing the ISR early in order to take advantage of the full 2017 study season. White Pine notes here that it still plans to file the ISR in late February or March 2017 in order to facilitate review and comments prior to the 2017 study season.

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

Sincerely,



Frank H. Dunlap
Licensing Specialist
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D. Wilson, FERC

CERTIFICATE OF SERVICE
Shawmut Hydroelectric Project (FERC No. 2322)
Study Update

I, Frank H. Dunlap, Licensing Specialist, Brookfield Renewable, hereby certify that copies of the foregoing document have been transmitted to the following parties on November 30, 2016.

One copy, via e-filing to:

Ms. Kimberly D. Bose
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Via email with an electronic link to the filing on the Commission's website, or one copy on compact disk, regular mail, postage paid to:

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Frank H. Dunlap
Licensing Specialist

November 30, 2016
Date

Brookfield

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March 29, 2017

VIA E-FILING

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

Shawmut Hydroelectric Project (FERC No. 2322)
Second Quarterly Study Progress Report

Dear Secretary Bose:

Brookfield White Pine Hydro LLC (White Pine) hereby files with the Commission the following study update for the relicensing of the Shawmut Hydroelectric Project (FERC No. 2322). A Revised Study Plan (RSP) was filed on July 1, 2016 and the Commission issued a Study Plan Determination (SPD) on July 28, 2016.

In Section 3.0 of the RSP White Pine committed to developing and distributing quarterly progress reports on the conduct of studies. This letter represents the second such report. In general, most first year studies were completed as planned and White Pine is reviewing and finalizing study reports. Individual study details are as follows:

1. **Baseline Water Quality and Impoundment Trophic State Study** – Field work was completed during the 2016 field season and data analysis and reporting is in progress. Results will be included in the Initial Study Report (ISR) due in 2017. There were no significant methodology variances from the RSP.
2. **Benthic Macroinvertebrate Survey** – Field work was completed during the 2016 field season and data analysis and reporting is in progress. Results will be included in the Initial Study Report due in 2017. There were no significant methodology variances from the RSP.
3. **Fish Assemblage Survey** – As discussed during the last update letter, White Pine deferred the fish assemblage study until 2017 to allow resolution of the issue of potential incidental take of Atlantic salmon during the study.
4. **Brown Trout Telemetry Study** – Field work for this study is expected to start during April–May 2017 with the tagging and release of hatchery trout. Similar to the Fish Assemblage Survey, the supplemental field collection methods anticipated the use of boat electrofishing which has the potential for incidental take of Atlantic salmon. White Pine will continue discussion with the relevant fisheries agencies to ensure the use of appropriate field methods and to ensure that proper coverage is provided for any incidental take of salmon.
5. **Impoundment Tributary Access Survey** – Field work was completed during the 2016 field season and data analysis and reporting is in progress. The evaluation was conducted both at the full pond elevation and with a one foot impoundment drawdown with low

natural flows in the tributaries. Results will be included in the Initial Study Report due in 2017.

6. **Wildlife Resources Survey** – Fieldwork was completed during the 2016 field season. Draft habitat maps have been completed using aerial imagery in combination with field data. Results will be included in the Initial Study Report due in 2017. There were no significant methodology variances from the RSP.
7. **Botanical Resource Surveys** – Field work was completed during the 2016 field season and data analysis and reporting is in progress. Results will be included in the Initial Study Report due in 2017. There were no significant methodology variances from the RSP.
8. **Recreation Facilities Inventory and Public Recreation Use Assessment** – Inventory and condition assessment field work has been completed, and preparation of recreation facility site maps is under way. Recreation use counts have been ongoing since June and will continue through May, 2017. A trail camera was installed at the Project tailwater access site throughout the summer to get additional information on portage trail use. The camera was removed at the end of October as planned. Recreation use count data are being reviewed and entered into a project database. Trail camera data will be reviewed and tabulated for entry into a database. Results will be included in the Updated Study Report. There have been no significant methodology variances from the RSP.
9. **Historic Architectural Survey** – Background research and field survey work has been completed. Results will be included in the Initial Study Report due in 2017.
10. **Historic Archaeological Phase I Survey** – White Pine has prepared a Scope of Work for the reconnaissance survey and will submit it to the Maine Historic Preservation Commission for review. White Pine anticipates that the survey will be conducted in 2017.
11. **Precontact Period Archaeological Survey** – Background research and the reconnaissance level field survey have been completed and report drafting is under way. The report will be accompanied by recommendations if appropriate for Phase 1b work to be conducted in 2017. Results of the reconnaissance survey will be included in the Initial Study Report due in 2017; results of any Phase 1b field work will be reported in the Updated Study Report as appropriate.

As noted in the SPD, the Commission's Process Plan and Schedule for the Project requires that the Initial Study Report must be filed no later than August 1, 2017. Also as noted in the SPD, White Pine anticipates filing the ISR early in order to take further advantage of the 2017 study season.

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

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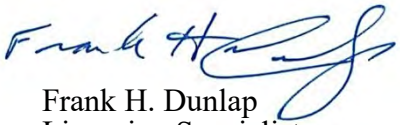

Frank H. Dunlap
Licensing Specialist
Brookfield Renewable

cc: Distribution List

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W. Bley, TRC
D. Trested, TRC
P. O'Bannon, Gray and Pape
D. Wilson, FERC

CERTIFICATE OF SERVICE
Shawmut Hydroelectric Project (FERC No. 2322)
Study Update

I, Frank H. Dunlap, Licensing Specialist, Brookfield Renewable, hereby certify that copies of the foregoing document have been transmitted to the following parties on March 29, 2017.

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March 29, 2017
Date

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August 1, 2017

VIA E-FILING

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

Shawmut Hydroelectric Project FERC No. 2322
Initial Study Report (Volume I)

Dear Secretary Bose:

In accordance with 18 CFR § 5.15(c), the Licensee for the Shawmut Hydroelectric Project, Brookfield White Pine Hydro LLC (White Pine), submits Volume I of the Initial Study Report (ISR) for the relicensing of the Shawmut Hydroelectric Project (Project). The ISR includes the results of the field studies and desktop assessments conducted during 2016 and 2017.

The ISR has been divided into two volumes in order to protect sensitive archaeological and other culturally important information in accordance with the Commission's regulations at 18 CFR §388.112 and pursuant to Section 106 of the National Historic Preservation Act. Volume I of the ISR contains the results from the non-cultural resource studies. Volume II contains the results from the cultural resources surveys and is being filed as "Privileged" with FERC, applicable area Native American Tribes, and the Maine Historic Preservation Commission.

The studies and assessments included in the ISR are:

Volume I (Public)

1. Baseline Water Quality and Impoundment Trophic State Study
2. Benthic Macroinvertebrate Survey
3. Tributary Access Survey
4. Wildlife and Botanical Resources Survey

Volume II (Privileged)

5. Historical Architecture Survey; and
6. Pre-contact Period Archaeological Survey

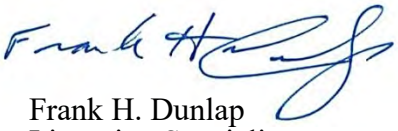
In addition, four studies will continue into the late 2017 field season; the status of these studies is discussed in the ISR. The technical reports for the following studies will be provided in the Updated Study report (USR) in 2018:

1. Fish Assemblage Survey
2. Brown Trout Telemetry Study
3. Recreation Facilities Inventory and Public Recreation Use Assessment; and
4. Historic Archaeological Phase I Survey

In accordance with 18 CFR § 5.15(c), within 15 days following the filing of the ISR, White Pine will hold a meeting with stakeholders and Commission staff to discuss results from the ISR studies, and modifications to the study plans, if necessary. White Pine Hydro will conduct the ISR meeting on August 15, 2017 at the Skowhegan Community Center, 39 Poulin Drive, Skowhegan, Maine 04240, starting at 10:00 AM.

If you have any questions regarding the ISR, please contact me at Frank.Dunlap@BrookfieldRenewable.com.

Sincerely,



Frank H. Dunlap
Licensing Specialist

Attachment: Initial Study Report for the Shawmut Hydroelectric Project (Volume I)

cc: Distribution List

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

GOVERNOR

PATRICK C. KELIHER
COMMISSIONER

August 9, 2017

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

RE: Scoping Document 2 for the Shawmut Project (FERC No. 2322-060)

Dear Secretary Bose:

On August 9, 2016, the Federal Energy Regulatory Commission (Commission) issued Scoping Document 2 (SD 2) for the Shawmut Project (FERC No. 2322-060), located on the Kennebec River in Maine. As noted by the Commission noted, SD2 was distributed for informational purposes, and no response was required. We understand that after the Licensee files its Final License application, the Commission will determine whether an Environmental Impact Statement (EIS) or Environmental Assessment (EA) is necessary to assess the project impacts pursuant to the National Environmental Policy Act.

Several studies in support of the ongoing relicensing have been completed while others will be conducted this year. However, given the existing information on project impacts, summarized below, we recommend that the Commission analyze the impacts of the project by preparing an EIS, rather than an EA.

1. Six hydropower projects on the mainstem Kennebec River (Table 1) impact the movements of five species of diadromous fishes (Atlantic salmon, alewife, American shad, blueback herring, and American eel) that are being restored to the Kennebec River watershed by MDMR.

Table 1. Details of the lower six hydropower projects on the Kennebec River.

Project	FERC No.	River mile
Williams	2335	131.2
Anson	2365	116.2
Abenaki	2364	115.5
Weston	2325	102.0
Shawmut	2322	88.4
Hydro-Kennebec	2611	82.9
Lockwood	2574	81.7

2. Approximately 73% (1,252 hectares) of all designated critical habitat for Atlantic salmon in the Merrymeeting Bay Salmon Habitat Recovery Unit (MMB SHRU) is in the Sandy River, which enters the Kennebec River at river mile 113.6 (i.e. above four dams). An additional 2,305 hectares of

noncritical salmon habitat is in the Carrabassett River, which enters the Kennebec at river mile 121.8 (i.e. above 6 dams). The lowermost four projects are required to have operational passage for Atlantic salmon by May 1, 2020. The 5th and 6th projects have license conditions that require passage for Atlantic salmon when certain conditions are met. Because most salmon habitat in the MMB SHRU is above four dams, we expect that performance standards for passage efficiency would be higher than those on the Penobscot (i.e. >96% for downstream passage and >95% for upstream passage) where salmon critical habitat is above fewer hydropower dams.

3. Approximately 1,495 hectares of spawning/rearing habitat historically accessible to American shad and blueback herring lies between the Lockwood Project and the Abenaki Project, as does 1,058 hectares of historical alewife habitat. The results of several telemetry studies and observations made with underwater cameras demonstrate that few American shad approach or find the fishway entrance at the Lockwood project.
4. The catadromous American eel occurs throughout the Kennebec watershed, and has been documented above the Williams Project. The 2012 Benchmark American Eel Stock Assessment, conducted by the Atlantic States Marine Fisheries Commission, found the American eel population in U.S. waters is at or near historically low levels due to a combination of factors including turbine mortality. Safe, timely, and effective upstream and downstream passage for this species is essential.
5. The restoration of Atlantic salmon and other anadromous species in the Kennebec River, the second largest river in Maine, has generated significant public interest. For these reasons, we feel there is sufficient information which indicates that the Shawmut Project affects important natural resources, and its relicensing constitutes a major federal action significantly affecting the quality of the human environment

Please contact Paul Christman (207-624-6352; paul.christman@maine.gov) or Gail Wippelhauser (207-624-6349; gail.wippelhauser@maine.gov if you have any questions.

Sincerely,

Patrick C. Keliher, Commissioner

cc: Sean Ledwin, Gail Wippelhauser, Paul Christman, DMR
John Perry, Jason Seiders DIFW
Kathy Howatt, DEP
Antonio Bentivoglio, Steven Shepard, USFWS
Sean McDermott, Jeff Murphy, Matt Byoff, NOAA

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Maine Field Office
306 Hatchery Road
East Orland, Maine 04431
Telephone: 207/469-7300 Fax: 207/902-1588

August 9, 2017

Vince Yearick, Director
Division of Hydropower Licensing
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20424

Re: Request for EIS in the relicensing of the Shawmut Hydroelectric Project (FERC No. P-2322).

Dear Mr. Yearick:

On March 29, 2017, Brookfield White Pine Hydro LLC (White Pine) issued its Second Quarterly Study Progress Report, in accordance with FERC's study plan determination, issued on July 28, 2016, for the Integrated Licensing Process (ILP) relicensing of the Shawmut Hydroelectric Project (FERC No. P-2322).

We look forward to reviewing the results of the remaining studies as additional information will support the ongoing relicensing effort. Using the current project information, it is clear that federally endangered Atlantic salmon occur in the project area. The project area is also included in the critical habitat designation for Atlantic salmon. The relicensing of Shawmut Hydroelectric has the potential to impact both Atlantic salmon and their critical habitat. The restoration of Atlantic salmon and other anadromous species in the Kennebec River, the second largest river in Maine, has generated significant public interest. For these reasons, we feel there is sufficient information to conclude that the Shawmut Project affects important natural resources, and its relicensing constitutes a major federal action significantly affecting the quality of the human environment.

We understand that the Commission will make a determination regarding the necessity of an Environmental Impact Statement (EIS) or Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) after White Pine files its final license application. Given the existing information on project effects, we recommend that FERC analyze the impacts of the project by preparing an EIS, rather than an EA. If you have any questions or need additional information, please contact Antonio Bentivoglio by telephone at 207/781-8364 Extension 18 or by email at *Antonio_Bentivoglio@fws.gov*.

Sincerely,

Anna Harris

Anna Harris
Project Leader
Maine Field Office
Maine Fish and Wildlife Service Complex

cc: Bryan Sojkowski, FWS
Gail Wipplehauser, Paul Christman, Sean Ledwin, Maine DMR
Matt Buhyoff, Bill McDavitt, Sean McDermott, Chris Boelke, Bjorn Lake, NOAA
Kelly Maloney, Brookfield
Nick Bennett, NRCM
John Burrows, ASF
Jeff Reardon and Jeff Ponte, TU

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

AUG 16 2017

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20424

Re: Request for EIS in the relicensing of the Shawmut Hydroelectric Project (FERC No. P-2322).

Dear Secretary Bose:

On March 29, 2017, Brookfield White Pine Hydro LLC (White Pine) issued its Second Quarterly Study Progress Report, in accordance with FERC's study plan determination, issued on July 28, 2016, for the Integrated Licensing Process (ILP) relicensing of the Shawmut Hydroelectric Project (FERC No. P-2322).

Additional information in support of the ongoing relicensing effort is still being collected and we look forward to reviewing the results of the remaining studies. However, we note that existing information indicates that Federally endangered Atlantic salmon occur in the project area and are known to be impacted by project operations. The project area is also included in the critical habitat designation for Atlantic salmon; the project impacts several of the essential features of the critical habitat. Finally, we note that the restoration of Atlantic salmon and other anadromous species in the Kennebec River, the second largest river in Maine, has generated significant public interest. For these reasons, we feel there is sufficient information which indicates that the Shawmut Project affects important natural resources, and its relicensing constitutes a major federal action significantly affecting the quality of the human environment.

We understand that the Commission will make a determination regarding the necessity of an Environmental Impact Statement (EIS) or Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) after White Pine files its final license application. However, given the existing information on project effects, we recommend that FERC analyze the impacts of the project by preparing an EIS, rather than an EA. If you have any questions or need additional information, please contact Matt Buhyoff (Matt.Buhyoff@noaa.gov) or 207-866-4238.

Sincerely,

Julie Crocker

Julie Crocker
ESA Fish Recovery Coordinator

Brookfield

Brookfield Renewable
Brookfield White Pine Hydro LLC
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Lewiston ME 04240

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August 30, 2017
Via Electronic Filing

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

Shawmut Hydroelectric Project (FERC No. 2322-060)
Summary of Initial Study Report Meeting

Dear Secretary Bose:

Brookfield White Pine Hydro LLC (White Pine) is the Licensee for the Shawmut Hydroelectric Project (Project) (FERC No. 2322). White Pine is pursuing a new license for the Project from the Federal Energy Regulatory Commission (FERC or Commission) using the Commission's Integrated Licensing Process (ILP) as defined in 18 Code of Federal Regulations (C.F.R.) Part 5. In accordance with 18 C.F.R. § 5.15(c)(3), White Pine is filing herewith the summary of the Initial Study Report meeting that was held on August 15, 2017.

On August 1, 2017 White Pine filed the Initial Study Report (ISR) for the Project pursuant to 18 C.F.R. § 5.15(c)(1). In accordance with the Commission's regulations at 18 C.F.R. § 5.15(c)(2), the ISR Meeting was held within 15 days of issuance of the ISR (the meeting was held at the Skowhegan Community Center, Skowhegan, Maine from on August 15, 2017) The Commission's regulations at 18 C.F.R. § 5.15(c)(3) require White Pine to file this summary of the ISR meeting, including any proposed modifications to ongoing studies or new studies proposed by the Licensee, within 15 days of the ISR Meeting.

White Pine is not proposing any modifications to any of the studies at this time, nor is White Pine proposing any new studies. After review of the ISR Meeting summary, stakeholders may file disagreements with the meeting summary, request modifications to ongoing studies, or request new studies. Disagreements with the ISR meeting summary and any requests to amend the study plan to include new or modified studies must be filed with the Commission no later than 30 days after the filing of the ISR meeting summary (on or before September 29, 2017). In requesting modifications to ongoing studies or new studies, stakeholders must follow the Commission's Criteria for Modification of Approved Study (18 C.F.R. 5.15(d)) or Criteria for New Study (18 C.F.R. 5.15(e)).

White Pine will have 30 days to respond to any disagreements or requests to amend the study plan, and the Commission's Director of the Office of Energy Projects will resolve any disagreement and amend the approved study plan, as appropriate, within 30 days of the due date for White Pine's response.

If you have any questions regarding the filing, please contact me at (207) 755-5603 Frank.Dunlap@BrookfieldRenewable.com.

Sincerely,

Frank Dunlap
Licensing Specialist

Attachment

Cc: Distribution List
S. Murphy (Brookfield)
K. Maloney (Brookfield)

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

September 29, 2017

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

Re: Initial Study Report Comments for Shawmut Hydroelectric Project
FERC Project 2322

Dear Secretary Bose:

The Maine Department of Environmental Protection (Department) received and reviewed the Initial Study Report, dated August 1, 2017, for the Shawmut Hydroelectric Project (FERC 2322). Department staff reviewed project documents to prepare the following comments pertaining to Water Quality Studies.

All water quality studies requested by the Department were completed to the Department's satisfaction and present information sufficient to evaluate whether proposed project operations meet Maine water quality standards, or may cause or contribute to non-attainment of those standards.

Thank you for the opportunity to comment on the studies conducted by Kleinschmidt at the Shawmut Project on behalf of Brookfield White Pine Hydro LLC. Please contact me by telephone at 207-446-2642 or by email at Kathy.Howatt@maine.gov if you have any questions.

Sincerely,

Kathy Howatt

Kathy Davis Howatt
Hydropower Coordinator
Bureau of Land Resources

Cc: Frank Dunlap (email)
Randy Dorman (email)

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October 30, 2017

VIA E-FILING

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

Shawmut Hydroelectric Project (FERC No. 2322)
Study Update and Response to Comments

Dear Secretary Bose:

Brookfield White Pine Hydro LLC (White Pine) submits the following responses to comments on the Initial Study Report (ISR) and study update for the relicensing of the Shawmut Hydroelectric Project (Project).

On July 28, 2016 the Commission issued a Study Plan Determination for the Shawmut Project and White Pine began several studies in late summer and early fall of 2016. White Pine filed the ISR on August 1, 2017 and held the ISR meeting on August 16, 2017. A summary of that meeting was filed on September 30, 2017.

ISR Comments

White Pine received written comments on the ISR from the Maine Department of Environmental Protection (MDEP) and the Maine Historic Preservation Commission (MHPC).

The MHPC noted in a September 11 letter that "We agree with the proposal and three tasks for Phase I[b] prehistoric archeological survey." In that same letter the MHPC requested that White Pine file the Architectural Survey Report in hard copy on the specified MHPC forms; hard copies of the report were subsequently mailed to the MHPC. MHPC responded by letter dated October 23, 2017 and regarding the Architectural Survey Report noted that they "concur with the Architectural Survey Report" with respect to findings regarding the eligibility of listing for certain Project structures. MHPC asked only that the proposed National Register of Historic Places (NRHP) boundary "be enlarged to capture more of the impoundment and surrounding waters." White Pine will consult with MHPC concerning the specifics of their request.

The MDEP noted in a September 29, 2017 letter that "All water quality studies requested by the Department were completed to the Department's satisfaction and present information sufficient to evaluate whether proposed project operations meet Maine water quality standards, or may cause or contribute to non-attainment of those standards."

No other comments have been received. Based on the comment letters received, there are no disputes with the ISR meeting notes and no requests for modified or additional studies.

Study Update

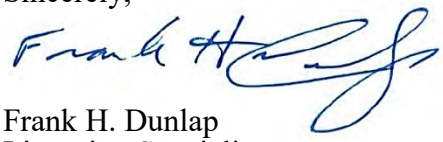
As noted in the ISR, several studies for the Shawmut Relicensing are ongoing. The Updated Study Report (USR), due August 1, 2018, will provide any additional information developed since the filing of the ISR.

Updates on ongoing studies are provided below. Unless specified here, Brookfield considers all other studies contained in the ISR to be complete.

- **Fish Assemblage Survey:** White Pine was unable to resolve the issue of potential incidental take during the study and has deferred this effort until 2018.
- **Brown Trout Telemetry Study:** Field work for this study started in May 2017 and will run through November 2017. Results will be provided in the USR.
- **Impoundment Tributary Access Survey:** White Pine undertook a follow-up survey on September 28 to take advantage of a 3 foot drawdown of the impoundment during maintenance work. The results confirmed the findings of the earlier survey. Results will be provided in the USR.
- **Recreation Facilities Inventory and Public Recreation Use Assessment:** Field data collection (recreation use counts) began in June 2016 and continued through May 2017. Data analysis for developing use estimates and site mapping is being completed and results will be provided in the USR.
- **Historic Archaeological Phase I Survey:** White Pine conducted the reconnaissance survey in September 2017. Results of the survey will be provided in the USR.
- **Prehistoric Archaeological Phase Ib Survey:** Based on the Phase Ia survey, several sites were identified for Phase Ib work. As noted above, the MHPC agreed with the assessment; field work is scheduled for 2018.

If you have any questions regarding this filing, please contact me at Frank.Dunlap@BrookfieldRenewable.com.

Sincerely,



Frank H. Dunlap
Licensing Specialist

Shawmut Hydroelectric Project (FERC No. 2322)
Distribution List

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Mark Bergeron
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NGO

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Town of Clinton
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Town of Fairfield
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Skowhegan, ME 04976

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Licensee

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August 1, 2018

VIA E-FILING

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

Shawmut Hydroelectric Project FERC No. 2322
Updated Study Report

Dear Secretary Bose:

In accordance with 18 CFR § 5.15(c), the Licensee for the Shawmut Hydroelectric Project, Brookfield White Pine Hydro LLC (White Pine), submits the Updated Study Report (USR) for the relicensing of the Shawmut Hydroelectric Project (Project). The USR includes the results certain field studies and desktop assessments conducted during 2017.

The studies and assessments included in the USR are:

1. Brown Trout Telemetry Study
2. Recreation Facilities Inventory and Public Recreation Use Assessment

In addition, one study was completed, but the study report is in development, and two studies will continue into the late 2018 field season; the status of these studies is discussed in the USR. The technical reports for the following studies will be provided concurrent with the Draft License Application or Final License Application (FLA) as applicable:

1. Fish Assemblage Survey (to be provided concurrent with the FLA),
2. Historical Archaeological Phase I Survey (to be provided concurrent with the DLA),
3. Historical Archaeological Phase II Survey (to be provided concurrent with the FLA).

In accordance with 18 CFR § 5.15(c), within 15 days following the filing of the USR, White Pine will hold a meeting with stakeholders and Commission staff to discuss results from the USR studies, and modifications to the study plans, if necessary. White Pine Hydro will conduct the USR meeting on August 16, 2018 at the Sportsman's Alliance of Maine, Church Hill Road, Augusta, Maine 04330, starting at 10:00 AM.

If you have any questions regarding the USR, please contact me at Frank.Dunlap@BrookfieldRenewable.com.

Sincerely,

Frank H. Dunlap
Licensing Specialist

Attachment: Updated Study Report for the Shawmut Hydroelectric Project

cc: Distribution List

Distribution List
Shawmut Project (FERC No.2322)
Updated Study Report

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National Park Service
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Boston, MA 02109-3572

Distribution List
Shawmut Project (FERC No.2322)
Updated Study Report

Regional Director
U.S. Fish and Wildlife Service
300 Westgate Center Dr.
Northeast Regional Office
Hadley, MA 02109-3572

U.S. Army Corps of Engineers
Divisional Office, Regulatory
696 Virginia Road
Concord, MA 01742-2718

U.S. Army Corps of Engineers
Commander
North Atlantic Division
26 Federal Plaza, #2109
New York, NY 10278-0090

State Agencies

Jim Vogel
Department of Agriculture, Conservation, and Forestry
Division of Parks and Public Lands
18 Elkins Lane, Harlow Building
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Kathleen Leyden, Director
Maine Coastal Program
Maine Department of Marine Resources
21 State House Station
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Maine Department of Environmental Protection
17 State House Station
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Jason Overlock
Maine Department of Marine Resources
21 State House Station
Augusta, ME 04333

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Chief
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Presque Isle, ME 04769

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

Distribution List
Shawmut Project (FERC No.2322)
Updated Study Report

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THPO
Cultural and Historic Preservation Program
Natural Resources Department
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Governor
Passamaquoddy Tribe - Pleasant Point
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Perry, ME 04667-0343

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Houlton Band of Maliseet
Natural Resources Department
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William Nicolas, Sr.
Chief
Passamaquoddy Tribe - Indian Township
PO Box 301
Princeton, ME 04668

NGO

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American Rivers
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Washington, DC 20005

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Manchester, ME 04351

Bill Oleszczuk
Chair
Maine Council of Trout Unlimited
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Local / Governments

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Town of Benton
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Benton, ME 04901

Town of Clinton
27 Baker Street
Clinton, ME 04927

Town of Fairfield
19 Lawrence Avenue
PO Box 149
Fairfield, ME 04937

Town of Skowhegan
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Skowhegan, ME 04976

Somerset County Government
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City of Waterville
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Waterville, ME 04901

Town of Winslow
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Winslow, ME 04901

Distribution List
Shawmut Project (FERC No.2322)
Updated Study Report

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Licensee

Frank Dunlap
Licensing Specialist
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Brookfield

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www.brookfieldrenewable.com

August 31, 2018

VIA E-FILING

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

Shawmut Hydroelectric Project FERC No. 2322-060
Updated Study Report Meeting Summary

Dear Secretary Bose:

In accordance with 18 CFR § 5.15, the Licensee for the Shawmut Hydroelectric Project, Brookfield White Pine Hydro LLC (White Pine), submits the Updated Study Report (USR) Meeting Summary for the relicensing of the Shawmut Hydroelectric Project (Project). The meeting was held August 16, 2018, in accordance with the Commission's regulations. Pursuant to the process plan and schedule contained in Scoping Document 2 (issued August 9, 2016), Any disagreement concerning this meeting summary or requests to amend the study plan must be filed by October 1, 2018.

If you have any questions regarding the USR, please contact me at Frank.Dunlap@BrookfieldRenewable.com.

Sincerely,

Frank H. Dunlap
Licensing Specialist

Attachment: Updated Study Report Meeting Summary for the Shawmut Hydroelectric Project

cc: Distribution List

Brookfield

Brookfield Renewable Energy Group
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston ME 04240

Tel 207.755.5600
Fax 207.755.5655
www.brookfieldrenewable.com

September 4, 2018

VIA E-FILING

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

Shawmut Hydroelectric Project FERC No. 2322-060
Draft License Application

Dear Secretary Bose:

In accordance with 18 CFR § 5.16(c), the Licensee for the Shawmut Hydroelectric Project, Brookfield White Pine Hydro LLC (White Pine Hydro or Licensee), respectfully submits the Draft License Application (DLA) for filing with the Federal Energy Regulatory Commission (FERC). The DLA is being filed in accordance with the Integrated Licensing Process (ILP) and consists of draft technical exhibits and a draft environmental analysis. The draft of Exhibit F - General Design Drawings, contains Critical Energy Infrastructure Information (CEII) and will be filed under separate cover with the Commission only.

As outlined in 18 CFR § 5.18, the DLA discusses White Pine Hydro's proposal for continued maintenance and operation of the Shawmut Project. Licensees' proposal is to continue the fundamental operation of the Project. Exhibit E discusses the results of the studies conducted in support of the relicensing, and considers how the information and data collected during those studies addresses issues that were raised by agencies and other relicensing participants, and how that data addresses the Licensee's proposal. In support of this proposal, Exhibit E evaluates the potential impacts to environmental and recreational resources that may occur as a result of continued project operation under a new license. As appropriate, Exhibit E includes Licensee's preliminary proposals for the protection and mitigation of effects on, or enhancement to, resources that are associated with the continued operation of the Project.

In accordance with FERC regulations (18 CFR § 5.16(e)), participants and Commission staff may submit comments to the Licensee regarding the DLA within 90 days following this filing, i.e. by December 3, 2018. Any participant whose comments request new information, studies, or other amendments to the approved Study Plan must include a demonstration of extraordinary circumstances, pursuant to the requirements of 18 CFR § 5.15(f).

If you have any questions regarding the DLA, please contact me at Frank.Dunlap@BrookfieldRenewable.com.

Sincerely,

Frank H. Dunlap
Licensing Specialist

Attachment: Draft License Application for the Shawmut Hydroelectric Project

cc: Distribution List

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426
November 30, 2018

OFFICE OF ENERGY PROJECTS

Project No. 2322-060-Maine
Shawmut Hydroelectric Project
Brookfield White Pine Hydro, LLC

Mr. Frank H. Dunlap
Brookfield White Pine Hydro, LLC
150 Main Street
Lewiston, ME 04240

RE: Staff comments on Draft License Application for the Shawmut Project

Dear Mr. Dunlap:

On September 4, 2018, Brookfield White Pine Hydro, LLC (White Pine Hydro) filed a draft license application (DLA) for the Shawmut Hydroelectric Project No. 2322 (Project). The project is located on the Kennebec River, in the towns of Skowhegan, Fairfield, Clinton, and Benton, Maine.

We have reviewed the DLA and have identified additional information needs, which are detailed in the attached Appendix A, that should be addressed in the final license application.

In the draft license application, you indicate that additional information will be provided in the final license application.[1] This information and the information requested in Appendix A should be included in your final license application or the Commission may find that the application is not ready for environmental analysis, pursuant to 18 CFR § 5.22 of the Commission's regulations.

[1] This information includes the Baseline Fish Assemblage Study results; the Phase 1B Archaeological Investigation results, and any Phase II Investigation results; revised Exhibit G drawings; a list of unscheduled outages and lost generation; average annual inflow; DLA comment responses; and the non-Project recreation facilities overlap summary.

If you have any questions regarding this letter or the contents of your final license application, please contact Dustin Wilson at (202) 502-6528, or via email at dustin.wilson@ferc.gov.

Sincerely,

Stephen Bowler

Stephen Bowler, Chief
South Branch
Division of Hydropower Licensing

Attachment: Appendix A – Comments on Draft License Application

Appendix A
Comments on Draft License Application

Commission staff's review of your draft license application (DLA) has identified the following additional information requests and clarifications that should be addressed in your final license application (FLA).

General

1. In Scoping Document 2 (SD2), we identified migratory fish, including Atlantic salmon, American shad, alewife and blueback herring, American eel, as well as recreation resources, as resources that could be cumulatively affected by the continued operation and maintenance of the project. In section 4.1.1, *Cumulative Effects*, of the DLA, though, you indicate that SD2 identified four resources for cumulative effects analysis, including migratory fish, recreation resources, aquatic habitat, and wetlands. While you identified the latter two resources as cumulatively-affected resources in the DLA, they are not mentioned in SD2. We also note that these resources are not further addressed in your DLA's subsequent sections on cumulative effects. Therefore, please expound on the discussion of these resources as being cumulatively affected in the FLA. If the inclusion of the resources was a mistake, please remove reference to these resources, as cumulatively affected resources, in the FLA.

2. To facilitate our review of project effects on environmental resources at the project, please submit the digital files (i.e., GIS[2] data layers) specified below that you used to create the maps in the DLA and study reports. Any GIS data layer(s) documenting occurrence of federally-listed species, or their habitats, or showing the locations of cultural or historic sites, should be filed with the Commission as "Not for Public Disclosure, Privileged." Please provide the following, if available:

    a. Project boundary, as revised by removing the two parcels;
    b. Project facilities, including: (i) access roads; and (ii) existing project recreation sites and amenities;
    c. Habitat types/land cover, including wetlands, as shown on figure 4-1, sheets 1-11 of the Initial Study Report;
    d. Locations of non-native invasive plant occurrences, as shown on table 6-3 of the Initial Study Report;
    e. Observed state species of special concern, as shown on table 6-7 of the Initial Study Report;

[2] Geographic Information System

Project Description

3. Exhibit A does not provide all of the information that is required by section 4.51(b) of the Commission's regulations. To address this deficiency, Exhibit A should be revised to describe the: (1) respective heights of each section of the dam (i.e., earthen embankment, gated spillway, abutment, stanchion spillway, bulkhead, and cut-off wall); (2) height of the stanchion spillway bays; (3) dimensions of the sluiceway at the west end of the stanchion spillway; and (4) the minimum hydraulic capacity of turbine units 7 and 8.

Project and Study Area Boundaries

4. In section 3.2 of Exhibit E, you indicate that the Shawmut impoundment extends about 11 miles upstream of Shawmut Dam, and that the project boundary extends about 12.3 miles upstream of Shawmut Dam. Please explain, in the FLA, why the project boundary extends an additional 1.3 miles upstream of the headwaters of the Shawmut impoundment.

5. In section 3.2.3 of Exhibit E, you propose to remove two parcels of land from the existing project boundary. One parcel, which you estimate to have an area of 2.2 acres, is located on the east shore of the river. The other parcel, which you estimate to have an area of 26.4 acres, is located on the west shore. Please modify Exhibits A and E to provide: (1) the total acreage for the existing and proposed project boundary; (2) the exact acreage of the two sites proposed to be removed from the project boundary; and (3) a description of the site-specific circumstances justifying each of the two proposed revisions.

6. The Exhibit G drawings should be revised to show the proposed project boundary. The Exhibit G drawings should provide the site names and locations of all project recreation facilities.

7. The revised Exhibit G drawings to be filed with the FLA must be stamped by a registered land surveyor as required by Section 4.39(a) of the Commission's regulations.

8. In sections 4.7.1.1 and 4.7.1.3, *Wildlife and Botanical Resources*, you describe the study area for identifying botanical and wildlife resources as extending approximately 1,200 feet downstream of the dam. However, the maps of the study area in your 2017 study report depict the study area extending approximately 4,000 feet downstream of the dam, roughly corresponding to the project boundary. Please reconcile this discrepancy in the FLA.

Water, Fish, and Aquatic Resources

9. In section 2.1.4 of Exhibit A, pages A-3 and A-4, you describe the trash racks at each of the project's powerhouses. You indicate that the 1912 Powerhouse has trash racks with a clear bar spacing of 1.5 inches, and that the 1982 Powerhouse has trash racks with a clear bar spacing of 3.5 inches. To facilitate staff review of the project's effects on fish entrainment and turbine mortality, please include in the FLA: (a) the overall dimensions of each set of trash racks at each of the two powerhouses; (b) the number and width of the individual bar racks; and (c) an estimate of the intake velocity for both the intake trash racks and the draft tube trash racks, along with the calculations used to develop the estimate(s).

10. You propose to describe, in an operations monitoring plan, how you plan to monitor and report on maintenance of the pond level within 2 feet of normal pond elevation of 112 feet U.S. Geological Survey (USGS) Datum. The plan would include information on how you intend maintain impoundment levels using the project's gates, adjust unit flows, and inflate/deflate the flashboards. Please file your draft operations monitoring plan with the FLA.

11. On page E-3-7 of Exhibit E, you state that you anticipate developing an operations and maintenance plan for any upstream and downstream fish passage facilities that you may propose after completion of the fish passage feasibility assessment. We will need to assess the benefits and costs of your proposed fish passage operations and maintenance measures as part of our environmental analysis. Therefore, please include the proposed fish passage facility operations and maintenance plan(s), together with any updated proposals and costs for new or modified fish passage facilities, in the FLA.

12. On page E-4-36 of Exhibit E, you refer to a pending license amendment application for the Shawmut Project, as well as a fish passage feasibility assessment that is currently underway for four projects on the lower Kennebec River. The feasibility assessment will include an evaluation of potential upstream and downstream fish passage alternatives for the Shawmut Project. You anticipate completing the evaluation by the end of 2018. Please file the results of the feasibility assessment with the FLA, or as soon as possible following its completion. If the feasibility assessment is completed after the filing of the FLA, and if the results of the feasibility assessment cause you to modify your proposed action for fish passage facilities or operations at the project, then you must update all applicable exhibits of your FLA to reflect those modifications. In addition, please include with your updated proposed action the conceptual designs of any new or modified fish passage facilities, including documentation of consultation with the National Marine Fisheries Service, U.S. Fish

and Wildlife Service, Maine Department of Marine Resources, Maine Department of Inland Fisheries and Wildlife, and Kennebec Coalition.[3]

13. On page E-4-61 of Exhibit E, you refer to the conceptual engineering design work that you have completed for upstream and downstream fish passage facilities at Shawmut Dam. You also refer to a Computational Fluid Dynamic (CFD) model and a river herring radio telemetry study that you completed to inform the design and location of an upstream fish passage facility at Shawmut Dam. To facilitate our review of fish passage issues at the Shawmut Project, please provide copies of the CFD model and river herring radio telemetry study reports as part of your FLA.

14. Based on comments received during scoping, and to understand the overall effects of your proposed operation, our analysis must address the effects of continued project operation on downstream migration of diadromous fish. While the DLA provides some analysis of the effects of project operation on downstream migrating juvenile Atlantic salmon and adult American eel, there is little analysis of project effects on other diadromous fish species such as American shad and river herring, which are stocked in the Kennebec River upstream of the project. For example, your analysis of project effects on American shad and river herring appears to be limited to the following statement on page E-4-62 of Exhibit E: "The Licensee also provides downstream passage for American eels, American shad, and river herring at the dam; high passage success rates are expected based on previous studies." However, you provide no information, or analysis, to support this conclusion. Therefore, please include in the FLA a thorough discussion of how project operation affects juvenile and adult (post-spawn) river herring and American shad during downstream migration. The analysis should include:

    (a) a specific description of project operation (e.g., flow routing and turbine operation) through the full range of hydrologic conditions during the downstream passage season for these species and life stages;
    (b) an estimate of injury and mortality rates for each species and life stage passing through the various downstream passage routes (e.g., sluice ways, deep gates, spillways) that are available during the requisite migration period;
    (c) a comparison of fish body length and width, as well as swimming abilities, to the physical and hydraulic characteristics of the powerhouse trash racks (e.g., bar spacing and approach or through-screen velocities) and proximity to a surface bypass route to evaluate entrainment potential; and
    (d) an expected turbine injury and mortality rate for each species and life stage.

[3] The Kennebec Coalition is a group of four non-governmental organizations, including the Atlantic Salmon Federation, the Kennebec Valley Chapter of Trout Unlimited, Maine Rivers, and the Natural Resources Council of Maine.

If there are no site-specific data available on injury and mortality rates through the project's various passage routes (e.g., spillways, Francis-type turbine, Propeller turbine), then an estimate should be derived from studies performed at other dams and hydroelectric projects with similar downstream passage characteristics.

15. On page E-4-44 of Exhibit E, you indicate that you are authorized to lower the impoundment down to an elevation of 108 feet for maintenance activities. On page E-4-60 you state that: "Continued operation of the Shawmut Project is not expected to adversely affect aquatic habitat, including EFH [*Essential Fish Habitat*] for Atlantic salmon. The Licensee operates the Shawmut Project in a run-of-river mode except during routine maintenance operations." However, in the DLA you do not describe the frequency or duration of planned maintenance drawdowns, any proposed limits on the timing of these activities to protect sensitive aquatic resources such as Endangered Species Act-listed Atlantic salmon, or any corresponding effects of maintenance drawdowns on aquatic resources. Therefore, please include in your FLA a description of: (1) the types of activities performed during maintenance drawdowns; and (2) the general frequency and duration of maintenance drawdowns, as well as a general description of the extent and variability of the drawdown between the 108-foot lower limit and 112-foot normal operating level. Additionally, please describe any seasonal limitations or preferences for the maintenance drawdowns if they exist.

16. The cumulative effects analysis for migratory fish in the DLA (pages E-4-62 and E-4-63) generally acknowledges that accumulation of effects from this project, together with other dams and diversions within the Kennebec River Basin between the Brassau Hydroelectric Project and the river mouth at Merrymeeting Bay, has affected migratory fish. The analysis also points out that historic fish passage agreements implemented at the Lockwood, Hydro Kennebec, Shawmut, and Weston Projects have been designed to restore access to riverine habitat for migratory fish. The analysis, however, does not fully describe the actions that have cumulatively affected migratory fish in the basin. For example, the analysis does not identify all major dams and diversion structures on the Kennebec River. It also does not identify major tributaries with historically accessible migratory fish habitat, nor does it indicate whether any have fish passage obstructions or if any such obstructions have upstream or downstream passage facilities. The analysis does not identify any other actions within the geographic scope that might have cumulatively affected migratory fish resources. Therefore, please revise the cumulative effects analysis to include the following:

    (a) identify all dams and hydroelectric projects on the mainstem Kennebec River and major tributaries, their location (preferably by river mile) and a description of whether they currently operate any upstream and downstream fish passage facilities;

(b) describe other actions within the geographic scope of analysis that have cumulatively affected migratory fish (e.g., land use practices, industrial development, fish harvest); and
(c) describe any existing plans and activities for migratory fish restoration, including a discussion of migratory fish stocking goals, locations, and habitat conditions within the basin.

For further guidance on preparing cumulative effects analyses you may want to review the Commission's guidelines for preparing environmental documents, which can be found on the Commission's webpage at: http://www.ferc.gov/industries/hydropower/gen-info/guidelines/eaguide.pdf.

Wildlife and Botanical Resources

17. Sections 4.7.1.1 and 4.7.1.2 of Exhibit E identify terrestrial habitat communities and wetland cover types in the project boundary. The acreages of each habitat and cover type are not provided. Please include the acreages of each habitat and wetland cover type.

18. Section 4.7.2 of Exhibit E briefly mentions the vegetation management practices that you apply within the project boundary (trimming and mowing around project facilities, access road, and recreational facilities). The FLA should describe your vegetation management practices, including your: (1) vegetation maintenance schedule (i.e., activities performed annually, seasonally, as-needed, etc.); (2) procedures for managing vegetation in sensitive habitats (i.e., wetlands, riparian habitat, etc.); and (3) procedures applied when rare, threatened, or endangered plants or animals are encountered during maintenance activities, such as the federally threatened northern long-eared bat, and the state-listed long-leaved bluet.

19. At several points in Exhibit E, you refer to "trace amounts" of species (silky dogwood, stunted silver maple, purple loosestrife) being observed or present in vegetation communities in the project boundary. Please estimate the quantity of these species in more precise terms, describing their abundance within the project boundary, such as the number and size of species patches or area occupied by, and density of species, as appropriate.

20. The FWS IPaC Trust Resource report that you cite in section 4.8.1 is over three years old and no longer valid. Please generate, and cite in the FLA, a current IPaC report for the project area. Include the resources it lists in your evaluation of potential project effects.

21. Please describe and discuss any effects that construction, operation, and maintenance of your proposed fish passage facilities would have on wildlife and their habitats.

Recreation

22. Section 4.9.1.4 of Exhibit E describes formal Project recreation facilities and indicates that their locations are shown on figure 4-13. While figure 4-13 shows an overview of the formal recreation facilities, specific maps for each facility are not included. The FLA should include additional figures showing the formal recreation facilities, and their amenities, to scale.

Cultural Resources

23. Table 4-31 of Exhibit E lists eligible historic properties to be addressed in the Historic Properties Management Plan (HPMP). However, no other reference to an HPMP is made. The FLA should contain a copy of the HPMP.

Developmental Analysis

24. Your Exhibit E does not include a developmental analysis. You should include a developmental analysis in Exhibit E of your FLA. For specific guidance on how to prepare the developmental analysis, see Chapter 4 of the document: *Preparing Environmental Documents, Guidelines for Applicants, Contractors, and Staff* on the Commission's webpage. Section 4.3 of the developmental analysis should include the anticipated capital, as well as annual operation and maintenance, costs for all proposed environmental measures described in the license application.

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Maine Fish and Wildlife Service Complex
P.O. Box A
306 Hatchery Road
East Orland, Maine 04431
207/469-7300 Fax: 207/902-1588

November 30, 2018

Frank Dunlap
Licensing Specialist
Brookfield Renewable
Brookfield White Pine Hydro LLC
150 Main Street
Lewiston, Maine 04240

REF: Comments on Brookfield's Draft License Application for the Shawmut Project (FERC No. 2322-060)

Dear Mr. Dunlap:

Brookfield White Pine Hydro LLC (Licensee) submitted a Draft License Application (DLA) for the Shawmut Hydroelectric Project (FERC No. 2322-060 or Project) to the Federal Energy Regulatory Commission (FERC) on September 24, 2018. On August 1, 2018, the Licensee submitted a request to the FERC for a one-year Extension of Time of the existing license terms to allow time to file a Final License Application pending the outcome of a Feasibility Study. The results of this feasibility study could change operations at the Project and in so doing change the License Application.

Because considerable information is still pending, the Service believes that the current DLA does not accurately portray the situation at the Project. This is no fault of the Licensee, simply the fact that new developments have arisen that could influence the operations of the Project. For these reasons the Service is not providing specific comments at this time. The Service suggests that once the additional information is disseminated, the Licensee and the Resource Agencies discuss the proposed Project operations anticipated in a Final License Application.

Thank you for your cooperation and if you have any questions please feel free to contact Antonio Bentivoglio via telephone at 207/781-8364 x18 or by email at *Antonio_Bentivoglio@fws.gov*.

Sincerely,

ANNA HARRIS Digitally signed by ANNA HARRIS Date: 2018.11.30 09:17:01 -05'00'

Anna Harris
Project Leader
Maine Field Office
Maine Fish and Wildlife Service Complex

cc: Bryan Sojkowski, FWS
Matt Buhyoff, Don Dow, Jeff Murphy, NMFS
Gail Wipplehauser, Casey Clark, Paul Christman, Maine DMR
John Perry, Jason Seiders, Maine DIFW

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

MELANIE LOYZIM
ACTING COMMISSIONER

December 3, 2018

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

RE: Comments on Draft License Application
Shawmut Hydroelectric Project
FERC No. 2322

Dear Ms. Bose:

The Department of Environmental Protection (Department) reviewed the Draft License Application for the Shawmut Hydroelectric Project (FERC 2322), located on the Kennebec River in the towns of Skowhegan, Fairfield, Clinton, and Benton in Somerset County, Maine.

The existing Shawmut Hydroelectric Project consists of a concrete gravity dam, an enclosed forebay, an intake and headworks section, two powerhouses, a tailrace, and interconnection with the local utility's transmission system, and appurtenant facilities. The concrete gravity overflow section dam has a fixed crest elevation of 108.0 feet (USGS datum). The spillway is 1,135 feet long and approximately 24 feet high; the entire dam is approximately 1,480 feet long. The spillway is comprised of several sections; the first section is a non-overflow section located between the forebay headworks structure and the first overflow section, the first overflow sections comprises 380 feet and includes four-foot-high hinged flashboards, the second section has a 25-foot-wide sluice with a timber and steel gate and a crest elevation of 104.0 feet USGS datum, and the third overflow section is 730 feet long and is topped by an inflatable bladder in three sections, each 4.46 feet in height when inflated. A concrete-core earthen dike lies between the west abutment and the headworks structure. At normal full pond elevation of 112.0 feet USGS datum the dam creates an impoundment of 1,310 acres, extending 12.3 miles upstream. The dam operates as a run-of-river facility, and produces52,466 megawatt hours (MWh) of electricity annually. The 1912 powerhouse includes six turbines rated at 1,200 horsepower each, and five generators rated at 750 kilowatts (kW) each and one is rated at 900 kW. The 1982 powerhouse contains two turbines, rated at 2,880 horsepower each and two generators rated at 2,000 kW each. The total installed capacity of the facility is 8,650 kW.

The Department understands that Brookfield White Pine Hydro (Brookfield or the applicant) is proposing to continue operations of the facility in run-of-river mode. In addition, the Department understands that Brookfield is proposing measures to protect and enhance affected environmental resources, including continuing to operate and maintain existing recreational facilities, and to implement measures to provide fish passage past the project site. We further understand that, in response to comments from state and federal resource agencies, Brookfield has conducted various studies to assess the impact of project operations on environmental resources.

Specifically, Brookfield is proposing to:

- Maintain public access and use of Project lands and waters, and to continue to pro9vide for and maintain the existing Project recreation sites including the Hinckley boat launch and canoe portage sites.

- Continue to provide downstream American eel passage by opening a Tainter gate and turning off units 7 and 8 in the 1982 powerhouse for a 6-week period between September 15 and November 15 each year.

- Provide downstream passage for anadromous fish at the Project.

- Develop an operations monitoring plan specifying the methods the applicant will use to monitor operations, including the maintenance of pond level within the license limits.

Brookfield anticipates developing an operations and monitoring plan associated with any upstream and downstream fish passage measures for diadromous species after site specific measures are implemented.

The Department has the following comment on the draft application.

1. The Project history, current operations, and the applicant's proposal are reasonably well documented.
2. Water quality studies conducted pursuant to the Project study plan included:
    a. Collection of lake trophic data in the Shawmut impoundment;
    b. Collection of riverine water quality, including dissolved oxygen and water temperature data, in the Project impoundment and in the tailwater reach;
    c. Sampling benthic macroinvertebrates in the Kennebec River below the project; and
    d. Evaluation of baseline water temperatures at three tributary streams.

The water quality studies provide data sufficient to assess attainment of Maine's water quality standards in the Project impoundment and downstream of the Project dam in an evaluation of the Project's impact on the waters of the Kennebec River. Data collected provide an understanding of current water quality conditions and update historical water quality data sets, document dissolved oxygen concentrations and water temperatures upstream and downstream of the Shawmut dam, document benthic macroinvertebrate community structure and function downstream of the Shawmut dam, and determine the effect of project operations on the habitat for fish and other aquatic life.

<u>Impoundment Trophic State Data Collection</u>

Brookfield completed the lake trophic study in accordance with the Department's Sampling Protocol for Hydropower Studies (2014) and a study plan approved by the Department and filed with FERC on July 1, 2016. Data was collected from June to October 2016 to assess baseline water quality and to assess the trophic state of the Shawmut impoundment. Samples were collected for phosphorus, Chlorophyll-A, color, dissolved oxygen, temperature, pH, total alkalinity, iron, calcium, silica, and sulfate; secchi disk transparency measurements were collected as well. Additional late season samples were collected on August 9, 2016.

Analysis of the sampling results indicates that the Shawmut impoundment is mesotrophic in character, showing minimal signs of nutrient enrichment. The impoundment did not show evidence of stratification. Samples documented good water quality with a low potential for nuisance algal blooms.

Based on the results of sampling and information contained in the draft application as well as initial and revised study results, the Department concludes that Brookfield has provided sufficient information to demonstrate that the project impoundment meets applicable Class B and Class C water quality standards and is free of culturally induced algal blooms which impair it use or enjoyment.

Dissolved Oxygen Monitoring

Brookfield completed dissolved oxygen (DO) monitoring in the Shawmut impoundment and in the tailrace downstream of the Shawmut dam in accordance with the Department's Sampling Protocol for Hydropower Studies (2014) and a study plan approved by the Department and filed with FERC on July 1, 2016. DO and temperature data were collected from June to October 2016.

DO data collected early in the summer indicate that the impoundment stratifies under certain atmospheric conditions. Stratification did not persist and was not apparent later in the summer (during the August sampling). DO concentrations in the Shawmut impoundment ranged from 1.4 mg/L to 9.7 mg/L; low DO measurements (1.4 mg/L, 3.0 mg/L, and 5.4 mgL) were collected in late June and late July. These measurements occurred below the point of compliance, and so are not considered by the Department as non-attainment of water quality standards. Excluding these three low measurements, average DO in the impoundment ranged from 7.0 mg/L to 9.6 mg/L.

DO and temperature sampling in the Project tailrace below the Shawmut dam were collected in accordance with Department protocol using a Onset HOBO U-26 DO data sonde, beginning in June at the Department's request because it had been a particularly dry spring. DO concentrations recorded during the monitoring period ranged from 6.8 mg/L to 9.6 mg/L and between 81.3% and 110.3% saturation.

Analysis of the sampling results indicates that DO concentrations met the applicable Class C water quality standard in the Shawmut impoundment; additional information may be required to fully understand the conditions that led to low DO results in the impoundment. Sampling results indicate that DO concentrations met applicable Class B water quality standard downstream of the dam under conditions of low flow and high water temperature.

Based on the results of sampling and the information contained in the draft application as well as the initial study results, the Department concludes that Brookfield has provided sufficient information to demonstrate that the project outlet stream meets the applicable Class B dissolved oxygen standard under critical water quality conditions, and that that the measured concentrations in the Shawmut impoundment meet applicable Class C water quality standards.

Benthic Macroinvertebrate Monitoring

Brookfield completed a benthic macroinvertebrate study in accordance with the Department's Sampling Protocol for Hydropower Studies (2014) and a study plan approved by the Department and filed with FERC on July 1, 2016. Data was collected from two sampling locations approximately 1,000 feet downstream of the Shawmut dam in representative benthic macroinvertebrate habitat to assess

whether current instream flow releases and project operations are affecting attainment of classification standards for habitat and aquatic life.

Benthic macroinvertebrate samplers were deployed for 28 days (+/- 4 days), from August 11 to September 7, 2016. Habitat and water quality data was collected at the time of deployment and at retrieval. Habitat parameters included substrate composition, canopy coverage, land use, and terrain characteristics; water quality measurements included water velocity, temperature, specific conductance, and dissolved oxygen.

Analysis of the sampling results, including review of associated field sheets, using the Department's linear discriminant model indicates that the sampled macroinvertebrate community meets applicable Class B standards for aquatic life.

Based on the results of sampling, the Department concludes that Brookfield has provided sufficient information to demonstrate that the benthic macroinvertebrate community in the Kennebec River below the Shawmut dam meets Class B aquatic life standards under current and proposed minimum flow conditions.

Outlet Stream Aquatic Habitat

In lieu of conducting a habitat and aquatic life study the applicant proposed to submit three years of impoundment elevation and inflow/outflow data. The proposed data set was submitted on March 22, 2016, in response to an Additional Information Request from FERC.

Review of the submitted data set, along with data collected during the macroinvertebrate study, suggests that run-of-river operations do not negatively affect the quality of aquatic habitat downstream of the Shawmut dam. Based on the information provided in the draft application and in the initial study report, the Department concludes that Brookfield has provided sufficient information to demonstrate that the project meets Class B aquatic life and habitat standards.

Other Comments

The final license application should include final reports and data summaries for all the studies requested by various stakeholders.

Thank you for the opportunity to comment on the Draft License Application. Please contact me by telephone at (207) 446-2642 or by email to kathy.howatt@maine.gov if you have questions.

Sincerely,

Kathy Davis Howatt
Hydropower Coordinator
Maine Department of Environmental Protection
Bureau of Land Resources

cc: Mr. Frank Dunlap, Brookfield White Pine Hydro LLC

Ms. Kelly Maloney, Brookfield White Pine Hydro LLC

December 3, 2018

BEFORE THE

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426
December 3, 2018

FERC Project No. 2322-060 – Maine
Shawmut Hydroelectric Project
Brookfield White Pine Hydro LLC

Subject: Comments of Kennebec Coalition on the Draft License Application for Shawmut Hydroelectric Project, FERC Project No. 2322

A. Introduction

These comments are filed on behalf of four non-profit environmental organizations who have intervened in Project No. 2322 and who have long been involved in Kennebec River fishery restoration efforts: the Atlantic Salmon Federation, the Natural Resources Council of Maine, Maine Rivers, and Trout Unlimited and its Kennebec River chapter. Collectively, these four organizations form the Kennebec Coalition.[1] Three of the organizational members -- the Atlantic Salmon Federation, the Natural Resources Council of Maine, and Trout Unlimited and its Kennebec Valley chapter -- were signatories to the 1998 Kennebec Hydro Developers Group ("KHDG") Agreement,[2] an

[1] These members of the Kennebec Coalition both intervened in and have filed comments on the application for the extension of license term for the Shawmut Hydroelectric Project (Project No. P-2322-067). See, Motion to Intervene and Comments dated September 11, 2018 [FERC Accession No. 20180911-5178].

[2] The KHDG Agreement is formally entitled "the Agreement Between Members of the Kennebec Hydro Developers Group, the Kennebec Coalition, the National Marine Fisheries Service, the State of Maine, and the U.S. Fish and Wildlife Service," and is dated May 26, 1998.

agreement incorporated into the current license terms of the Shawmut Hydroelectric Project, FERC Project No. 2322; see KHDG Agreement ¶ 1B (Parties). The fourth organizational member of the Kennebec Coalition – Maine Rivers – had not yet been constituted in 1998.

Paragraphs IV-A through IV-D of the KHDG Agreement contain discrete provisions that relate only to four dams on the Kennebec River *all of which are owned and operated by* Brookfield White Pine Hydro LLC, a part of Brookfield Renewables: the Lockwood Project FERC No. 2574; the Hydro-Kennebec Project FERC No. 2611; the Shawmut Project FERC No. 2322, and the Weston Project FERC No. 2325. Brookfield became a party to the KHDG Agreement when it acquired the four projects in 2012 to 2013.

In these comments, the Kennebec Coalition will focus on significant flaws and gaps in the approach taken by Brookfield in the Shawmut draft application for new license, as it relates to the project's impacts on sea-run fisheries. The draft application is seriously deficient and must be changed when the time comes for its filing as a complete application.

B. Evaluation of the Environmental Impacts from Relicensing the Shawmut Project Requires a Basin-wide Environmental Scope that Takes Into Account the Impacts from All Four Dams

Assessment of environmental impacts of relicensing the Shawmut Project must legally involve a "basin wide" analysis, taking into account the cumulative impact of all four of these dams. In Brookfield's recent request for a one-year extension of the Shawmut license, the Kennebec Coalition was encouraged by a stated premise of that request, namely that Brookfield was exploring a basin wide solution and approach to fish

passage restoration issues, involving all four of these projects. In particular, NMFS and Brookfield have indicated that the Biological Opinion under the Endangered Species Act addressing jeopardy, survival and recovery of a listed species (Atlantic salmon), would take the form of a combined comprehensive biological opinion addressing all four projects, including Shawmut.

In describing the background for its extension request of the Shawmut license, Brookfield noted that on September 16, 1998, the Commission issued an order "amending the fish passage requirements for the Lockwood, Hydro Kennebec, Shawmut and Weston Projects."[3] In fact, the implementation of those requirements was sequentially linked to the anticipated growth of American shad counts at the Lockwood Project, after the removal of the downstream Edwards Dam in Augusta. From a biological and ecological perspective, the grouping of the four projects for purposes of assessing their impact to sea-run fisheries makes perfect sense, since Lockwood, Hydro Kennebec, Shawmut and Weston are the only four dams on the mainstem of the Kennebec River downstream of the Sandy River, a major tributary which is acknowledged as supporting some of the most productive spawning and rearing critical habitat for endangered Atlantic salmon. Further, as each of the federal and state wildlife agencies recognize, and as this Commission recognizes, dams are among the greatest impediments to the survival and recovery of Atlantic salmon, and to restoration of other important species, such as river herring and American shad.[4] As Brookfield has correctly

[3] Brookfield March 20, 2018 letter to FERC, p.2 [FERC Accession No. 20180320-5201 at 2].

[4] 74 Fed. Reg. 29344, **29366-67 (June 19, 2009) (ESA listing for GOM-DPS of Atlantic salmon). See National Marine Fisheries Service, interim Biological Opinion (including Shawmut Project FERC No. 2322), July 19, 2013, at 53. See also National Research Council of the National Academy of Sciences. 2004. Atlantic Salmon in Maine. National Academy Press, Washington, D.C., pp. 189 & 191.

acknowledged, the Shawmut project must pass sea-run fish in sufficient numbers upstream and downstream not only in isolation, but in combination with the other three dams on the river between the Sandy River confluence and the sea. This must happen in order for there to be meaningful fish restoration under the KHDG Agreement, and in order to avoid "jeopardy" to the survival and recovery of Atlantic salmon under the Endangered Species Act.

Performing a cumulative, basin-wide analysis is consistent with the terms of the KHDG Agreement. The KHDG Agreement is "intended to accomplish" the purposes of achieving "a comprehensive settlement governing fisheries restoration, for numerous anadromous and catadromous species," and to "rapidly assist in the restoration of these species in the Kennebec River (from 1998 forward)." The KHDG Agreement was intended to address the "next phase of a restoration program for these species on the Kennebec River." KHDG Agreement, Part II ("Purpose").

Biological assessment of the fish restoration impacts of the Shawmut relicensing in issue cannot take place – legally or factually – in isolation without regard to the impacts caused by the other three Brookfield-owned projects on the main-stem Kennebec. All four projects are located within designated critical habitat of listed endangered species, including the Gulf of Maine Distinct Population Segment (GOM-DPS) of Atlantic salmon.[5] As the Kennebec Coalition has regularly emphasized, there is no case known to science, and no current experience, where fish passage facilities constructed at more than one major main-stem dam have been able to satisfactorily pass fish entirely upstream, past all dams, at performance standards necessary for restoration

[5] 74 Fed. Reg. 29300 (June 19, 2009) (codified at 50 C.F.R. § 226.217) (critical habitat designation).

of self-sustaining migratory runs. The Declaration of John Waldman, which the Kennebec Coalition has brought to the Commission's attention on the Hydro-Kennebec project file [FERC Accession No. 20171103-5100 in Project No. P-2611] underscores this point forcefully.[6]

1. An Environmental Impact Statement is Essential

Like all federal agencies, FERC is subject to the requirements of the National Environmental Policy Act of 1969 ("NEPA"), as implemented by the regulations of the Council on Environmental Quality, 40 C.F.R. parts 1500 through 1508, which apply to FERC "except where those regulations are inconsistent with the statutory requirements of the Commission." 18 C.F.R. 380.1. The relevant FERC regulation regarding actions that require an environmental impact statement ("EIS") is 18 C.F.R. 380.5. While stating that normally an environmental assessment will be required first for an action (which is what the subject draft application for new license proposes), "depending on the location or scope of the proposed action, or the resources affected, the Commission may in specific circumstances proceed directly to prepare an environmental impact statement." 18 C.F.R. 380.5. The list of projects in 18 C.F.R. 380.6 that "normally" require that an EIS be prepared first is nonexclusive (it refers only to "normally") and does not preclude first requiring an EIS for any other "major Federal action significantly affecting the quality of the human environment," which is the case here We submit that a basin wide evaluation of alternatives, ranging from removal or decommissioning to alternative structures or

[6] Paragraph 17 of Professor Waldman's expert opinion concludes: "Simply put, engineered fish passage for multiple dams on other Atlantic rivers has been a dismal failure. There is no reason to believe it will work on the Kennebec." Waldman Declaration ¶ 17.

passage facilities, that Brookfield is now committed to undertake, is such a major federal action.

Moreover, in the letter to the Commission dated March 20, 2018 [FERC Accession No. 20180320-5201] Brookfield lists the delays that have occurred since the Commission's approval of the KHDG Agreement in 1998 (almost exactly 20 years ago). The letter of March 20th states:

> Since the fall of 2017, Brookfield Renewable has been meeting with MDMR, NMFS, USFWS and others to collaboratively discuss an alternative multi-dam approach to improve fish passage on the Kennebec River. Brookfield Renewable, the agencies and others agreed to develop and conduct an independent feasibility assessment to explore a range of fish passage options at the Lockwood, Hydro Kennebec, Shawmut and Weston Projects including but not limited to options currently proposed….[7]

These collaborative discussions appear to have led to a consultation with an "expert group of fishway engineers" who advised Brookfield that a variety of alternatives do exist and that these "alternatives range from removal to alternate passage structures and facilities."[8] Clearly, since the range of options to be considered include dam removal, the environmental impact analysis statutorily required is vastly more in-depth than the standard "fill the blanks" EA suggested by Brookfield in the draft application for new license [9] which we urge the Commission to reject and instead order an EIS at the outset.

We are not alone in urging an EIS. By letter to FERC dated August 9, 2017, the U.S. Fish and Wildlife Service wrote:

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[7] Brookfield March 20, 2018 letter to FERC, p.4 [FERC Accession No. 20180320-5201 at 2].

[8] NOAA Fisheries letter of March 9, 2018, at p. 3 (attached to the Brookfield March 20th letter, FERC Accession No. 20180320-5201].

[9] Draft Application for New License at Exhibit E, Section 3.0.

> The restoration of Atlantic salmon and other anadromous species in the Kennebec River, the second largest river in Maine, has generated significant public interest. For these reasons, we feel there is sufficient information to conclude that the Shawmut Project affects important natural resources, and its relicensing constitutes a major federal action significantly affecting the quality of the human environment….Given the existing information on project effects, we recommend that FERC analyze the impacts of the project by preparing an EIS rather than an EA.[10]

In sum, Brookfield is embarking on a "basin wide" approach which will consider not only the Shawmut project, but also the operational date for volitional fish passage for three dams (Lockwood, Shawmut and Weston), all in the context of passage possibilities of the fourth dam in the evaluation, Hydro Kennebec. We concur with the U.S. Fish and Wildlife Service that this evaluation will lead to consideration of a "major federal action significantly affecting the quality of the human environment" in the Kennebec River basin.

2. The Environmental Baseline

The draft application for new license's discussion of proposed actions states that FERC uses the existing operations of the facility "to establish baseline environmental conditions with other alternatives." Draft Application for New License, at E-3-1. While we concur with this as a general principle, we note that the basin wide circumstances considered by Brookfield must also include the existing operations of each of the four dams. Among the most important of the existing conditions is the existence of four major impoundments – impounded waters created by the damming of the river at the four

[10] Letter to Vince Yearick, Director , Division of Hydropower Licensing, FERC, from Anna Harris, Project Leader, Maine Field Office, Fish and Wildlife Service, United Sates Department of the Interior, August 9, 2017.

projects. In the aggregate, these impoundments cover a significant percentage of the river from the Lockwood project to the Weston project.

We emphasize impoundments here because it has long been recognized that these areas of the riverine environment are deleterious to the recovery of fish species. For example, in the 2013 Biological Opinion regarding the Lockwood, Shawmut, and Weston Projects on the Kennebec River, NMFS concluded:

> Dams have eliminated or degraded vast, but to date un-quantified, reaches of suitable rearing habitat in the Kennebec . . . watershed. The Kennebec River consists of 254,558 historic habitat units, with 44, 402 units considered to be occupied . . . . Impoundments created by these dams limit access to habitat, alter water quality through increased temperatures and lowered dissolved oxygen levels. Furthermore, because hydroelectric dams are typically constructed in reaches with moderate to high underlying gradients, significant areas of free flowing habitat have been converted to impounded habitats in the Kennebec . . . River watersheds. Coincidently, these moderate to high gradient reaches, if free-flowing, would likely constitute the highest value as Atlantic salmon spawning nursery, and adult resting habitat within the context of all potential salmon habitat within these reaches.[11]

In short, dams are a man-made degradation of the natural riverine environment that are an essential component of the environmental baseline. However, as reflected in the decision in *American Rivers and Alabama Rivers Alliance v. Federal Energy Regulatory Commission*, 895 F.3d 32, 46-50 (D.C. Cir. 2018), that degradation cannot be ignored in the environmental analysis required by the National Environmental Policy Act ("NEPA"), for the reasons discussed in the next section.

3. NEPA Requirements and the Decision in *American Rivers*

[11] National Marine Fisheries Service, interim Biological Opinion, July 19, 2013, at 46.

NEPA's primary function is to compel federal agencies "to take a hard and honest look at the environmental consequences of their decisions." *American Rivers*, 895 F.3d at 49. NEPA, 42 U.S.C. 4332(C), requires an EIS for any major federal action that might significantly affect the human environment.[12] The NEPA requirements are elaborated in the Regulations of the Council on Environmental Quality, and in the case of FERC, by 18 C.F.R. 308 et seq. As we have noted above, FERC has the discretion to require an EIS without first evaluating an environmental assessment when it is determined that "significant environmental impacts" might result from the proposed federal action.

(i) Significance and Intensity: Evaluating "an action's environmental 'significance' requires analyzing both the context in which the action takes place and the intensity of its impact." *American Rivers*, 895 F.3d at 49. While "significance typically depends on the action's effects in the immediate locale, rather than in the broader ecosystem or world as a whole," "intensity" refers to the " 'severity' or acuteness of the impact on the contextualized environment." *Id.* at 49-50. These criteria are spelled out in greater detail in the NEPA implementing regulations. *See* 40 C.F.R. 1508.27 (b). Obviously, this is a fact driven analysis, but there is little doubt on the ultimate federal action involved here – relicensing of a project that is one of four projects within a cumulative and combined environmental analysis of a NMFS biological opinion, incidental take permissions, and final species protection plan. The environmental impacts of relicensing of Shawmut in this context are significant and intense.

[12] See *American Rivers, supra*, 895 F.3d at 49; *Sierra Club v. Peterson*, 717 F.2d. 1409 (D.C. Cir. 1983).

(ii) Consideration of Cumulative Impacts: According to 40 C.F.R. 1508.7, cumulative impacts are " the incremental impact of the action [on the environment] when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions." What is key here is that the agency must consider the incremental impact of the action at issue "when added to other past, present, and reasonably foreseeable future actions." *Grand Canyon Trust v. FAA*, 290 F.3d 339, 342 (D.C. Cir. 2002). In other words, evaluation of the "total impacts" cannot "isolate a proposed project, viewing it in a vacuum." *Id.*

Here, the draft application for new license does not contain any developed "operations and maintenance plan associated with any upstream and downstream fish passage measures for diadromous species." Draft Application for New License at ¶ 3.3.3; see also ¶ 3.2.5 (fifth bullet point). The Kennebec Coalition's position is that whatever plans are proposed cannot be proposed or evaluated in a vacuum. Performance standards for upstream passage, for example, must consider that any fish reaching the Shawmut Project will in theory have passed already two dams (Lockwood and Hydro Kennebec), and, again in theory, fish passing Shawmut will need to confront and pass Weston, in order to access the Sandy River (and its critical spawning and rearing habitat for Atlantic salmon). *American Rivers, supra*, 895 F.3d at 49-54, emphasizes these principles in rejecting FERC's reliance on a biological opinion's erroneous conclusions which improperly used a flawed baseline for measuring environmental impacts. The Court's views are instructive:

> As a result, the Service's failure to factor the damage already wrought by the construction of dams into the cumulative effects analysis fatally infected this aspect of the Commission's NEPA decision. . . . The Commission gave scant attention to those past actions that had led to and

> were perpetuating the Coosa River's heavily damaged and fragile ecosystem. Nor did it offer any substantive analysis of how the present impacts of those past actions would combine and interact with the added impacts of the 30-year licensing decision. The Commission's cumulative impact analysis left out critical parts of the equation and, as a result fell far short of the NEPA mark.

Id. at 54.

(iii) Inadequate Cumulative Effects Discussion in the Draft License Application: The inaptly described "Environmental Analysis" in the Draft License Application at pages E-4-1 through E-4-127 is devoid of any analysis that meets the statutory and regulatory environmental impact analysis criteria, especially in light of recent precedent explaining and applying such criteria in *American Rivers*, *supra,* 895 F.3d 32 (D.C. Cir. 2018). There is, for example, no effort to assess the incremental (and demonstrably damaging) effect of the impoundments as cumulative impacts of the relicensing decision. As a final example, the draft application for new license does not address the subject of how fish passage facilities plans or operations at Shawmut will meet performance standards for upstream and downstream passage of diadromous fish species (or even what those performance standards will be) for both ESA-listed and for non-listed species, to achieve the goal of fish restoration to the Kennebec River.

4. FERC Staff Additional Information Requests

The Kennebec Coalition concurs in the FERC staff comments filed on November 30, 2018 ["Staff Comments" FERC Accession No. 20181130-3023]. In particular, the Kennebec Coalition reiterates and underscores the requirement of documentation of consultation with the Kennebec Coalition (Staff Comments ¶ 12 and footnote 3) on new or modified fish passage facilities as a result of the promised fish passage assessment for the four projects.

In addition to our general concurrence with the staff comments, the Kennebec Coalition draws particular attention to the points made in Staff Comment ¶ 16, which raise much of the same issues that the Kennebec Coalition describes above involving gaps in the requirements of a *complete cumulative effects* analysis for migratory fish. The Kennebec Coalition accordingly concurs with FERC staff comments that the cumulative effects analysis (pages E- 4-62 and E-4-63 of the draft application) would require complete revision for any final license application.

5. Decommissioning

The Draft Application for New License's draft EA (page E-3-8) devotes very little attention to the request of numerous stakeholders, including the Kennebec Coalition, that the Commission assess as an alternative the decommissioning and removal of the Shawmut dam. We urge the Commission, based on the *American Rivers* analysis, to conclude that relicensing of the Shawmut Project would not be consistent with the applicable NEPA standards, or with the ESA and other environmental impacts standards within the regulatory criteria of the Commission, and that the final order in this proceeding should require removal of the Shawmut hydropower dam.

Respectfully submitted,

The Kennebec Coalition by,

/S/ Charles Owen Verrill, Jr
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CERTIFICATE OF SERVICE

I, Charles Owen Verrill, Jr., hereby certify that a copy of these comments was transmitted by electronic means to each of the persons on the Service list maintained by the Secretary of the Commission on December 3, 2018.

/S/ Charles Owen Verrill, Jr.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

DEC - 3 2018

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

RE: Draft License Application for the Shawmut Hydroelectric Project (FERC No. 2322-060)

Dear Ms. Bose,

On September 24, 2018, Brookfield White Pine Hydro, LLC (Brookfield or Licensee) submitted its Draft License Application (DLA) for the Shawmut Hydroelectric Project (FERC No. 2322-060 or Project) to the Federal Energy Regulatory Commission. The project is located on the Kennebec River in Kennebec and Somerset Counties near the towns of Fairfield and Benton, Maine. We are submitting comments on the DLA in accordance with the Commission's Integrated Licensing Process (ILP).

NMFS Comments on the DLA
We find that the DLA, in its current form, is incomplete and its consideration of effects of the action on Atlantic salmon is inadequate. This is because the DLA does not include any proposed structural or operational modifications and scant environmental measures and is therefore inadequate for the protection of federally listed Atlantic salmon and other diadromous species from detrimental project effects. We note that there are ongoing or incomplete processes that could significantly affect the Licensee's proposed action in the near-term. The ongoing and/or incomplete processes include:

1) A Commission-required fish assemblage study that the licensee has not yet conducted.
2) Development of a Species Protection Plan for endangered Atlantic salmon via ongoing Endangered Species Act consultation with the Licensee for the Shawmut Project and three other hydroelectric projects on the mainstem of the Kennebec River. We note that the Species Protection Plan is not required but rather that it can be a helpful format for addressing all measures that the Licensee proposes to carry out to minimize, mitigate and monitor effects of the project on Atlantic salmon. Regardless of whether the Licensee develops a Species Protection Plan, the DLA must include a thorough description of how the Licensee proposes to minimize, mitigate and monitor effects of the project on Atlantic salmon.
3) Ongoing multi-party discussions that include our goals of: 1) Collaborative engagement with Brookfield regarding actions necessary to recover critically endangered Atlantic salmon and the ecosystems on which they depend, including other co-evolved diadromous species; and, 2) seeking a comprehensive approach to addressing challenges posed by dams in the recovery of Atlantic salmon and other diadromous species.

4) An outstanding request by the Licensee for the Commission to amend the current project license to accommodate an extension of the license term at the Shawmut Project. We discuss this outstanding request further, under the *Request for License Amendment* heading below.

Considering that the DLA is incomplete, and that significant information is still pending in this proceeding, we consider the DLA to be a placeholder -- an outcome of the Commission's regulatory requirement to adhere to ILP filing dates. As such, we are not providing specific comments on the DLA at this time and will provide substantive comments when there is a complete DLA or license application to comment on.

Request for License Amendment

On August 1, 2018, Brookfield requested an amendment of the license for the Shawmut Hydroelectric Project to extend the expiration date of the project license from January 31, 2021, to January 31, 2022. Brookfield stated that it requested this amendment in an effort to coordinate relicensing efforts at the Shawmut project with ongoing consultations to address fish passage on the Kennebec River in a more broad-scale and comprehensive manner. The extension of time request included letters of support from several resource agencies, including us. Our letter of support stated:

> "We are supportive of Brookfield's request. As noted by Brookfield in its request letter, we have participated in deliberative multi-party discussions for several months in pursuit of creative, viable, and effective alternatives to fish passage in the lower Kennebec River, which will greatly benefit the restoration and maintenance of healthy diadromous fish populations that support coastal communities in Maine. Additionally, we are engaged in Endangered Species Act (ESA) consultation, in collaboration with other resource agencies, in an effort to develop new species protection plan (SPP) for the Lockwood, Shawmut, Weston, and Hydro Kennebec hydroelectric projects. Throughout these discussions, it has been our intent to: (1) engage Brookfield in a collaborative way about the need to act to recover critically endangered Atlantic salmon and other co-evolved diadromous species; and, (2) seek a comprehensive approach to addressing challenges posed by dams in the recovery of Atlantic salmon and other diadromous species.
>
> In order to account for the Shawmut project comprehensively with the other lower Kennebec projects, the relicensing of Shawmut project will ultimately need to incorporate information that is currently under development as part of the multi-party discussions and the ongoing ESA consultation. Given the current relicensing schedule, which requires Brookfield to submit a final license application by January 31 2019, it would be unlikely for that information to be adequately incorporated into any license application. As such, we believe that granting Brookfield's request would lessen stakeholder confusion amidst these comprehensive discussions, and eliminate the imposition of an unnecessary regulatory burden upon the collaborative work that stakeholders are involved in to ensure the health and survival of critically endangered Atlantic salmon and

other protected and native diadromous species in the lower Kennebec River."

It is our understanding that the Commission has yet to make a determination on the Licensee's request for an extension of time, which was supported by multiple stakeholders. We respectfully request that Commission act expeditiously to amend the Shawmut Project license in accordance with the Licensee's request for an extension of time. In doing so, the Commission can reduce the unnecessary regulatory burden and confusion placed on both the project stakeholders and the Licensee in filing mostly superfluous placeholder documents like this DLA. In addition, expediting the requested amendment can only strengthen the possibility of a comprehensive agreement between project stakeholders and the Licensee. The Commission has indicated that it views such agreements in "great favor" as they can "save time and money, avoid the need for protracted litigation, promote the development of positive relationships among entities who may be working together during the course of a license term, and give the Commission, as it acts on license and exemption applications, a clear sense as to the parties' views on the issues presented in each settled case."[1]

Please contact Matt Buhyoff by phone (207-866-4238) or by email (matt.buhyoff@noaa.gov) if you have questions regarding this correspondence.

Sincerely,

Julia Crocker for

Michael Asaro
Acting Assistant Regional Administrator for
Protected Resources

[1] FERC Policy Statement on Hydropower Licensing Settlements. 116 FERC ¶61,270.

165 FERC ¶ 62,152

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Brookfield White Pine Hydro, LLC Project No. 2322-067

ORDER EXTENDING LICENSE TERM

(Issued December 11, 2018)

1. On August 1, 2018, Brookfield Renewable Partners, L.P. (Brookfield), on behalf of its affiliate Brookfield White Pine Hydro, LLC (licensee), filed a request with the Commission to extend the license[1] term for the Shawmut Hydroelectric Project No. 2322. The licensee requests a one year extension of the license term to January 31, 2022. The project is located on the Kennebec River, in Kennebec and Somerset Counties, Maine.

Background

2. On January 5, 1981, the Commission issued a 40-year license for the operation and maintenance of the Shawmut Project that expires on January 31, 2021. The Shawmut Project is located on the lower Kennebec River, downstream from the Weston Project No. 2325, also licensed to the licensee, and upstream of the Lockwood Project No. 2574, licensed to Merimil Limited Partnership,[2] and the Hydro-Kennebec Project No. 2611, licensed to Hydro-Kennebec LLC.[3]

3. In 2009, Atlantic salmon were listed as endangered species in the lower Kennebec River. In order to address the protection of Atlantic salmon, on February 21, 2013, Brookfield filed an Interim Species Protection Plan (ISPP) and Biological Assessment (BA) with the Commission for the Weston, Shawmut, and Lockwood Projects.[4] On May 19, 2016, the Commission approved the ISPP, which requires the licensees to implement

[1] *Central Maine Power Company*, 14 FERC ¶ 62,004 (1981).

[2] Brookfield is a general partner for Merimil Limited Partnership, and is responsible for operating the Lockwood Project.

[3] Hydro-Kennebec, LLC is an affiliate of Brookfield.

[4] Hydro-Kennebec, LLC filed an ISPP for the Hydro-Kennebec Project, separately, on April 6, 2012, which the Commission approved on February 28, 2013. See *Hydro-Kennebec, LLC*, 142 FERC ¶ 62,174.

interim measures to avoid and minimize impacts to endangered Atlantic salmon from 2013 through 2019.[5]

4. The licensee filed a pre-application document and notice of intent to relicense the Shawmut Project on September 21, 2015, and is required to file the final application for a new license by January 31, 2019.[6] Brookfield is currently in the process of developing a final BA and Species Protection Plan (SPP) for Atlantic salmon for the four lower Kennebec River projects, ahead of the expiration date of the ISPP in December 2019.[7] In addition, Brookfield initiated discussions with resource agencies to develop a multi-dam approach to improve fish passage on the lower Kennebec River. As a result, Brookfield and the resource agencies agreed to develop and conduct an independent feasibility assessment to explore fish passage options and alternatives at the lower Kennebec River Projects. The feasibility assessment and resulting review are expected to take at least a year to complete.

5. In order to allow time to complete the feasibility assessment, as well as the BA and SPP, Brookfield requests a one year extension of the license term so that the final license application for the Shawmut Project would be due no later than January 31, 2020. Brookfield states that the extension would allow it to incorporate the findings of the fish passage feasibility assessment, BA, and SPP into the final license application. Brookfield included with its request correspondence from the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (FWS), Maine Department of Marine Resources (Maine DMR), and Maine Department of Inland Fisheries and Wildlife (Maine DIFW) supporting the license term extension.

Public Notice

6. The Commission issued a public notice of Brookfield's request on August 16, 2018, setting a deadline of September 17, 2018, for filing comments, motions

[5] *Merimil Limited Partnership*, 155 FERC ¶ 61,185 (2016).

[6] The Commission's regulations require a licensee to file a notification of intent to relicense 5 to 5.5 years prior to the expiration date of the license, 18 C.F.R. § 5.5(d) (2018), and to file a new license application at least 24 months prior to the expiration date of the license, 18 C.F.R. § 16.9(b) (2018).

[7] The ISPP for the Hydro-Kennebec Project required implementation of interim measures for years 2012 through 2016. On March 14, 2018, the Commission approved Brookfield's request to extend the Hydro-Kennebec Project ISPP through 2019 to align it with that of the Weston, Shawmut, and Lockwood Projects. *Hydro-Kennebec, LLC*, 162 FERC ¶ 62,158.

to intervene, and protests. A timely motion to intervene was filed jointly by the Atlantic Salmon Federation, Kennebec Valley Chapter of Trout Unlimited, Maine Rivers, and the National Resources Council of Maine (collectively, the Kennebec Coalition).[8] Timely notices of intervention were filed by Maine DIFW, FWS, the Bureau of Indian Affairs, and NMFS.[9]

7. NMFS filed comments restating its support for the license term extension. The Kennebec Coalition filed comments stating it would support the extension on the condition that Brookfield file a report, 6 months into the extension, on the status of the fish passage feasibility assessment and review, and the development of any fish passage alternatives for the four projects on the lower Kennebec River. The Kennebec Coalition states that the report would allow the coalition to monitor the status of progress in the extension period, and to respond further, provide input, or if necessary object to the findings in the assessment process.

Discussion

8. Extending the license term for the Shawmut Project would allow Brookfield to complete the BA and SPP for the protection of Atlantic salmon before filing its final license application. In addition, the extension would allow Brookfield and the resource agencies additional time to complete the feasibility assessment of fish passage options for the lower Kennebec River, and to review the findings. Accordingly, the extension would allow Brookfield to file a more comprehensive final license application for the Shawmut Project, and should be approved.

9. In ordering paragraph (C), we are requiring the licensee to file a report, 6 months into the extension, detailing the status of the multi-dam feasibility study for fish passage and alternatives for the lower Kennebec River. The report must include at a minimum: (a) the status of the feasibility assessment and resulting review of multi-dam fish passage and alternatives for the projects on the lower Kennebec River; (b) any identified fish passage alternatives; and (c) documentation of consultation with the resource agencies and the members of the Kennebec Coalition.

The Director orders:

(A) Brookfield White Pine Hydro, LLC's request to extend the license term for the Shawmut Hydroelectric Project No. 2322, filed on August 1, 2018, is approved.

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[8] Timely, unopposed motions to intervene are granted by operation of Rule 214(c) of the Commission's Rules of Practice and Procedure. 18 C.F.R. § 385.214(c) (2018).

[9] Timely notices of intervention are granted by operation of Rule 214(a)(2) of the Commission's Rules of Practice and Procedure. 18 C.F.R. § 214(a)(2) (2018).

(B) The license term for the Shawmut Project is extended to January 31, 2022.

(C) The licensee must file a report with the Commission by June 30, 2019 detailing the status of the multi-dam feasibility study for fish passage on the lower Kennebec River. The report must include: (a) a discussion of the status of the progress of the feasibility assessment and resulting review of multi-dam fish passage and alternatives for the projects on the lower Kennebec River; (b) any identified fish passage alternatives; and (c) documentation of consultation with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Maine Department of Marine Resources, Maine Department of Inland Fisheries and Wildlife, Atlantic Salmon Federation, Kennebec Valley Chapter of Trout Unlimited, Maine Rivers, and the National Resources Council of Maine. The licensee must provide a draft copy of the report to the above agencies and entities, providing them with at least 30 days to review and comment on the report, before filing the final report with the Commission.

(D) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 825*l* (2012), and the Commission's regulations at 18 C.F.R. § 385.713 (2018). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Steve Hocking, Chief
Environmental and Project Review Branch
Division of Hydropower Administration
and Compliance

APPENDIX E-3

FISH ASSEMBLAGE STUDY

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Fish Assemblage Survey

Shawmut Hydroelectric Project, FERC No. 2322

Prepared For
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November 2019

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1 Introduction

A survey of the resident fish community was conducted in support of the relicensing for the Shawmut Hydroelectric Project (Project or Shawmut), Federal Energy Regulatory Commission (FERC) No. 2322, as identified in the Revised Study Plan (RSP) submitted by Brookfield White Pine Hydro LLC (White Pine Hydro or Licensee) on July 1, 2016 and approved by FERC in its Study Plan Determination letter dated July 28, 2016. Since the performance of the resident fish community survey is considered as an "action" under the Endangered Species Act (ESA) due to the potential presence of Atlantic salmon and the geographical location of Shawmut within the bounds of critical habitat for the species, White Pine Hydro provided a consultation request and pertinent information of potential use of the Project area by Atlantic Salmon to the National Marine Fisheries Service (NMFS) on July 18, 2019. Based upon their review of the submitted information and existing knowledge of the species and Project area, NMFS concurred with White Pine Hydro that the proposed action (i.e., the Fish Assemblage Study; Study) was not likely to adversely affect any NMFS ESA-listed species or critical habitat. This report provides a summary of the methods and results from the Shawmut Fish Assemblage Study which was conducted during September-October, 2019.

2 Study Objectives

The goal of this study was to characterize the occurrence, distribution and relative abundance of fish species present within the Shawmut Project boundary, from a point approximately 12.3 miles upstream of the dam to a point approximately 4,000 feet downstream of the dam.

Specific objectives included:

- Documentation of fish species occurrence, distribution and relative abundance within the project impoundment and tailwater reaches;
- Comparison of historical records of fish species occurrence in the Project area to the results from this study; and
- Collection of biometric data necessary for the characterization of fish population dynamics.

3 Study Area

The Shawmut Project is located at River Mile (RM) 66 on the Kennebec River, in south-central Maine in Kennebec and Somerset counties. Project facilities consist of a concrete gravity dam, headworks section, enclosed forebay and two powerhouses. The Project impoundment is 1,310 acres at a normal full pond elevation. The Project boundary extends approximately 12.3 miles upstream of the dam generally following the normal pond elevation of 112.0' and approximately 4,000 foot downstream of the dam. The study area for the fish assemblage survey included locations within both the Project impoundment as well as the 4,000 foot reach downstream of the dam.

4 Methods

4.1 Shawmut Impoundment

A qualitative visual-based survey of the Project impoundment was conducted prior to determining the placement of transects for fish assemblage sampling. The boat-based survey consisted of a visual evaluation of littoral zone substrate types to determine the proportional and spatial distribution of dominant substrate throughout the impoundment area. The modified Wentworth scale presented in Table 4-1 was used for classifications of dominant substrate types. The visual survey was intended to inform placement of electrofish transects over dominant substrate types in proportion to their occurrence within the impoundment.

Following review of the impoundment habitat survey, a total of 15, 300-meter (m) electrofish transects were placed using a stratified-random design. Boat electrofish sampling took place during the early morning (~0730 – 1030) and late afternoon (~1400-1800) hours. Prior to the start of sampling, settings on the electrofishing unit were adjusted by a trained crew member to ensure that approximately 3.0-4.0 amps of pulsed DC current was being generated. After recording the start time, boat electrofish sampling consisted of a single shoreline pass starting at the downstream end of the transect and proceeding upstream. Effort was made by the boat driver to follow the shoreline contour and probe the sampling anodes into habitat areas (i.e., overhanging vegetation, submerged aquatic vegetation, woody debris, etc.). The boat driver maintained the boat in a range of water depths from approximately 2-8 feet where the sampling field would be most effective. A pair of scap netters standing on the bow of the sampling vessel netted and placed all stunned fish into an onboard livewell for processing. Once the sample transect was finished, the driver recorded the completion time, and duration of the sampling effort (i.e., the number of seconds of pedal time as recorded on the Smith Root counter).

During completion of each electrofish transect, the boat crew visually evaluated habitat along the 300-m reach. Once completed, the dominant substrate, proportion of transect with submerged aquatic vegetation (i.e., 0-25%, 5-50%, 50-75%, or 75-100%), and the proportion of transect with overhanging vegetative cover (i.e., 0-25%, 5-50%, 50-75%, or 75-100%) was recorded. To get a sense of relative water depth for the Kennebec River at each sampling transect, a series of nine measurements were collected. River depths were recorded at the quarter points (i.e., 25, 50, and 75%) of three cross sections placed at the upstream extent, downstream extent, and midpoint of each electrofish transect. Following documentation of transect habitat and characteristics, a water quality measurement was collected along the shoreline transect at approximately one foot of depth. Water temperature (ºC) and dissolved oxygen (mg/L) were recorded.

All fish collected via electrofish sampling were identified to the lowest possible taxonomic classification (preferably to species), enumerated, measured to total length (to the nearest mm), and weighed (to the nearest g). If large numbers of small fish (i.e., YOY or small cyprinid species) were captured, length and weight information was collected from the first 25 individuals within the sample and the remaining individuals were grouped, enumerated, and batch weighed. The field crew was prepared to retain scale samples of any sampled salmonid species and to provide them to the Maine Department of Inland Fisheries and Wildlife (MDIFW) for their use. Similarly, the field crew retained any black crappie or Northern pike on ice following processing

and later provided to MDIFW staff for aging purposes. Following processing, all fish were released except for those retained as MDIFW specimens.

4.2 Shawmut Tailwater

Midwest Biodiversity Institute (MBI) was contracted to conduct the fish assemblage sampling within the 4,000 foot reach downstream of the Shawmut dam. A total of three approximately 300-m transects were placed in areas of habitat that were (1) safely accessible via the electrofish sampling gear and two-man crew, and (2) representative of the substrate and water depths available throughout the downstream reach. MBI employed a 16-foot inflatable raft, outfitted with a constructed metal frame and bow platform enclosed with safety railings. A Smith-Root 5.0 GPP electrofishing unit was mounted onto the raft frame and used to conduct the survey. The electrofish boat used for the tailrace sampling was manned by a boat driver and a single scap netter. The collection and processing of fish catch as well as recorded notations on the aquatic habitat sampled were similar to those described above for the impoundment sampling.

Table 4–1. Modified Wentworth scale for substrate classifications

Code	Size Class	Size Range (mm)	Description
RS	Bedrock (Smooth)	>4000	Smooth surface rock bigger than a car
RR	Bedrock (Rough)	>4000	Rough surface rock bigger than a car
XB	Large Boulders	>1000 to 4000	Meter stick to car size
SB	Small Boulders	>250 to 1000	Basketball to meter stick size
CB	Cobbles	>64 to 250	Tennis ball to basketball size
GC	Gravel (Coarse)	>16 to 64	Marble to tennis ball size
GF	Gravel (Fine)	> 2 to 16	Ladybug to marble size
SA	Sand	>0.06 to 2	Gritty – up to ladybug size,
FN	Fines	<0.06	Silt-Clay-Muck (not gritty between fingers)
HP	Hardpan		Firm, consolidated fine substrate
WD	Wood	Regardless of Size	Wood & other organic particles
OT	Other	Regardless of Size	Concrete, metal, tires, etc. (note in comments)

5 Results

5.1 Shawmut Impoundment

5.1.1 Habitat Survey and Transect Placement

The visual survey of impoundment shoreline substrate/habitat typing was conducted by boat on September 11, 2019. The survey did not indicate a diverse assemblage of shoreline substrate/habitat types but instead indicated that the Shawmut impoundment is dominated by primarily sand substrate. Based on the uniform shoreline substrate type, the Shawmut impoundment was stratified into an upper, middle and lower section and the 15, 300-m transects were randomly placed within those three strata (Figure 5-1, Table 5-1). Following placement, a specific river bank (i.e., east or west) was randomly selected for electrofish sampling.

5.1.2 Sampling Effort

Fish community data was collected from a total of 15,300-m transects (Figure 5-1) placed throughout the Shawmut impoundment over a three day period from September 16-18, 2019 (Table 5-2). Sampling was conducted during the early morning and late afternoon/evening hours to target periods of time where fish activity was likely to be greater in the littoral habitat being sampled than would be expected at mid-day. Sampling effort ranged between 589-784 seconds of pedal time to cover a 300-m transect. Two netters were used during all impoundment sampling.

5.1.3 Species Richness and Composition

A total of 798 individuals representing eight families and thirteen fish species were collected from the Shawmut impoundment during September, 2019 when all 15 sampling locations are considered. Table 5-3 presents the total count and percent composition of fish catch across the entire Shawmut impoundment as well as by section (i.e., upper, middle and lower). When all sampling locations are considered, Yellow Perch were the most abundant species representing over 50% of the total catch. Largemouth Bass (12.3%), Golden Shiner (10.4%) and Alewife (5.0%) were the only other species to represent greater than or equal to 5% of the total catch.

Greater than half of the total catch was collected from the five boat electrofish transects located in the lower third of the Shawmut impoundment (Table 5-3). Eleven of the thirteen fish species observed in the Shawmut impoundment were present in the lowermost section of the reach with Yellow Perch the most abundant species. Transects in the middle section of the Shawmut impoundment yielded a total of 10 species with Yellow Perch being collected in the greatest abundance. All of the thirteen fish species observed in the Shawmut impoundment were observed at the five transects placed in the uppermost section of the reach. Similar to catch in the middle and lower sections, Yellow Perch were the most abundant fish collected at the uppermost stations.

5.1.4 Relative Abundance

Relative abundance, the number of fish captured with known sampling effort and indexed as catch per unit of effort (CPUE), was calculated on a species-specific basis. CPUE values were standardized to a fixed unit of time or distance using the following equations:

For time (i.e., fish per hour): CPUE for taxon *j* in sample *i* = (catch $_{ji}$ / duration *i*) * 60 min

Where: duration is expressed in minutes

For distance (i.e., fish per 100 m): CPUE for taxon *j* in sample *i* = (catch $_{ji}$ / length *i*) * 100m

Where: length is expressed in meters

Prior to the calculation of any CPUE values the data set was "zero filled" for each fish species, such that each species collected in the study was represented in every sample. CPUE values were calculated for each fish species by impoundment section (i.e., upper, middle and lower) and for the full reach.

Catch rates were highest for Yellow Perch, Alewife, and Largemouth Bass during sampling in the uppermost impoundment section, Yellow Perch, Largemouth Bass and Pumpkinseed during sampling in the middle impoundment section, and Yellow Perch, Golden Shiner, and Black Crappie during sampling in the lowermost impoundment section (Table 5-4).

5.1.5 Biocharacteristics

Length frequency distributions for four common game species captured during the impoundment sampling (Yellow Perch, Largemouth Bass, Smallmouth Bass, and Black Crappie) are presented in Figures 5-2 through 5-5. A full listing of all available fish length information by species and electrofish station for the Shawmut impoundment is provided in Appendix A. The observed range for fish sizes recorded for species observed in the impoundment fall within the expected bounds for those species in the northeastern U.S. (Table 5-5).

5.1.6 Habitat Characteristics

Table 5-6 provides a summary of habitat and water quality information recorded for each of the 15, 300-m electrofish transects. Sand was the dominant substrate at all impoundment sampling locations. In general, the occurrence of transects with a higher percent coverage by submerged aquatic vegetation growth was higher at sample locations in the lower impoundment than the upper two sections. Mean water depth (as sampled at quarter points of the river channel at the upper, middle, and lower points of each transect) trended towards shallower at the upper end of the impoundment and deeper at the lower end. Water quality was relatively consistent among all impoundment electrofish stations with a 1-2^{o}C increase in water temperature from upriver to downriver. Dissolved oxygen was measured at 9.0 mg/L or greater at all stations.

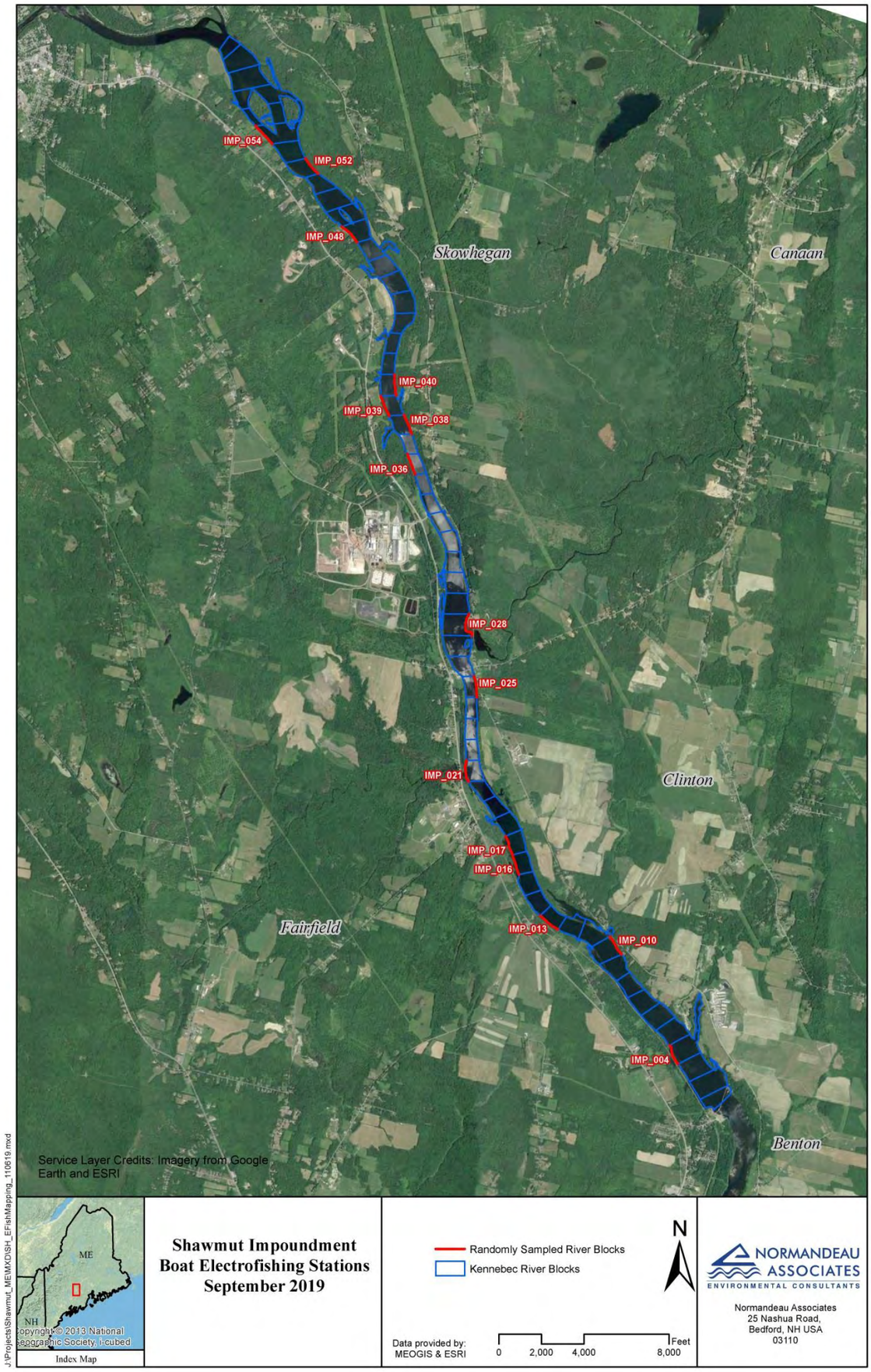

Figure 5–1. Spatial distribution of the 300-m blocks randomly selected for boat electrofish sampling within the Shawmut impoundment during September, 2019.

Table 5–1. Coordinate and bank locations for Shawmut impoundment boat electrofish transects sampled during September, 2019

Impoundment Section	Transect ID	Upstream Coordinates		Downstream Coordinates		Bank
Upper	IMP_054	44°45'30.29"N	69°40'5.00"W	44°45'21.39"N	69°39'58.80"W	west
	IMP_052	44°45'13.05"N	69°39'51.55"W	44°45'4.57"N	69°39'44.45"W	east
	IMP_048	44°44'42.89"N	69°39'16.55"W	44°44'36.03"N	69°39'6.97"W	west
	IMP_040	44°43'35.59"N	69°38'41.57"W	44°43'25.79"N	69°38'43.13"W	east
	IMP_039	44°43'25.79"N	69°38'43.13"W	44°43'15.97"N	69°38'42.15"W	west
Middle	IMP_038	44°43'15.97"N	69°38'42.15"W	44°43'6.91"N	69°38'37.56"W	east
	IMP_036	44°42'58.20"N	69°38'31.20"W	44°42'49.03"N	69°38'26.12"W	west
	IMP_028	44°41'44.70"N	69°37'56.85"W	44°41'35.05"N	69°37'57.10"W	west
	IMP_025	44°41'15.50"N	69°37'53.60"W	44°41'6.24"N	69°37'48.44"W	east
	IMP_021	44°40'36.94"N	69°37'46.04"W	44°40'27.22"N	69°37'44.96"W	west
Lower	IMP_017	44°40'2.18"N	69°37'24.97"W	44°39'53.92"N	69°37'17.78"W	west
	IMP_016	44°39'53.92"N	69°37'17.78"W	44°39'44.74"N	69°37'13.01"W	west
	IMP_013	44°39'26.50"N	69°37'3.33"W	44°39'18.41"N	69°36'55.70"W	west
	IMP_010	44°39'8.67"N	69°36'32.62"W	44°39'3.76"N	69°36'20.79"W	east
	IMP_004	44°38'26.08"N	69°35'37.65"W	44°38'18.81"N	69°35'28.44"W	west

Table 5–2. Collection timing and effort at Shawmut impoundment boat electrofish transects sampled during September, 2019

Impoundment Section	Transect ID	Sample Date			No. Amps	No. Netters	No. Runs
		Date	Time	Duration (Sec)			
Upper	IMP_054	9/18/2019	10:15	781	.	2	1
	IMP_052	9/18/2019	9:10	651	3	2	1
	IMP_048	9/18/2019	8:15	615	2	2	1
	IMP_040	9/18/2019	15:05	729	3	2	1
	IMP_039	9/18/2019	15:50	743	3	2	1
Middle	IMP_038	9/18/2019	14:20	784	3	2	1
	IMP_036	9/18/2019	17:12	687	3	2	1
	IMP_028	9/16/2019	17:10	589	3	2	1
	IMP_025	9/17/2019	17:48	627	4	2	1
	IMP_021	9/17/2019	10:12	636	3	2	1
Lower	IMP_017	9/17/2019	9:00	658	3	2	1
	IMP_016	9/17/2019	7:58	675	4	2	1
	IMP_013	9/17/2019	16:45	719	4	2	1
	IMP_010	9/17/2019	16:01	681	4	2	1
	IMP_004	9/17/2019	15:00	664	3	2	1

Table 5–3. Total catch (N) and percent composition (Pct.) for Shawmut impoundment boat electrofish transects sampled during September, 2019

Common Name	Lower		Middle		Upper		Total	
	N	Pct.	N	Pct.	N	Pct.	N	Pct.
Alewife	6	1.5%	2	1.0%	32	16.7%	40	5.0%
American Eel	1	0.2%	3	1.5%	5	2.6%	9	1.1%
Banded Killifish					1	0.5%	1	0.1%
Black Crappie	39	9.5%		0.0%	2	1.0%	41	5.1%
Chain Pickerel	12	2.9%	5	2.6%	3	1.6%	20	2.5%
Fallfish					24	12.5%	24	3.0%
Golden Shiner	66	16.1%	8	4.1%	9	4.7%	83	10.4%
Largemouth Bass	26	6.3%	44	22.4%	28	14.6%	98	12.3%
Lepomis spp.	1	0.2%			3	1.6%	4	0.5%
Pumpkinseed	11	2.7%	13	6.6%	3	1.6%	27	3.4%
Redbreast Sunfish	5	1.2%	2	1.0%	1	0.5%	8	1.0%
Smallmouth Bass	10	2.4%	8	4.1%	5	2.6%	23	2.9%
White Sucker	3	0.7%	6	3.1%	1	0.5%	10	1.3%
Yellow Perch	230	56.1%	105	53.6%	75	39.1%	410	51.4%
Total	**410**		**196**		**192**		**798**	

Table 5–4. Mean CPUE expressed as fish per 100m of shoreline or one hour of sampling time as derived from Shawmut impoundment boat electrofish transects sampled during September, 2019

Common Name	Upper		Middle		Lower		Total	
	Fish/100m	Fish/hr	Fish/100m	Fish/hr	Fish/100m	Fish/hr	Fish/100m	Fish/hr
Alewife	2.1	32.2	0.1	2.2	0.4	5.7	0.9	13.4
American Eel	0.3	5.3	0.2	3.3	0.1	1.0	0.2	3.2
Banded Killifish	0.1	1.1	0.0	0.0	0.0	0.0	0.0	0.4
Black Crappie	0.1	2.1	0.0	0.0	2.6	38.1	0.9	13.4
Chain Pickerel	0.2	3.2	0.3	5.8	0.8	13.0	0.4	7.3
Fallfish	1.6	25.4	0.0	0.0	0.0	0.0	0.5	8.5
Golden Shiner	0.6	9.3	0.5	9.1	4.4	67.9	1.8	28.8
Largemouth Bass	1.9	29.4	2.9	49.7	1.7	25.7	2.2	34.9
Lepomis spp.	0.2	3.0	0.0	0.0	0.1	0.9	0.1	1.3
Pumpkinseed	0.2	3.2	0.9	13.9	0.7	11.1	0.6	9.4
Redbreast Sunfish	0.1	1.1	0.1	2.1	0.3	5.2	0.2	2.8
Smallmouth Bass	0.3	5.3	0.5	9.0	0.7	10.2	0.5	8.2
White Sucker	0.1	1.1	0.4	6.8	0.2	3.0	0.2	3.6
Yellow Perch	5.0	80.1	7.0	119.4	15.3	235.2	9.1	144.9

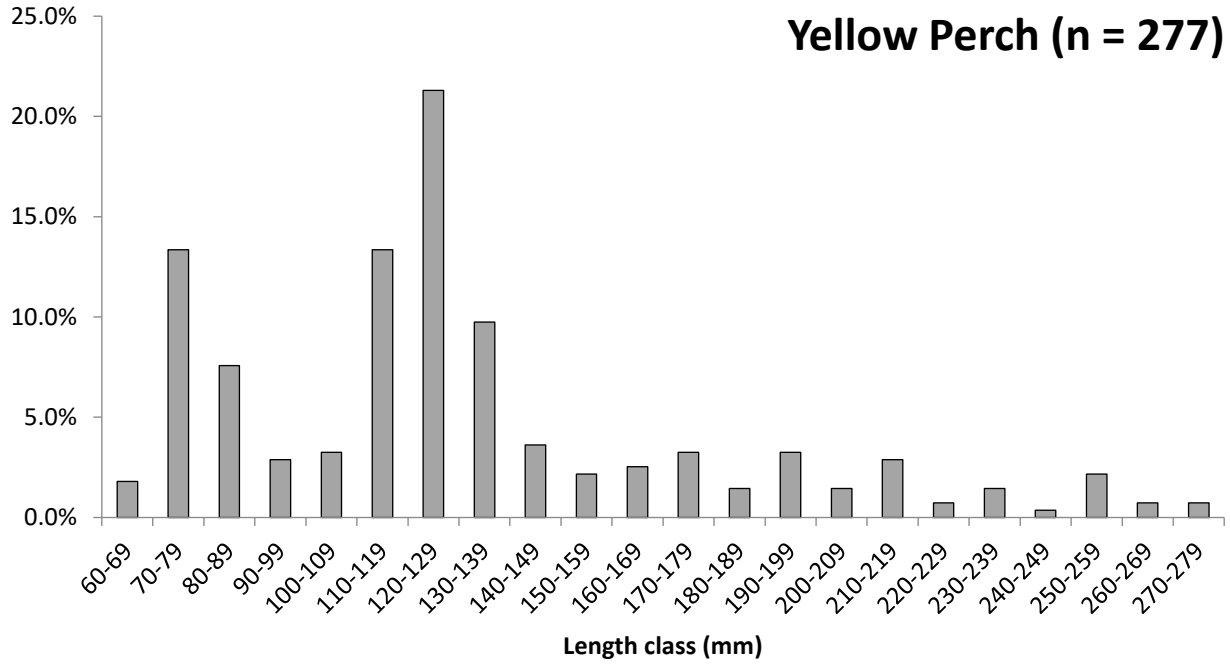

Figure 5–2. Length frequency distribution for Yellow Perch collected from the Shawmut impoundment boat electrofish transects sampled during September, 2019.

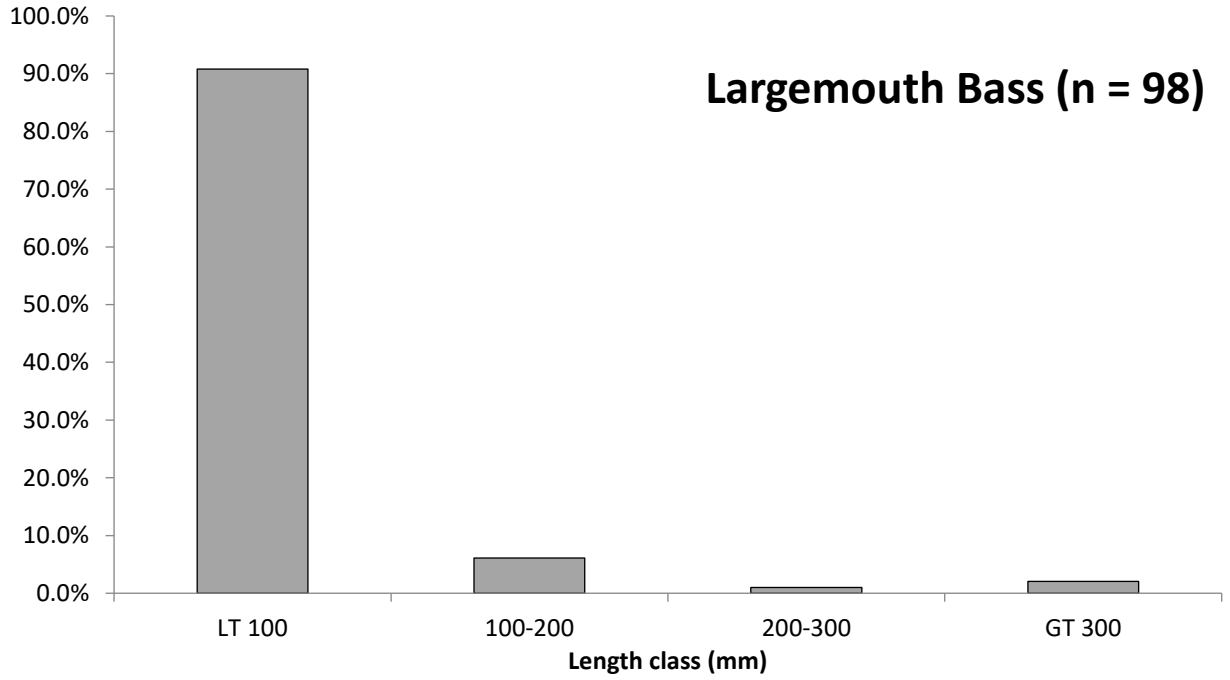

Figure 5–3. Length frequency distribution for Largemouth Bass collected from the Shawmut impoundment boat electrofish transects sampled during September, 2019.

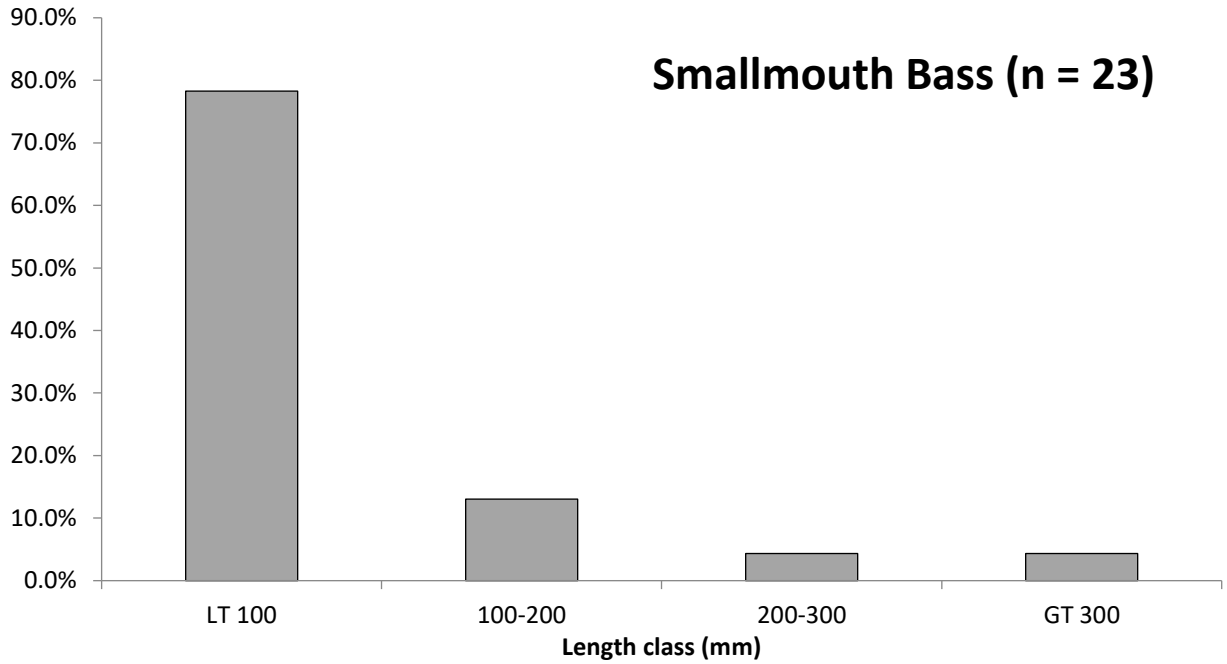

Figure 5–4. Length frequency distribution for Smallmouth Bass collected from the Shawmut impoundment boat electrofish transects sampled during September, 2019.

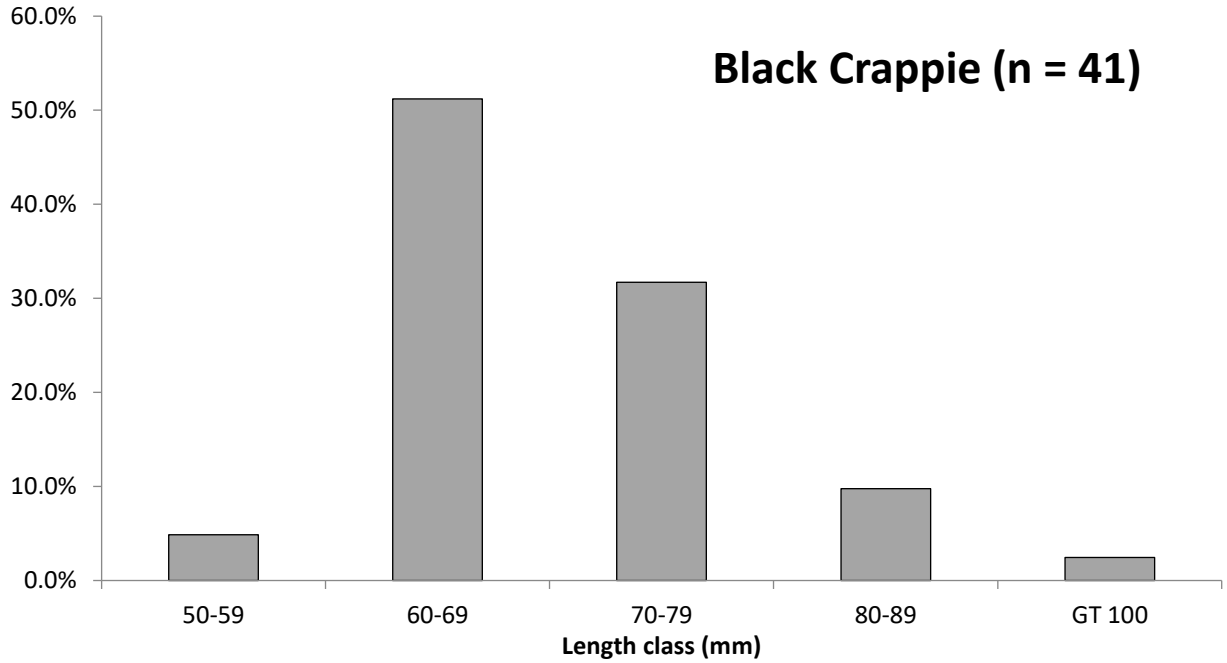

Figure 5–5. Length frequency distribution for Black Crappie collected from the Shawmut impoundment boat electrofish transects sampled during September, 2019.

Table 5–5. Minimum, maximum, and mean total length (mm) for fish species captured from Shawmut impoundment boat electrofish transects sampled during September, 2019

Common Name	No. Individuals	Total Length (mm)		
		Min.	Max.	Mean
Alewife	40	66	96	80
American Eel	9	375	542	456
Banded Killifish	1	70	70	70
Black Crappie	41	59	146	71
Chain Pickerel	20	86	585	205
Fallfish	24	54	190	71
Golden Shiner	83	47	177	83
Largemouth Bass	98	60	409	87
Lepomis spp.	4	25	41	30
Pumpkinseed	27	78	191	108
Redbreast Sunfish	8	68	155	102
Smallmouth Bass	23	60	351	99
White Sucker	10	80	460	254
Yellow Perch	277	60	273	130

Table 5–6. Habitat and water quality information recorded at Shawmut impoundment boat electrofish transects sampled during September, 2019

Impoundment Section	Transect ID	Habitat Parameter				Water Quality	
		Dominant Substrate	Pct. SAV	Pct. Cover	Mean Depth (ft)	Temp (ºC)	DO (mg/L)
Upper	IMP_054	sand	0-25%	50-75%	12.7	17.0	9.7
	IMP_052	sand	50-75%	0-25%	13.8	17.1	9.3
	IMP_048	sand	25-50%	50-75%	16.0	16.9	9.3
	IMP_040	sand	0-25%	50-75%	22.6	17.9	9.3
	IMP_039	sand	0-25%	75-100%	19.8	17.7	9.3
Middle	IMP_038	sand	25-50%	50-75%	18.6	17.7	9.3
	IMP_036	sand	0-25%	50-75%	25.1	17.9	9.3
	IMP_028	sand	75-100%	0-25%	16.8	19.3	9.1
	IMP_025	sand	0-25%	0-25%	23.2	18.4	9.2
	IMP_021	sand	0-25%	25-50%	22.0	18.5	9.0
Lower	IMP_017	sand	50-75%	0-25%	22.3	18.9	9.0
	IMP_016	sand	50-75%	25-50%	22.1	18.9	9.0
	IMP_013	sand	25-50%	50-75%	23.8	19.0	9.0
	IMP_010	sand	50-75%	0-25%	21.2	19.0	9.0
	IMP_004	sand	75-100%	25-50%	19.0	19.0	9.0

5.2 Shawmut Tailwater

5.2.1 Sampling Effort

Fish community data was collected from three 300-m transects placed within the 4,000 foot section of the Kennebec River located immediately downstream of Shawmut dam during a single day sampling event on October 11, 2019 (Figure 5-6; Table 5-7). Sampling was conducted between the hours of 1030 and 1330 and sampling effort was comprised of approximately 1,000 seconds of pedal time at each 300-m transect. A single netter was used during the downstream sampling.

5.2.2 Species Richness and Composition

A total of 51 individuals representing six families and seven fish species were collected from the Shawmut tailwater during October, 2019 when each of the three sampling transects are considered. Table 5-8 presents the total count and percent composition of fish catch from the Shawmut tailwater. When all three sample transects are considered, fallfish were the most abundant species representing over 50% of the total catch. Smallmouth Bass (13.7%), American Eel (9.8%) and White Sucker (9.8%) were the only other species to represent greater than or equal to 5% of the total catch. Fish catch in the Shawmut tailrace was highest along Transect 2, located parallel to the western shoreline and near to the downstream end of the reach. Greater than 65% of the total fish catch, representing six fish species, was collected from that reach.

5.2.3 Relative Abundance

CPUE values were calculated on a species-specific basis based on catch numbers from the MBI electrofish sampling in the Shawmut tailwater reach. These values were calculated following the methodology described for the impoundment (Section 5.2.4). As would be expected based on the total catch presented in Table 5-8, fallfish had the highest observed CPUE for fish species collected downstream of Shawmut (Table 5-9).

5.2.4 Biocharacteristics

A full listing of all available fish length information by species and transect for the Shawmut tailwater is provided in Appendix B. The observed range for fish sizes recorded for species observed in the Shawmut tailwater fall within the expected bounds for those species in the northeastern U.S. (Table 5-10).

5.2.5 Habitat Characteristics

Tailwater habitat was characterized by the MBI field staff conducting the boat electrofish sampling downstream of Shawmut. In contrast to the sand substrate observed upstream of the dam, the tailrace habitat electrofished by MBI was dominated by boulder and cobble. Submerged aquatic vegetation was classified as present over 25-50% of the sampled area. The presence of overhanging vegetation was classified as present between 0-25% of the sampled area. A single water quality reading was taken in the downstream sample area. Values were reported for water temperature (13.3 ºC), dissolved oxygen (10.11 mg/L), conductivity (130.7 µS) and pH (6.92).

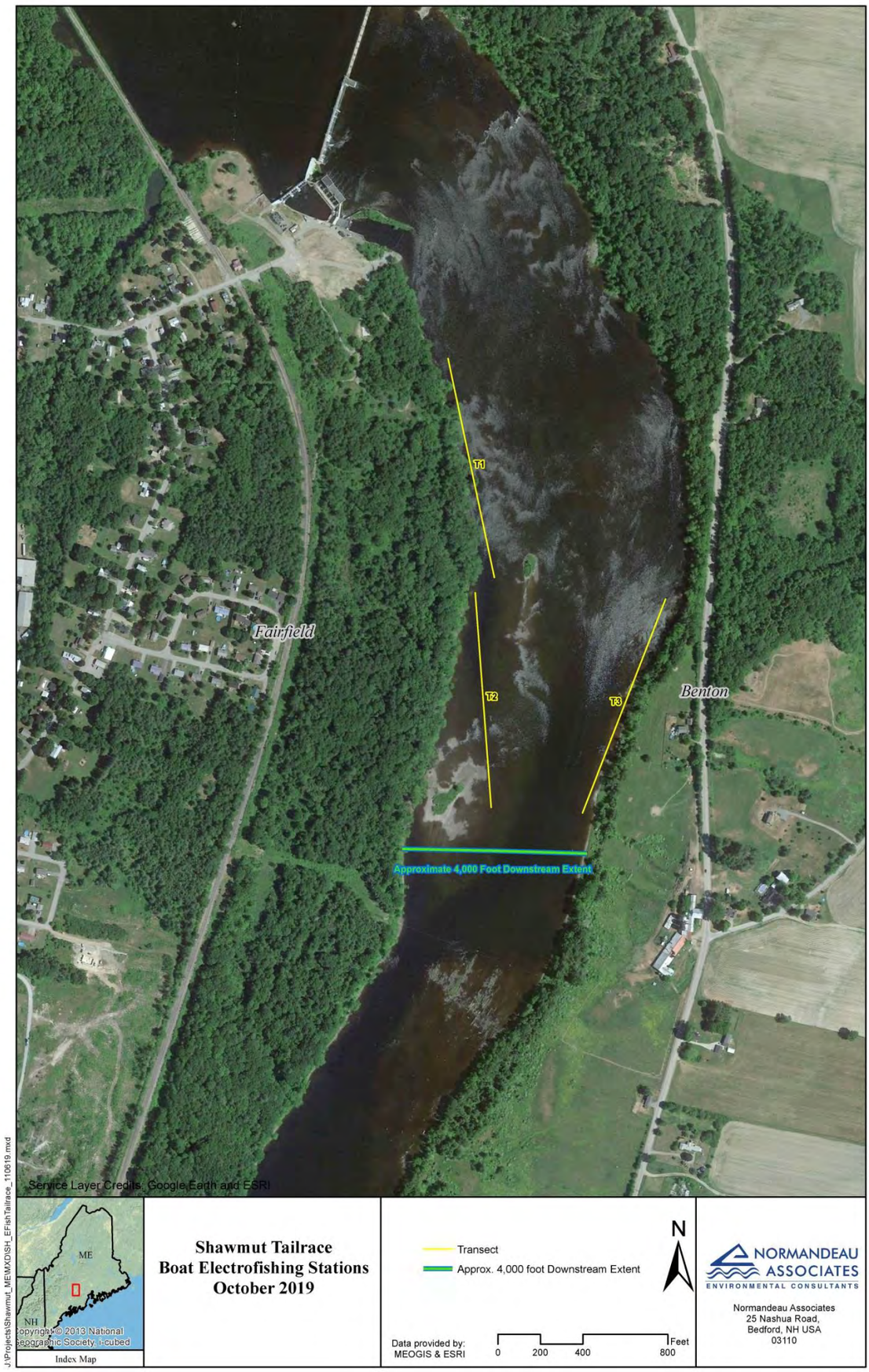

Figure 5–6. Shawmut tailrace boat electrofish transects sampled by MBI during October, 2019.

Table 5–7. Sampling locations for the Shawmut tailwater boat electrofish transects sampled by MBI during October, 2019

Transect ID	Upstream Coordinates		Downstream Coordinates	
001	44°37'37.87"N	69°34'52.10"W	44°37'27.73"N	69°34'48.90"W
002	44°37'27.01"N	69°34'50.12"W	44°37'17.06"N	69°34'48.91"W
003	44°37'26.83"N	69°34'37.74"W	44°37'16.86"N	69°34'42.96"W

Table 5–8. Total catch (N) and percent composition (Pct.) for Shawmut tailwater boat electrofish transects sampled by MBI during October, 2019

	Transect 1	Transect 2	Transect 3	Total	
Common Name	N	N	N	N	Pct.
Alewife		2		2	3.9%
American Eel			5	5	9.8%
Fallfish		27	1	28	54.9%
Redbreast Sunfish		2		2	3.9%
Smallmouth Bass	2	1	4	7	13.7%
White Sucker	1	1	3	5	9.8%
Yellow Perch		2		2	3.9%
Total	**3**	**35**	**13**	**51**	

Table 5–9. CPUE (expressed as fish per 100m or one hour of sampling time) as derived from Shawmut tailwater boat electrofish transects sampled by MBI during October, 2019

	Total	
Common Name	Fish/100m	Fish/hr
Alewife	0.2	2.4
American Eel	0.6	5.9
Fallfish	3.1	33.3
Redbreast Sunfish	0.2	2.4
Smallmouth Bass	0.8	8.3
White Sucker	0.6	5.9
Yellow Perch	0.2	2.4

Table 5–10. Minimum, maximum, and mean total length (mm) for fish species captured from Shawmut tailwater boat electrofish transects sampled by MBI during October, 2019

Common Name	No. Individuals	Total Length (mm)		
		Min.	Max.	Mean
Alewife	2	52	67	60
American Eel	5	330	540	438
Fallfish	28	55	78	67
Redbreast Sunfish	2	35	46	41
Smallmouth Bass	7	190	386	290
White Sucker	5	113	484	318
Yellow Perch	2	85	162	124

5.3 Historical Comparison

As described in the Shawmut relicensing Pre-Application Document (PAD), MBI surveyed the resident fish assemblage and aquatic habitat within the Kennebec River during August 2002 (Yoder et al. 2006). That study examined the fish community at nearly 30 boat electrofishing stations throughout the Kennebec River between Bingham and Merrymeeting Bay. Three of the sampling locations assessed during the 2002 evaluation were located within or very near to the Shawmut Project boundary. These stations were:

- Upper Shawmut impoundment in Hinckley (impoundment habitat at RM 32.1[1]).
- Upstream of Shawmut Dam near SAPPI (impoundment habitat at RM 25.1).
- Downstream of Shawmut Dam (riverine habitat at RM 23.9).

Table 5-11 provides a summary (total catch and percent composition) for the two electrofish stations sampled by MBI during 2002 within the Shawmut impoundment. During the 2002 MBI survey, Largemouth Bass, Smallmouth Bass, Redbreast Sunfish, Alewife and Yellow Perch were the five most abundant fish species, accounting for 75% of the total number of fish handled. Those same five species accounted for 73% of the total number of fish handled during 2019. The relative contributions of each of the five species varied between the two sample years with relatively even contributions from each during 2002 and a higher contribution of Yellow Perch and lower contribution of Redbreast Sunfish and Smallmouth Bass during 2019. When species diversity is directly compared, the 2019 impoundment sampling produced 13 out of the 15 fish species observed by MBI during 2002. Two fish species, Common Shiner and White Perch were present in low abundance (i.e., less than 1.5% of total catch) during 2002.

A summary of total catch and percent composition for the single electrofish station sampled by MBI during 2002 in the riverine reach downstream of Shawmut is provided in Table 5-12. During the previous 2002 study, Smallmouth Bass, Fallfish, American Eel, and White Sucker

[1] River miles above head of tide at the former Edwards dam in Augusta as compared to river miles above the mouth of Merrymeeting Bay as referenced earlier in this report.

were the numerically dominant species accounting for 80% of the total catch. Those four species were also the most numerically dominant during the 2019 MBI electrofish sampling downstream of Shawmut, accounting for 88% of the total catch. Species richness was greater during the 2002 survey (fourteen species) than was observed during 2019 (seven species). Fish species documented during 2002 but absent from the 2019 survey all represented 3% or less of the total catch from the original survey.

Table 5–11. Total catch (N) and percent composition (Pct.) for historical MBI electrofish sampling within the Shawmut impoundment during 2002

Common Name	Total	
	Count	Pct.
Alewife	141	12.3%
American eel	26	2.3%
Black crappie	29	2.5%
Chain pickerel	1	0.1%
Common shiner	5	0.4%
Eastern banded killifish	32	2.8%
Fallfish	53	4.6%
Golden shiner	49	4.3%
Largemouth bass	221	19.3%
Pumpkinseed	48	4.2%
Redbreast sunfish	170	14.8%
Smallmouth bass	190	16.6%
White perch	15	1.3%
White sucker	27	2.4%
Yellow perch	139	12.1%

Table 5–12. Total catch (N) and percent composition (Pct.) for historical MBI electrofish sampling within the riverine section downstream of the Shawmut dam during 2002

Common Name	Total	
	Count	Pct.
Alewife	6	1.7%
American eel	60	16.7%
Brown trout	8	2.2%
Common shiner	4	1.1%
Eastern banded killifish	1	0.3%
Fallfish	67	18.6%
Golden shiner	11	3.1%
Largemouth bass	10	2.8%
Pumpkinseed	2	0.6%
Rainbow trout	1	0.3%
Redbreast sunfish	16	4.4%
Smallmouth bass	121	33.6%
White sucker	42	11.7%
Yellow perch	11	3.1%

6 Summary

The Shawmut RSP identified three specific objectives for the fish assemblage study including documentation of the occurrence, distribution and relative abundance for fish species within the project impoundment and tailwater, a comparison of the current study to historic data collections and the collection of biometric data necessary for the characterization of fish population dynamics.

The impoundment and tailwater sampling conducted during 2019 met each of the objectives described in the RSP. The Project area fish community as sampled during 2019 upstream and downstream of Shawmut dam is best described as a warm to cool water assemblage. Information collected during field sampling allowed for the determination of the relative abundance and diversity of the current fish assemblage upstream and downstream of the dam. These values are provided in Sections 5.1 and 5.2 of this report and are compared to the historic 2002 Project area survey in Section 5.3. Length and weight data for fish collected during the 2019 study is provided. Field crews conducting this work coordinated with members of the MDIFW for the transfer of additional biological specimens to allow for further characterization of the current assemblage population dynamics.

7 Variances from FERC-Approved Study Plan

The FERC-approved RSP specified that the Shawmut fish assemblage survey would be conducted during the late summer of 2016. The initiation of this process was delayed so that the Licensee could obtain the necessary incidental take coverage under the Endangered Species Act for Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic Salmon in the event that

any GOM DPS of Atlantic Salmon were encountered during sampling. The Shawmut Project sits within Critical Habitat for GOM DPS of Atlantic Salmon and the species does seasonally transit the Project area. As described above in Section 1, NMFS concurred with Brookfield that the proposed action (i.e., this study) was not likely to adversely affect any NMFS ESA-listed species or critical habitat. No Atlantic salmon were encountered during the sampling.

The FERC-approved RSP specified "*Scale samples will be collected from all individuals greater than six inches in length and classified as either black bass or salmonid species and provided to MDIFW for their use*". Prior to field sampling in September 2019, Normandeau contacted MDIFW to confirm collection of biological samples from the Shawmut Project area. MDIFW staff indicated that the collection of scale samples from black bass was unnecessary and requested only scale samples from unmarked salmonid (i.e., trout) species be retained. In addition, MDIFW requested that Normandeau retain whole body samples of any Black Crappie or Northern Pike for subsequent otolith analysis by the State. Correspondence related to this request is provided in Appendix C.

With the exception of the MDIFW statement that the collection of black bass scale samples as described in the RSP was unnecessary, there were no variances from the methodologies described in the FERC approved study plan.

8 References

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

9 Appendices

Appendix A. Fish assemblage catch from the Shawmut Impoundment – September 2019.

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Alewife	Upper	IMP_048	W	9/18/2019	8:15	66	2	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	76	4	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	67	2	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	76	3	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	70	2	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	83	5	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	76	3	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	80	5	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	83	3	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	83	5	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	74	3	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	74	4	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	77	2	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	77	4	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	90	6	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	86	5	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	84	5	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	74	3	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	84	4	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	79	4	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	73	3	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	82	5	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	89	6	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	68	2	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	78	3	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	84	4	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	86	5	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	75	3	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	72	3	1
Alewife	Upper	IMP_048	W	9/18/2019	8:15	78	3	1
Alewife	Upper	IMP_052	E	9/18/2019	9:10	96	8	1
Alewife	Upper	IMP_052	E	9/18/2019	9:10	71	2	1
Alewife	Middle	IMP_025	E	9/17/2019	17:48	89	4	1
Alewife	Middle	IMP_038	E	9/18/2019	14:20	94	7	1
Alewife	Lower	IMP_004	W	9/17/2019	15:00	83	5	1
Alewife	Lower	IMP_004	W	9/17/2019	15:00	85	5	1
Alewife	Lower	IMP_004	W	9/17/2019	15:00	85	5	1
Alewife	Lower	IMP_004	W	9/17/2019	15:00	87	5	1
Alewife	Lower	IMP_004	W	9/17/2019	15:00	84	5	1
Alewife	Lower	IMP_010	E	9/17/2019	16:01	84	5	1
American Eel	Upper	IMP_040	E	9/18/2019	15:05	375	120	1
American Eel	Upper	IMP_040	E	9/18/2019	15:05	405	105	1
American Eel	Upper	IMP_040	E	9/18/2019	15:05	542	310	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
American Eel	Upper	IMP_052	E	9/18/2019	9:10	452	150	1
American Eel	Upper	IMP_054	W	9/18/2019	10:15	531	285	1
American Eel	Middle	IMP_025	E	9/17/2019	17:48	490	240	1
American Eel	Middle	IMP_038	E	9/18/2019	14:20	468	195	1
American Eel	Middle	IMP_038	E	9/18/2019	14:20	457	185	1
American Eel	Lower	IMP_017	W	9/17/2019	9:00	380	110	1
Banded Killifish	Upper	IMP_052	E	9/18/2019	9:10	70	3	1
Black Crappie	Upper	IMP_048	W	9/18/2019	8:15	68	3	1
Black Crappie	Upper	IMP_052	E	9/18/2019	9:10	61	3	1
Black Crappie	Lower	IMP_004	W	9/17/2019	15:00	146	43	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	60	2	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	65	4	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	69	4	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	59	3	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	68	3	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	62	3	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	62	3	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	65	3	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	59	2	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	65	3	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	70	4	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	74	5	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	70	4	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	66	3	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	73	4	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	61	3	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	69	4	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	62	3	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	65	4	1
Black Crappie	Lower	IMP_016	W	9/17/2019	7:58	70	4	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	72	5	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	66	4	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	76	5	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	67	3	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	76	6	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	80	7	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	73	5	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	83	8	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	78	6	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	72	4	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	80	6	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	82	7	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	69	4	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	77	5	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	68	4	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	69	4	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	77	6	1
Black Crappie	Lower	IMP_017	W	9/17/2019	9:00	66	4	1
Chain Pickerel	Upper	IMP_040	E	9/18/2019	15:05	190	31	1
Chain Pickerel	Upper	IMP_052	E	9/18/2019	9:10	148	15	1
Chain Pickerel	Upper	IMP_052	E	9/18/2019	9:10	157	18	1
Chain Pickerel	Middle	IMP_025	E	9/17/2019	17:48	313	150	1
Chain Pickerel	Middle	IMP_028	W	9/16/2019	17:10	135	10	1
Chain Pickerel	Middle	IMP_028	W	9/16/2019	17:10	108	6	1
Chain Pickerel	Middle	IMP_038	E	9/18/2019	14:20	86	2	1
Chain Pickerel	Middle	IMP_038	E	9/18/2019	14:20	140	12	1
Chain Pickerel	Lower	IMP_004	W	9/17/2019	15:00	161	19	1
Chain Pickerel	Lower	IMP_010	E	9/17/2019	16:01	426	440	1
Chain Pickerel	Lower	IMP_010	E	9/17/2019	16:01	255	81	1
Chain Pickerel	Lower	IMP_010	E	9/17/2019	16:01	145	12	1
Chain Pickerel	Lower	IMP_010	E	9/17/2019	16:01	100	5	1
Chain Pickerel	Lower	IMP_013	W	9/17/2019	16:45	132	9	1
Chain Pickerel	Lower	IMP_013	W	9/17/2019	16:45	120	8	1
Chain Pickerel	Lower	IMP_013	W	9/17/2019	16:45	103	4	1
Chain Pickerel	Lower	IMP_013	W	9/17/2019	16:45	165	24	1
Chain Pickerel	Lower	IMP_016	W	9/17/2019	7:58	344	210	1
Chain Pickerel	Lower	IMP_016	W	9/17/2019	7:58	286	115	1
Chain Pickerel	Lower	IMP_017	W	9/17/2019	9:00	585	1100	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	80	4	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	58	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	60	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	60	2	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	54	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	63	2	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	55	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	54	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	57	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	55	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	74	3	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	58	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	59	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	62	3	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	61	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	62	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	56	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	57	1	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	129	20	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	56	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	57	1	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	63	2	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	190	70	1
Fallfish	Upper	IMP_052	E	9/18/2019	9:10	133	20	1
Golden Shiner	Upper	IMP_048	W	9/18/2019	8:15	47	1	1
Golden Shiner	Upper	IMP_048	W	9/18/2019	8:15	55	1	1
Golden Shiner	Upper	IMP_048	W	9/18/2019	8:15	57	1	1
Golden Shiner	Upper	IMP_048	W	9/18/2019	8:15	49	1	1
Golden Shiner	Upper	IMP_052	E	9/18/2019	9:10	137	26	1
Golden Shiner	Upper	IMP_052	E	9/18/2019	9:10	115	13	1
Golden Shiner	Upper	IMP_052	E	9/18/2019	9:10	68	2	1
Golden Shiner	Upper	IMP_052	E	9/18/2019	9:10	123	17	1
Golden Shiner	Upper	IMP_052	E	9/18/2019	9:10	124	19	1
Golden Shiner	Middle	IMP_025	E	9/17/2019	17:48	120	17	1
Golden Shiner	Middle	IMP_028	W	9/16/2019	17:10	120	17	1
Golden Shiner	Middle	IMP_038	E	9/18/2019	14:20	115	14	1
Golden Shiner	Middle	IMP_038	E	9/18/2019	14:20	107	10	1
Golden Shiner	Middle	IMP_038	E	9/18/2019	14:20	115	14	1
Golden Shiner	Middle	IMP_038	E	9/18/2019	14:20	130	22	1
Golden Shiner	Middle	IMP_038	E	9/18/2019	14:20	130	23	1
Golden Shiner	Middle	IMP_038	E	9/18/2019	14:20	113	14	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	67	2	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	72	3	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	75	4	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	60	2	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	76	3	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	93	8	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	76	4	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	74	3	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	72	3	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	68	3	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	122	16	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	78	4	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	66	2	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	76	3	1
Golden Shiner	Lower	IMP_004	W	9/17/2019	15:00	73	3	1
Golden Shiner	Lower	IMP_010	E	9/17/2019	16:01	174	58	1
Golden Shiner	Lower	IMP_010	E	9/17/2019	16:01	177	52	1
Golden Shiner	Lower	IMP_010	E	9/17/2019	16:01	174	63	1
Golden Shiner	Lower	IMP_010	E	9/17/2019	16:01	145	34	1
Golden Shiner	Lower	IMP_010	E	9/17/2019	16:01	120	17	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Golden Shiner	Lower	IMP_010	E	9/17/2019	16:01	94	8	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	72	3	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	79	5	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	72	3	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	75	3	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	66	2	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	60	2	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	74	3	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	68	3	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	70	3	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	60	2	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	61	2	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	66	2	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	60	2	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	83	4	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	98	7	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	72	3	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	66	2	1
Golden Shiner	Lower	IMP_013	W	9/17/2019	16:45	61	2	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	59	2	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	60	2	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	56	1	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	50	1	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	54	1	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	55	1	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	53	1	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	53	1	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	50	1	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	55	1	1
Golden Shiner	Lower	IMP_016	W	9/17/2019	7:58	64	2	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	135	25	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	104	9	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	75	4	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	74	4	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	72	3	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	77	5	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	85	5	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	68	2	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	77	4	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	64	2	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	73	4	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	72	3	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	73	4	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	78	4	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	67	3	1
Golden Shiner	Lower	IMP_017	W	9/17/2019	9:00	70	3	1
Largemouth Bass	Upper	IMP_039	W	9/18/2019	15:50	67	3	1
Largemouth Bass	Upper	IMP_040	E	9/18/2019	15:05	86	8	1
Largemouth Bass	Upper	IMP_040	E	9/18/2019	15:05	74	5	1
Largemouth Bass	Upper	IMP_040	E	9/18/2019	15:05	86	8	1
Largemouth Bass	Upper	IMP_040	E	9/18/2019	15:05	78	6	1
Largemouth Bass	Upper	IMP_040	E	9/18/2019	15:05	77	7	1
Largemouth Bass	Upper	IMP_040	E	9/18/2019	15:05	73	5	1
Largemouth Bass	Upper	IMP_048	W	9/18/2019	8:15	100	12	1
Largemouth Bass	Upper	IMP_048	W	9/18/2019	8:15	106	18	1
Largemouth Bass	Upper	IMP_048	W	9/18/2019	8:15	62	3	1
Largemouth Bass	Upper	IMP_048	W	9/18/2019	8:15	64	3	1
Largemouth Bass	Upper	IMP_048	W	9/18/2019	8:15	67	3	1
Largemouth Bass	Upper	IMP_048	W	9/18/2019	8:15	69	4	1
Largemouth Bass	Upper	IMP_048	W	9/18/2019	8:15	70	3	1
Largemouth Bass	Upper	IMP_048	W	9/18/2019	8:15	72	4	1
Largemouth Bass	Upper	IMP_052	E	9/18/2019	9:10	74	5	1
Largemouth Bass	Upper	IMP_052	E	9/18/2019	9:10	69	4	1
Largemouth Bass	Upper	IMP_052	E	9/18/2019	9:10	72	5	1
Largemouth Bass	Upper	IMP_052	E	9/18/2019	9:10	80	6	1
Largemouth Bass	Upper	IMP_052	E	9/18/2019	9:10	60	3	1
Largemouth Bass	Upper	IMP_052	E	9/18/2019	9:10	80	6	1
Largemouth Bass	Upper	IMP_052	E	9/18/2019	9:10	66	3	1
Largemouth Bass	Upper	IMP_054	W	9/18/2019	10:15	89	10	1
Largemouth Bass	Upper	IMP_054	W	9/18/2019	10:15	81	6	1
Largemouth Bass	Upper	IMP_054	W	9/18/2019	10:15	86	7	1
Largemouth Bass	Upper	IMP_054	W	9/18/2019	10:15	77	6	1
Largemouth Bass	Upper	IMP_054	W	9/18/2019	10:15	87	9	1
Largemouth Bass	Upper	IMP_054	W	9/18/2019	10:15	75	5	1
Largemouth Bass	Middle	IMP_021	W	9/17/2019	10:12	83	5	1
Largemouth Bass	Middle	IMP_021	W	9/17/2019	10:12	80	6	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	80	7	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	83	8	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	75	5	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	85	7	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	80	6	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	73	5	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	68	4	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	80	6	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	85	7	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	78	6	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	61	3	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	74	5	1
Largemouth Bass	Middle	IMP_025	E	9/17/2019	17:48	72	4	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	74	4	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	75	6	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	68	4	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	71	5	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	68	4	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	77	6	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	63	3	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	68	4	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	68	4	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	75	5	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	73	5	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	67	4	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	75	5	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	88	9	1
Largemouth Bass	Middle	IMP_028	W	9/16/2019	17:10	69	3	1
Largemouth Bass	Middle	IMP_036	W	9/18/2019	17:12	90	9	1
Largemouth Bass	Middle	IMP_036	W	9/18/2019	17:12	80	6	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	79	6	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	63	3	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	65	4	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	69	4	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	67	4	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	72	4	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	93	9	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	75	5	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	74	4	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	79	6	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	60	3	1
Largemouth Bass	Middle	IMP_038	E	9/18/2019	14:20	91	9	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	125	23	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	69	4	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	83	7	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	73	4	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	78	5	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	85	8	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	112	16	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	63	3	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	85	8	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	74	5	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	83	6	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	62	3	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	67	4	1
Largemouth Bass	Lower	IMP_004	W	9/17/2019	15:00	79	6	1
Largemouth Bass	Lower	IMP_010	E	9/17/2019	16:01	79	5	1
Largemouth Bass	Lower	IMP_010	E	9/17/2019	16:01	76	5	1
Largemouth Bass	Lower	IMP_010	E	9/17/2019	16:01	111	14	1
Largemouth Bass	Lower	IMP_010	E	9/17/2019	16:01	81	7	1
Largemouth Bass	Lower	IMP_013	W	9/17/2019	16:45	80	7	1
Largemouth Bass	Lower	IMP_013	W	9/17/2019	16:45	83	8	1
Largemouth Bass	Lower	IMP_013	W	9/17/2019	16:45	90	11	1
Largemouth Bass	Lower	IMP_016	W	9/17/2019	7:58	102	15	1
Largemouth Bass	Lower	IMP_016	W	9/17/2019	7:58	354	600	1
Largemouth Bass	Lower	IMP_017	W	9/17/2019	9:00	400	1000	1
Largemouth Bass	Lower	IMP_017	W	9/17/2019	9:00	409	1050	1
Largemouth Bass	Lower	IMP_017	W	9/17/2019	9:00	116	20	1
Lepomis spp.	Upper	IMP_048	W	9/18/2019	8:15	25	1	1
Lepomis spp.	Upper	IMP_048	W	9/18/2019	8:15	26	1	1
Lepomis spp.	Upper	IMP_048	W	9/18/2019	8:15	29	1	1
Lepomis spp.	Lower	IMP_004	W	9/17/2019	15:00	41	1	1
Pumpkinseed	Upper	IMP_039	W	9/18/2019	15:50	129	43	1
Pumpkinseed	Upper	IMP_040	E	9/18/2019	15:05	99	18	1
Pumpkinseed	Upper	IMP_048	W	9/18/2019	8:15	105	21	1
Pumpkinseed	Middle	IMP_025	E	9/17/2019	17:48	104	17	1
Pumpkinseed	Middle	IMP_025	E	9/17/2019	17:48	105	17	1
Pumpkinseed	Middle	IMP_025	E	9/17/2019	17:48	85	14	1
Pumpkinseed	Middle	IMP_025	E	9/17/2019	17:48	106	22	1
Pumpkinseed	Middle	IMP_025	E	9/17/2019	17:48	101	16	1
Pumpkinseed	Middle	IMP_025	E	9/17/2019	17:48	110	23	1
Pumpkinseed	Middle	IMP_025	E	9/17/2019	17:48	90	12	1
Pumpkinseed	Middle	IMP_025	E	9/17/2019	17:48	86	11	1
Pumpkinseed	Middle	IMP_025	E	9/17/2019	17:48	93	14	1
Pumpkinseed	Middle	IMP_025	E	9/17/2019	17:48	85	11	1
Pumpkinseed	Middle	IMP_038	E	9/18/2019	14:20	99	18	1
Pumpkinseed	Middle	IMP_038	E	9/18/2019	14:20	110	24	1
Pumpkinseed	Middle	IMP_038	E	9/18/2019	14:20	116	29	1
Pumpkinseed	Lower	IMP_004	W	9/17/2019	15:00	80	8	1
Pumpkinseed	Lower	IMP_004	W	9/17/2019	15:00	117	22	1
Pumpkinseed	Lower	IMP_004	W	9/17/2019	15:00	110	25	1
Pumpkinseed	Lower	IMP_004	W	9/17/2019	15:00	109	24	1
Pumpkinseed	Lower	IMP_004	W	9/17/2019	15:00	78	9	1
Pumpkinseed	Lower	IMP_004	W	9/17/2019	15:00	114	25	1
Pumpkinseed	Lower	IMP_010	E	9/17/2019	16:01	179	105	1
Pumpkinseed	Lower	IMP_010	E	9/17/2019	16:01	191	150	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Pumpkinseed	Lower	IMP_013	W	9/17/2019	16:45	110	23	1
Pumpkinseed	Lower	IMP_013	W	9/17/2019	16:45	105	20	1
Pumpkinseed	Lower	IMP_016	W	9/17/2019	7:58	110	29	1
Redbreast Sunfish	Upper	IMP_040	E	9/18/2019	15:05	85	11	1
Redbreast Sunfish	Middle	IMP_025	E	9/17/2019	17:48	80	8	1
Redbreast Sunfish	Middle	IMP_025	E	9/17/2019	17:48	68	5	1
Redbreast Sunfish	Lower	IMP_004	W	9/17/2019	15:00	155	82	1
Redbreast Sunfish	Lower	IMP_004	W	9/17/2019	15:00	128	38	1
Redbreast Sunfish	Lower	IMP_013	W	9/17/2019	16:45	76	7	1
Redbreast Sunfish	Lower	IMP_013	W	9/17/2019	16:45	147	63	1
Redbreast Sunfish	Lower	IMP_016	W	9/17/2019	7:58	78	8	1
Smallmouth Bass	Upper	IMP_039	W	9/18/2019	15:50	66	4	1
Smallmouth Bass	Upper	IMP_040	E	9/18/2019	15:05	69	5	1
Smallmouth Bass	Upper	IMP_040	E	9/18/2019	15:05	137	30	1
Smallmouth Bass	Upper	IMP_040	E	9/18/2019	15:05	296	325	1
Smallmouth Bass	Upper	IMP_048	W	9/18/2019	8:15	74	5	1
Smallmouth Bass	Middle	IMP_025	E	9/17/2019	17:48	119	19	1
Smallmouth Bass	Middle	IMP_025	E	9/17/2019	17:48	65	3	1
Smallmouth Bass	Middle	IMP_036	W	9/18/2019	17:12	68	4	1
Smallmouth Bass	Middle	IMP_036	W	9/18/2019	17:12	60	3	1
Smallmouth Bass	Middle	IMP_036	W	9/18/2019	17:12	72	4	1
Smallmouth Bass	Middle	IMP_036	W	9/18/2019	17:12	135	30	1
Smallmouth Bass	Middle	IMP_036	W	9/18/2019	17:12	63	3	1
Smallmouth Bass	Middle	IMP_038	E	9/18/2019	14:20	351	600	1
Smallmouth Bass	Lower	IMP_013	W	9/17/2019	16:45	73	6	1
Smallmouth Bass	Lower	IMP_013	W	9/17/2019	16:45	75	6	1
Smallmouth Bass	Lower	IMP_016	W	9/17/2019	7:58	71	5	1
Smallmouth Bass	Lower	IMP_016	W	9/17/2019	7:58	70	5	1
Smallmouth Bass	Lower	IMP_016	W	9/17/2019	7:58	78	6	1
Smallmouth Bass	Lower	IMP_016	W	9/17/2019	7:58	65	3	1
Smallmouth Bass	Lower	IMP_016	W	9/17/2019	7:58	61	4	1
Smallmouth Bass	Lower	IMP_016	W	9/17/2019	7:58	78	6	1
Smallmouth Bass	Lower	IMP_016	W	9/17/2019	7:58	66	4	1
Smallmouth Bass	Lower	IMP_016	W	9/17/2019	7:58	71	5	1
White Sucker	Upper	IMP_052	E	9/18/2019	9:10	85	6	1
White Sucker	Middle	IMP_038	E	9/18/2019	14:20	261	175	1
White Sucker	Middle	IMP_038	E	9/18/2019	14:20	290	260	1
White Sucker	Middle	IMP_038	E	9/18/2019	14:20	98	10	1
White Sucker	Middle	IMP_038	E	9/18/2019	14:20	326	360	1
White Sucker	Middle	IMP_038	E	9/18/2019	14:20	80	5	1
White Sucker	Middle	IMP_038	E	9/18/2019	14:20	320	340	1
White Sucker	Lower	IMP_004	W	9/17/2019	15:00	178	53	1
White Sucker	Lower	IMP_010	E	9/17/2019	16:01	444	800	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
White Sucker	Lower	IMP_017	W	9/17/2019	9:00	460	1000	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	96	8	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	112	7	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	82	4	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	77	4	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	111	13	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	82	7	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	126	21	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	133	24	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	110	13	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	88	7	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	84	6	1
Yellow Perch	Upper	IMP_039	W	9/18/2019	15:50	74	4	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	145	31	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	84	6	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	130	22	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	86	5	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	99	9	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	122	17	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	118	15	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	121	19	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	80	5	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	127	19	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	121	15	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	145	33	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	69	3	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	130	21	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	118	16	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	71	4	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	130	21	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	150	30	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	120	19	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	80	5	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	110	12	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	121	20	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	120	18	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	127	21	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	105	11	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	218	105	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	87	7	1
Yellow Perch	Upper	IMP_040	E	9/18/2019	15:05	114	13	1
Yellow Perch	Upper	IMP_048	W	9/18/2019	8:15	252	165	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	115	15	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	122	17	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	121	17	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	79	4	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	107	11	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	141	28	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	107	10	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	198	74	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	111	12	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	83	5	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	135	27	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	168	46	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	257	190	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	273	220	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	136	24	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	234	150	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	190	72	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	78	3	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	183	57	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	117	15	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	136	27	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	124	18	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	105	10	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	119	18	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	255	165	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	103	11	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	238	170	1
Yellow Perch	Upper	IMP_052	E	9/18/2019	9:10	80	4	1
Yellow Perch	Upper	IMP_054	W	9/18/2019	10:15	124	21	1
Yellow Perch	Upper	IMP_054	W	9/18/2019	10:15	124	17	1
Yellow Perch	Upper	IMP_054	W	9/18/2019	10:15	121	19	1
Yellow Perch	Upper	IMP_054	W	9/18/2019	10:15	90	8	1
Yellow Perch	Upper	IMP_054	W	9/18/2019	10:15	253	175	1
Yellow Perch	Upper	IMP_054	W	9/18/2019	10:15	229	135	1
Yellow Perch	Middle	IMP_021	W	9/17/2019	10:12	90	6	1
Yellow Perch	Middle	IMP_021	W	9/17/2019	10:12	74	4	1
Yellow Perch	Middle	IMP_021	W	9/17/2019	10:12	90	6	1
Yellow Perch	Middle	IMP_021	W	9/17/2019	10:12	75	3	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	273	210	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	264	185	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	216	100	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	196	80	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	115	15	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	135	29	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	87	5	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	129	23	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	166	43	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	145	33	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	119	15	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	120	17	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	133	25	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	123	20	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	76	3	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	108	12	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	179	54	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	189	73	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	76	4	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	79	4	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	81	5	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	131	23	1
Yellow Perch	Middle	IMP_025	E	9/17/2019	17:48	81	5	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	188	73	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	122	17	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	197	87	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	130	25	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	114	15	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	122	18	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	130	25	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	120	19	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	123	21	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	75	4	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	123	20	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	120	16	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	223	110	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	90	8	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	113	15	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	120	17	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	124	19	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	125	24	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	75	4	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	74	3	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	73	4	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	124	20	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	126	20	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	121	19	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10	75	4	1
Yellow Perch	Middle	IMP_028	W	9/16/2019	17:10		85	12

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	127	22	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	127	19	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	122	18	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	125	19	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	105	11	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	78	4	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	71	3	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	118	16	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	136	24	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	83	5	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	151	34	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	89	7	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	74	3	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	120	17	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	119	17	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	119	16	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	122	17	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	122	19	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	115	15	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	119	16	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	118	14	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	126	17	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	119	16	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	126	17	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20	76	4	1
Yellow Perch	Middle	IMP_038	E	9/18/2019	14:20		200	16
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	255	170	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	123	19	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	77	5	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	174	56	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	130	21	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	133	23	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	195	74	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	170	47	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	127	19	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	127	19	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	120	16	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	130	23	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	125	18	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	120	16	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	118	15	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	116	15	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	126	19	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	122	17	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	75	4	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	77	4	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	90	7	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	115	14	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	80	5	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	114	13	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00	172	45	1
Yellow Perch	Lower	IMP_004	W	9/17/2019	15:00		257	14
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	201	89	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	203	93	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	162	41	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	237	135	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	174	60	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	79	5	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	233	130	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	73	4	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	69	4	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	71	3	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	91	7	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	74	5	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	177	60	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	124	21	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	150	37	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	187	63	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	79	5	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	84	6	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	124	20	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	66	2	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	131	22	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	73	3	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	66	2	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	74	3	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01	122	18	1
Yellow Perch	Lower	IMP_010	E	9/17/2019	16:01		110	9
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	169	51	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	143	28	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	117	17	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	216	105	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	164	44	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	112	13	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	77	4	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	252	170	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	143	32	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	136	25	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	160	46	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	86	5	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	195	83	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	121	17	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	114	13	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	125	18	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	112	13	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	194	73	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	131	24	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	174	53	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	216	100	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	210	81	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	199	85	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	246	165	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45	117	16	1
Yellow Perch	Lower	IMP_013	W	9/17/2019	16:45		580	18
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	131	22	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	71	3	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	138	23	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	60	2	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	149	31	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	154	35	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	133	22	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	114	13	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	206	65	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	265	205	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	196	70	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	75	4	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	140	30	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	211	70	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	108	13	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	75	3	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	166	43	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	130	21	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	141	25	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	117	15	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	83	6	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	117	15	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	78	4	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	104	10	1
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58	77	4	1

Common Name	Reach	Transect ID	Bank	Date	Start Time	Length (mm)	Weight (g)	Count
Yellow Perch	Lower	IMP_016	W	9/17/2019	7:58		108	17
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	157	41	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	114	14	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	125	21	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	159	38	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	200	81	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	138	28	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	84	6	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	122	17	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	75	4	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	72	4	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	218	105	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	126	19	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	113	13	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	132	22	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	131	21	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	149	31	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	212	100	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	123	17	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	127	20	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	123	18	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	173	50	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	170	50	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	121	16	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	119	12	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00	134	23	1
Yellow Perch	Lower	IMP_017	W	9/17/2019	9:00		460	47

Appendix B. Fish assemblage catch from the Shawmut tailwater – electrofish sampling conducted by MBI during October 2019.

Common Name	Transect ID	Date	Length (mm)
Smallmouth Bass	1	10/11/2019	305
Smallmouth Bass	1	10/11/2019	190
White Sucker	1	10/11/2019	116
Alewife	2	10/11/2019	52
Alewife	2	10/11/2019	67
Fallfish	2	10/11/2019	75
Fallfish	2	10/11/2019	71
Fallfish	2	10/11/2019	63
Fallfish	2	10/11/2019	69
Fallfish	2	10/11/2019	64
Fallfish	2	10/11/2019	67
Fallfish	2	10/11/2019	70
Fallfish	2	10/11/2019	65
Fallfish	2	10/11/2019	66
Fallfish	2	10/11/2019	59
Fallfish	2	10/11/2019	78
Fallfish	2	10/11/2019	58
Fallfish	2	10/11/2019	67
Fallfish	2	10/11/2019	63
Fallfish	2	10/11/2019	65
Fallfish	2	10/11/2019	67
Fallfish	2	10/11/2019	75
Fallfish	2	10/11/2019	75
Fallfish	2	10/11/2019	57
Fallfish	2	10/11/2019	70
Fallfish	2	10/11/2019	71
Fallfish	2	10/11/2019	67
Fallfish	2	10/11/2019	59
Fallfish	2	10/11/2019	63
Fallfish	2	10/11/2019	76
Fallfish	2	10/11/2019	75
Fallfish	2	10/11/2019	71
Redbreast Sunfish	2	10/11/2019	35
Redbreast Sunfish	2	10/11/2019	46
Smallmouth Bass	2	10/11/2019	223
White Sucker	2	10/11/2019	113
Yellow Perch	2	10/11/2019	162
Yellow Perch	2	10/11/2019	85
American Eel	3	10/11/2019	540
American Eel	3	10/11/2019	480
American Eel	3	10/11/2019	330

Common Name	Transect ID	Date	Length (mm)
American Eel	3	10/11/2019	470
American Eel	3	10/11/2019	370
Fallfish	3	10/11/2019	55
Smallmouth Bass	3	10/11/2019	349
Smallmouth Bass	3	10/11/2019	386
Smallmouth Bass	3	10/11/2019	284
Smallmouth Bass	3	10/11/2019	291
White Sucker	3	10/11/2019	462
White Sucker	3	10/11/2019	414
White Sucker	3	10/11/2019	484

Appendix C. MDIFW Fish assemblage sampling correspondence.

From: Seiders, Dwayne J
To: Drew Trested
Subject: Shawmut
Date: Monday, September 16, 2019 8:26:12 AM

Drew,

I received your message and figured it would be easiest to respond by email.

You do not need to collect scales from bass, only collect scales from unmarked salmonines. Retain all black crappie and northern pike and we will conduct age analysis through otolith and cleithrum examination.

We will not be able to offer assistance in the Shawmut tailwater. My suggestion would be to focus on the lower portion of the section due to the difficult navigation in the immediate tailwater area. The Shawmut impoundment is our greatest concern because we have very little information on the current status of the fishery. I will provide you with our recent report regarding our studies conducted in the Shawmut tailwater area.

If you have any questions, please let me know. Thank you.

Jason Seiders
Regional Fisheries Biologist
Maine Dept of Inland Fisheries & Wildlife
Fisheries Division
270 Lyons Road
Sidney, Maine 04330
(207) 287-5314
mefishwildlife.com | facebook | twitter

APPENDIX E-4

RECREATION SITES AMENITIES MAPS

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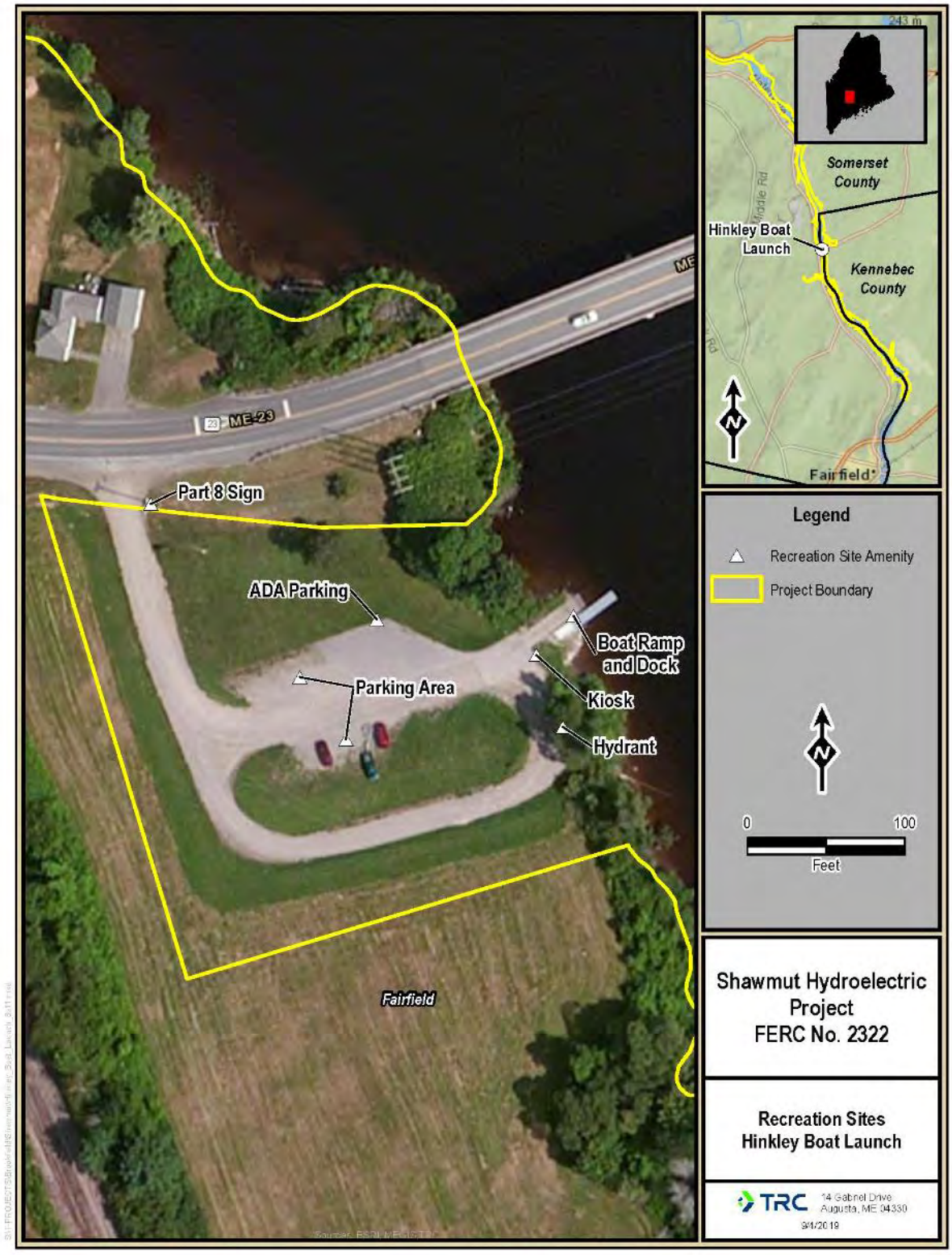
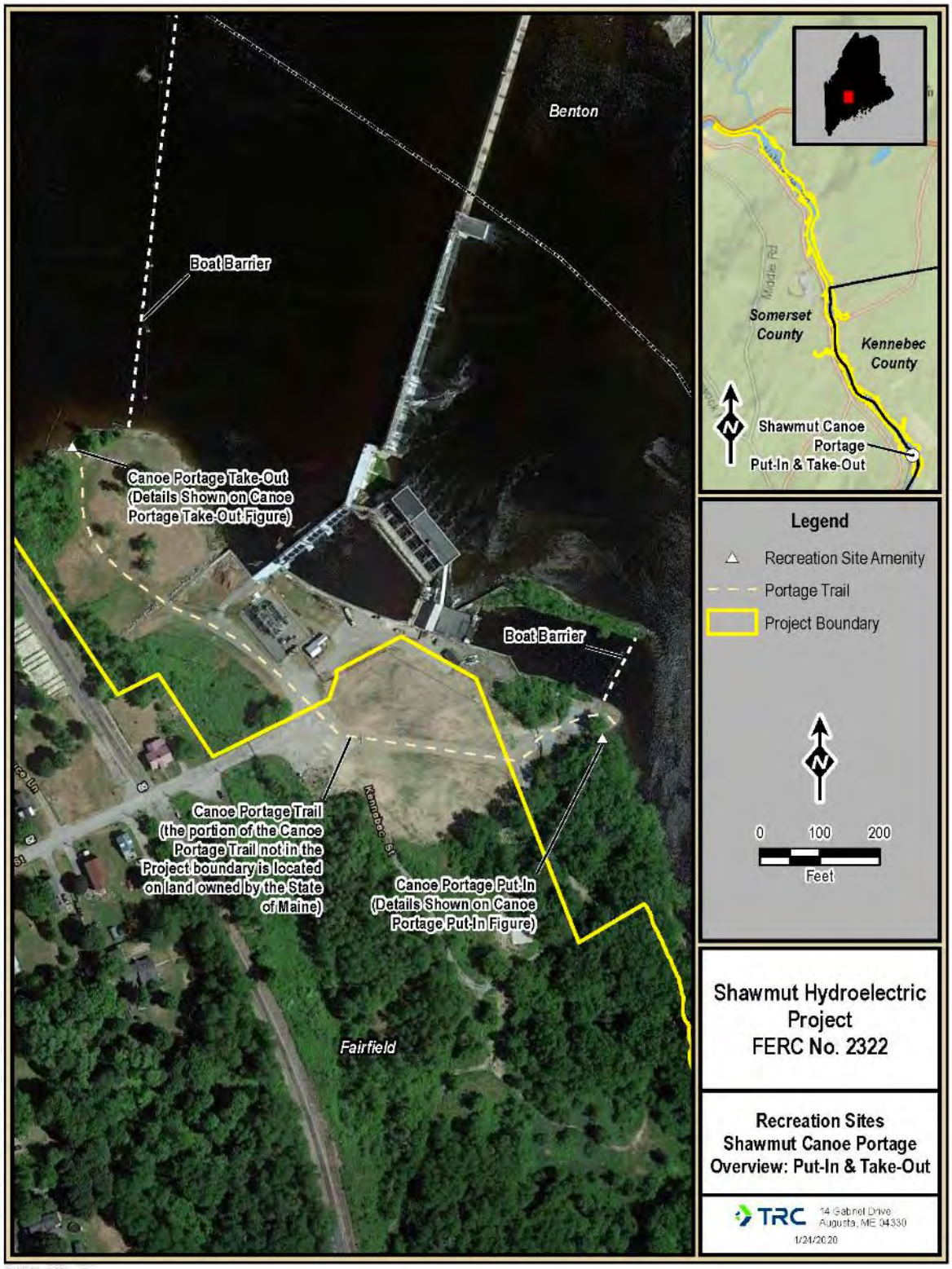
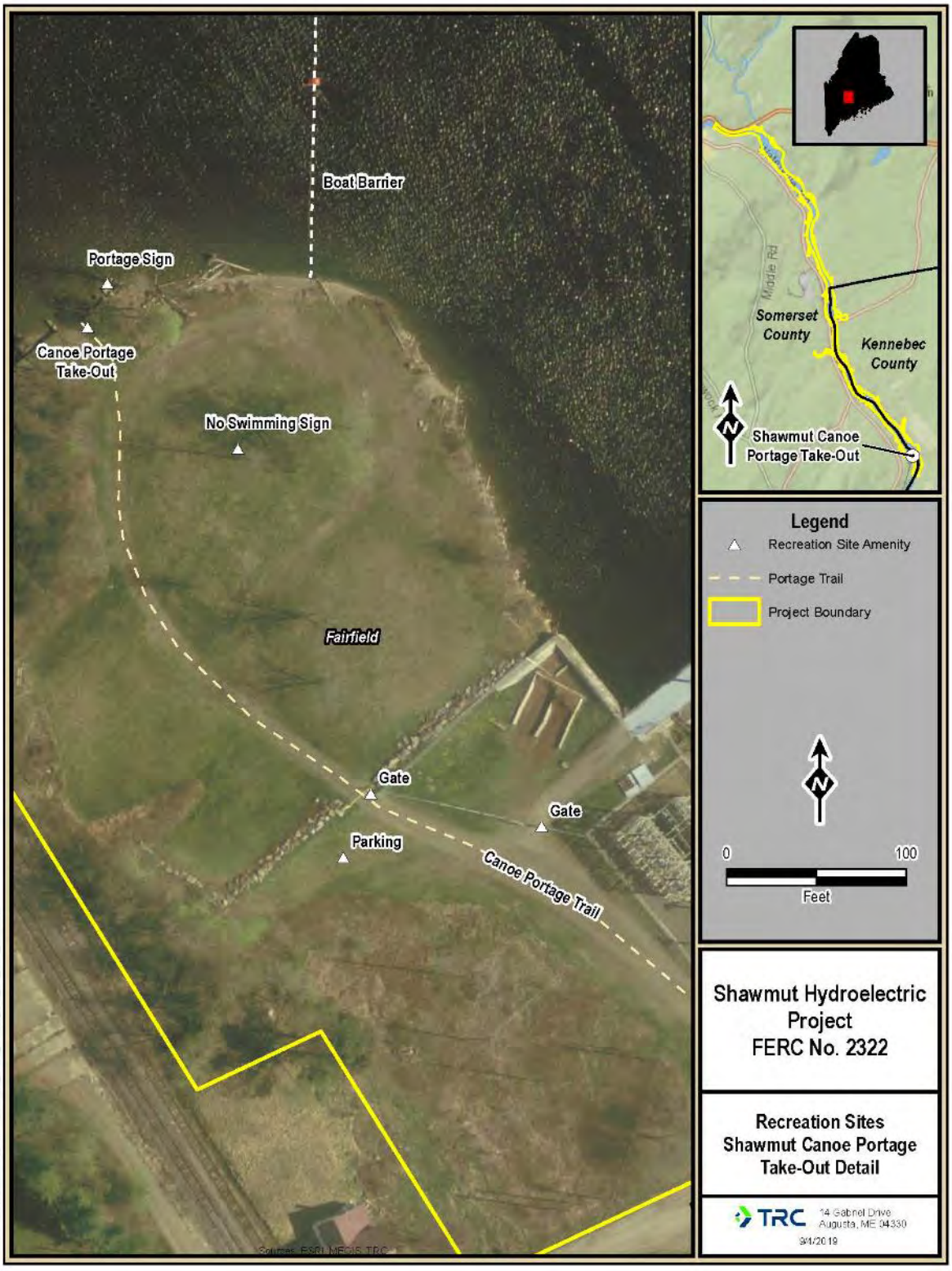
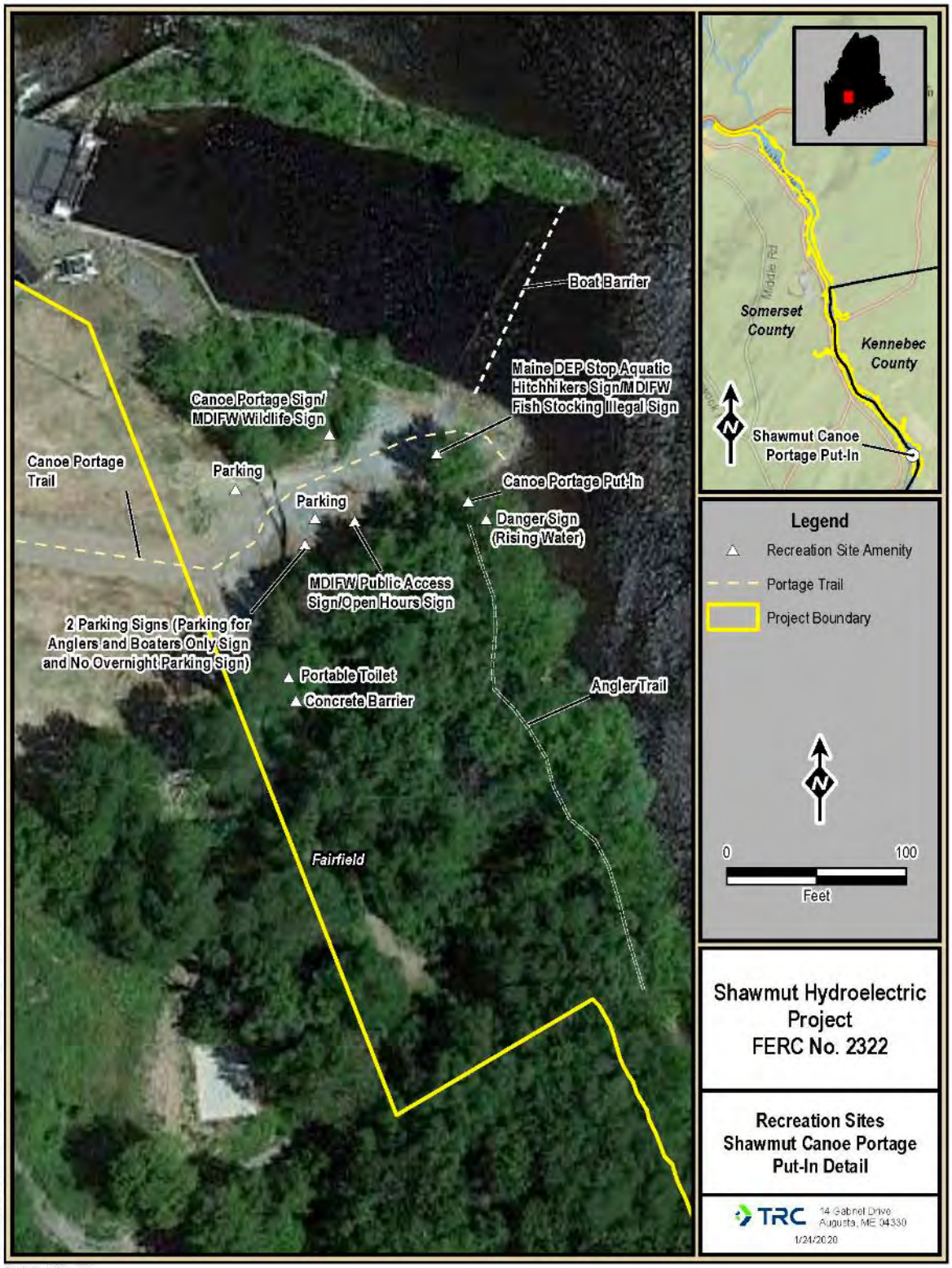
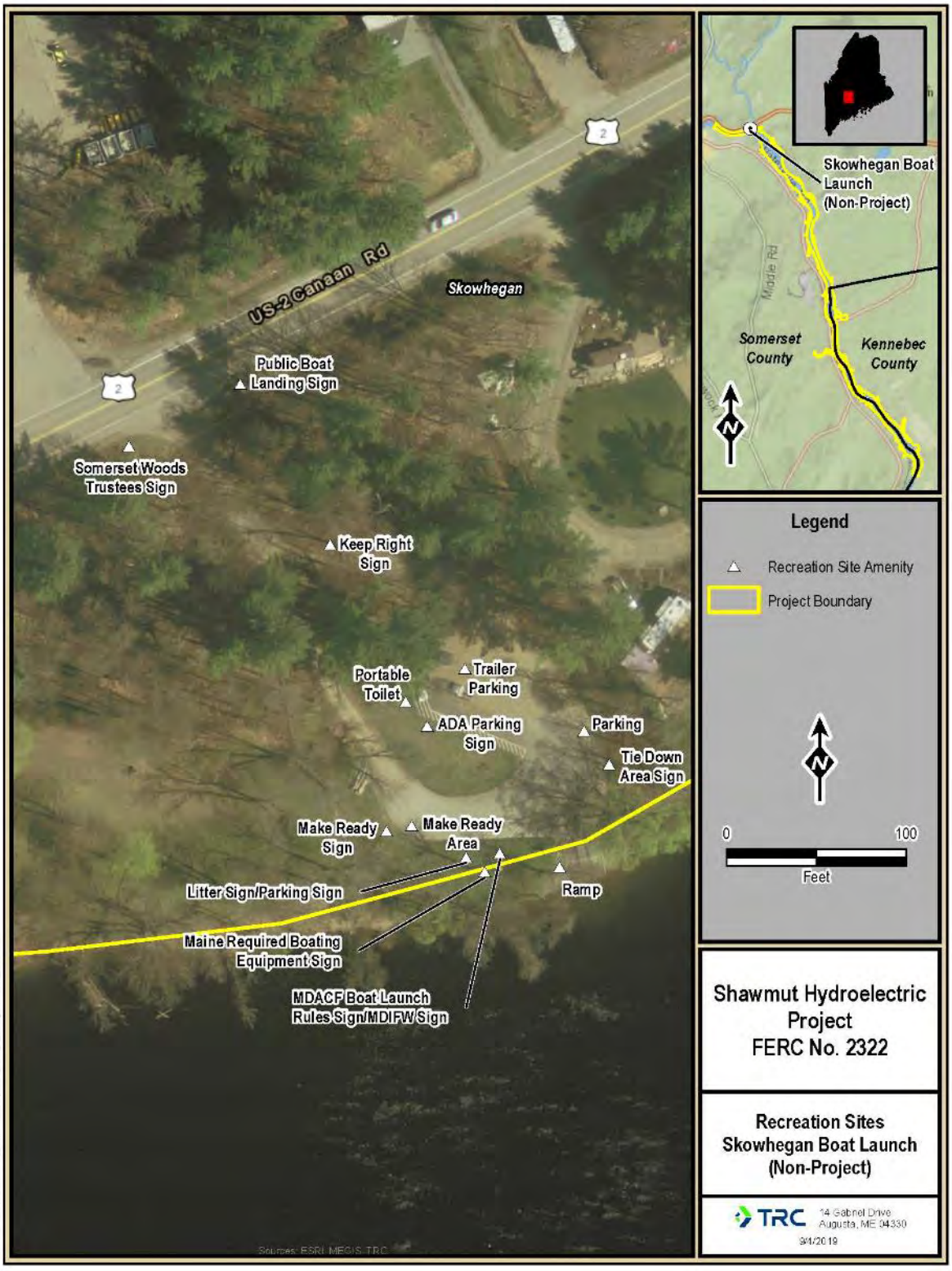

ME-23
Part 8 Sign
ADA Parking
Parking Area
Boat Ramp and Dock
Kiosk
Hydrant
Fairfield
Somerset County
Hinkley Boat Launch
Kennebec County
Fairfield
Legend
Recreation Site Amenity
Project Boundary
N
0
100
Feet
Shawmut Hydroelectric Project
FERC No. 2322
Recreation Sites
Hinkley Boat Launch
TRC
14 Gabriel Drive
Augusta, ME 04330
9/1/2019


Benton
Boat Barrier
Canoe Portage Take-Out
(Details Shown on Canoe
Portage Take-Out Figure)
Boat Barrier
Canoe Portage Trail
(the portion of the Canoe
Portage Trail not in the
Project boundary is located
on land owned by the State
of Maine)
Kennebec St
Canoe Portage Put-In
(Details Shown on Canoe
Portage Put-In Figure)
Fairfield
Somerset
County
Kennebec
County
Shawmut Canoe
Portage
Put-In & Take-Out
Legend
Recreation Site Amenity
Portage Trail
Project Boundary
N
0
100
200
Feet
Shawmut Hydroelectric
Project
FERC No. 2322
Recreation Sites
Shawmut Canoe Portage
Overview: Put-In & Take-Out
TRC
14 Gabriel Drive
Augusta, ME 04330
1/24/2020


Boat Barrier
Portage Sign
Canoe Portage Take-Out
No Swimming Sign
Fairfield
Gate
Gate
Parking
Canoe Portage Trail
Middle Rd
Somerset County
Kennebec County
N
Shawmut Canoe Portage Take-Out
Legend
Recreation Site Amenity
Portage Trail
Project Boundary
N
0
100
Feet
Shawmut Hydroelectric Project
FERC No. 2322
Recreation Sites
Shawmut Canoe Portage Take-Out Detail
TRC
14 Gabriel Drive
Augusta, ME 04330
9/1/2019


Boat Barrier
Maine DEP Stop Aquatic Hitchhikers Sign/MDIFW Fish Stocking Illegal Sign
Canoe Portage Sign/ MDIFW Wildlife Sign
Canoe Portage Trail
Parking
Parking
Canoe Portage Put-In
Danger Sign (Rising Water)
MDIFW Public Access Sign/Open Hours Sign
2 Parking Signs (Parking for Anglers and Boaters Only Sign and No Overnight Parking Sign)
Portable Toilet
Concrete Barrier
Angler Trail
Fairfield
Somerset County
Kennebec County
Middle Rd
Shawmut Canoe Portage Put-In
N
Legend
Recreation Site Amenity
Portage Trail
Project Boundary
N
0
100
Feet
Shawmut Hydroelectric Project
FERC No. 2322
Recreation Sites
Shawmut Canoe Portage
Put-In Detail
TRC
14 Gabriel Drive
Augusta, ME 04330
1/24/2020


US-2 Canaan Rd
Skowhegan
Public Boat Launch Sign
Somerset Woods Trustees Sign
Keep Right Sign
Portable Toilet
Trailer Parking
ADA Parking Sign
Parking
Tie Down Area Sign
Make Ready Sign
Make Ready Area
Litter Sign/Parking Sign
Ramp
Maine Required Boating Equipment Sign
MDACF Boat Launch Rules Sign/MDIFW Sign
Skowhegan Boat Launch (Non-Project)
Middle Rd
Somerset County
Kennebec County
Legend
Recreation Site Amenity
Project Boundary
0
100
Feet
Shawmut Hydroelectric Project
FERC No. 2322
Recreation Sites
Skowhegan Boat Launch
(Non-Project)
TRC
14 Gabriel Drive
Augusta, ME 04330
9/1/2019


Skowhegan
Canaan Rd
US-2
2
Kennebec Bank Rest Area Sign
8 Designated Parking Spaces
Grill
Picnic Table
Covered Picnic Table
Kennebec Bank Rest Area Sign
Grill
Covered Picnic Table
Portable Toilet
Litter Sign/No Camping
15 Designated Parking Spaces
Litter Sign
Kiosk
3 Picnic Tables/ Grill/Litter Sign
Litter Sign
Picnic Table
Covered Picnic Table
Covered Picnic Table
Historial Sign
Skowhegan Route 2 Wayside Picnic Area (Non-Project)
Middle Rd
Somerset County
Kennebec County
N
Legend
Recreation Site Amenity
Project Boundary
N
0
100
Feet
Shawmut Hydroelectric Project
FERC No. 2322
Recreation Sites
Skowhegan Route 2 Wayside Picnic Area (Non-Project)
TRC
14 Gabriel Drive
Augusta, ME 04330
9/18/2019

APPENDIX E-5

DRAFT RECREATION FACILITIES MANAGEMENT PLAN

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Shawmut Hydroelectric Project
FERC No. 2322

Draft
Recreation Facilities Management Plan

Prepared for:

Brookfield White Pine Hydro LLC

Prepared by:

TRC

January 2020

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SHAWMUT HYDROELECTRIC PROJECT
FERC NO. 2322

DRAFT
RECREATION FACILITIES MANAGEMENT PLAN

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LIST OF ACRONYMS

ADA	Americans with Disabilities Act
Commission	Federal Energy Regulatory Commission
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
Licensee	Brookfield White Pine Hydro LLC
MDIFW	Maine Department of Inland Fisheries and Wildlife
Project	Shawmut Hydroelectric Project (FERC No. 2322)
RM	river mile
RMP	Recreation Facilities Management Plan
USGS	U.S. Geological Survey
White Pine Hydro	Brookfield White Pine Hydro LLC

1.0 INTRODUCTION AND BACKGROUND

This document represents the Shawmut Hydroelectric Project (Shawmut Project or Project) Recreation Facilities Management Plan (RFMP). The Project is located on the Kennebec River in Kennebec and Somerset counties in the towns of Skowhegan, Fairfield, Clinton, and Benton, Maine. The Project is located at river mile (RM) 66. Brookfield White Pine Hydro LLC (White Pine Hydro or Licensee) is the owner and Licensee for the Project.

As part of the relicensing process, recreation studies for the Shawmut Project were performed in 2016 and 2017. Relicensing studies relevant to recreation and land use resources at the Shawmut Project included a recreation facilities inventory and public recreation use assessment and are reported in the January 2020 Final License Application (FLA).

This RFMP describes the available Federal Energy Regulatory Commission (FERC or Commission) Project public recreation facilities that provide access to Project lands and waters. This RMP also identifies measures for ensuring public access to Project lands and waters that, collectively, will maintain and enhance the recreational opportunities provided at the Shawmut Project over the term of the new license.

2.0 PROJECT DESCRIPTION

The Project consists of a concrete gravity dam with a sluice, hinged flashboards, and inflatable rubber bladders on the spillway, an enclosed forebay, intake and headworks section, two powerhouses, a tailrace, an interconnection with the transmission system, and appurtenant facilities. The Project boundary extends approximately 12.3 miles upstream of the dam, and approximately 4,000 feet downstream of the dam. Above the dam, the Project boundary generally follows elevation contours 113’ U.S. Geological Survey (USGS) datum[1] and 114’; the normal full pond elevation is 112’ .

[1] All elevations in this document are referenced in U.S. Geological Survey (USGS) datum.

Approximately 1,432 acres within the Project boundary is open water, consisting of an estimated 1,342 acres of impoundment waters and 90 acres of tailwater. The total acreage of land and water within the proposed Project boundary combined is estimated to be 1,729 acres.[2]

The majority of land within the Project boundary is undeveloped. The total land acreage within the Project boundary is estimated to be 297 acres. Of the land, there is approximately 165 acres of forested land (or approximately 10 percent of total lands), 9 acres of developed land, and 1 acre of electric transmission use land. Recreation lands within the Project boundary occupy approximately 2 acres.

The Licensee controls project lands via a combination of fee ownership and flowage easements. Lands around the Shawmut Project are principally rural with some residential and commercial development that are under private ownership.

3.0 PROJECT-RELATED RECREATION AREAS AND FACILITIES

3.1 Existing Federal Energy Regulatory Commission Project Recreation Sites and Facilities

The Shawmut Project has two public project recreation sites (i.e., Commission-approved sites). These are summarized in Table 3-1 and Table 3-2 and described in greater detail below.

Figure 3-1 provides the location of the FERC project recreation sites, as well as other project-related non-FERC and informal recreation sites that provide access to project lands and waters.

[2] As part of the Final License Application (FLA), White Pine Hydro has proposed to modify the Project boundary to remove two small parcels of land that are not needed for Project purposes. Both parcels are located in Skowhegan. One of these parcels is surplus land located to the west of the Project impoundment toward the northwestern end of the Project and the second parcel of land is surplus land located to the east of the Project impoundment toward the northeastern end of the Project. The two parcels are not needed for current or future recreational opportunities. The amounts of acreage set forth in this Draft RFMP are based on the proposed Project boundary.

Table 3-1 Commission-Approved Recreation Facilities at Shawmut Project

Recreation Site Name	Location	Recreation Facilities
Hinckley Boat Launch	Located on the west side of the Project impoundment, approximately 5 miles upstream of the dam, where State Route 23 crosses the Kennebec River	Single-lane concrete boat launch Americans with Disabilities Act (ADA)-compliant concrete dock Parking for approximately 3 vehicles and trailers and 5 vehicles without trailers and 1 ADA-compliant parking space Wooden kiosk Trash can
Shawmut Canoe Portage	Canoe portage take-out is located approximately 430 feet upstream from the dam Canoe portage put-in is approximately 600 feet downstream from the dam	Canoe portage take-out area with parking area for approximately 8 vehicles Canoe portage put-in area with parking area for approximately 5 vehicles Path between the two areas is a dirt and gravel pathway that is approximately 0,25-mile-long Angler access provided at both the take-out and put-in locations. A portable toilet is available at the put-in.

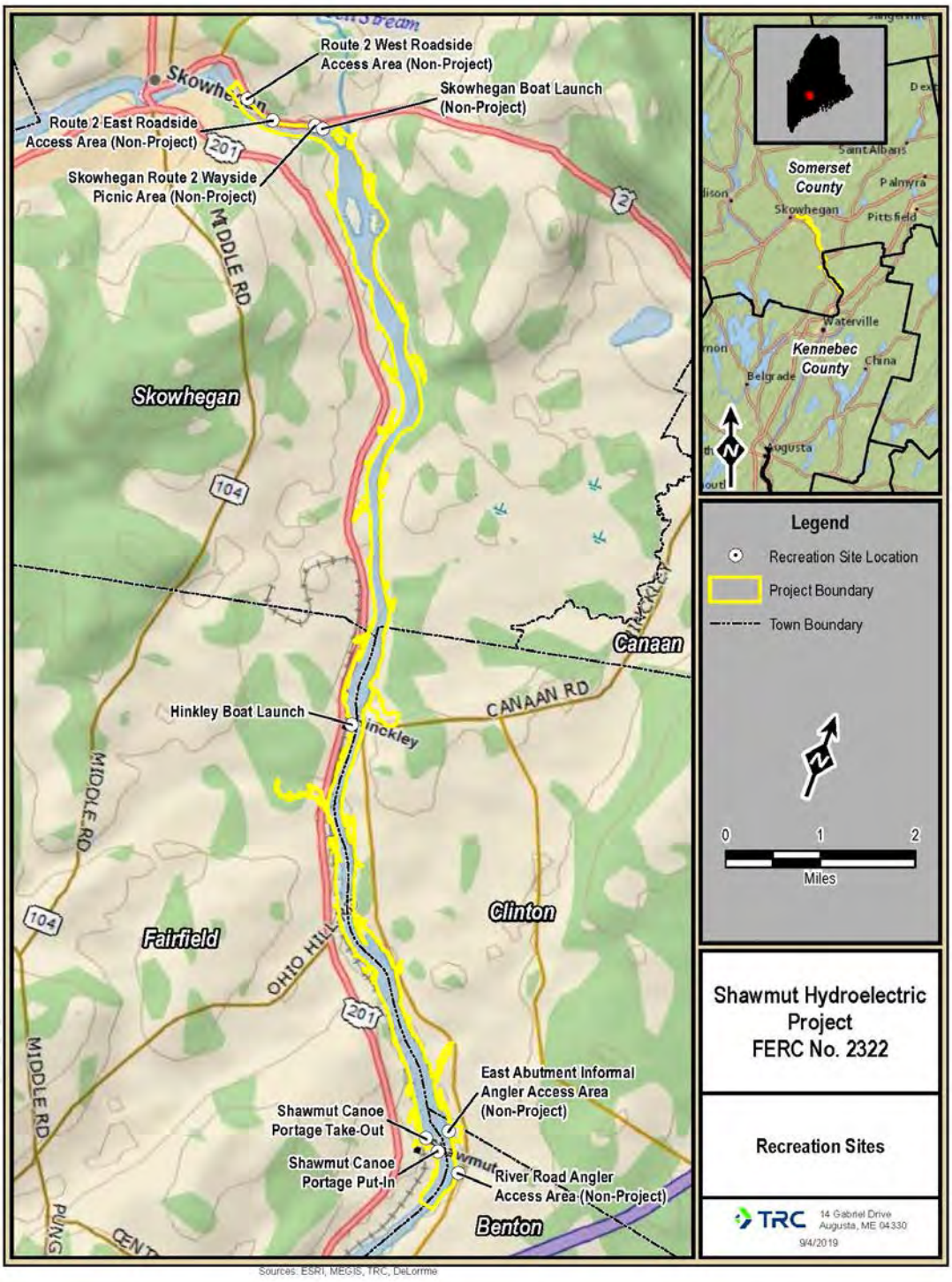


Figure 3-1 Project and Non-Project Public Recreation Sites at the Shawmut Project

Table 3-2 Approved Recreation Amenities for the Shawmut Project

Project No.	Development Name	Recreation Amenity Name	Recreation Amenity Type	Amenity Status	Latitude	Longitude	FERC Citation & Date	Notes
P-2322	Shawmut	Hinckley Boat Launch	Boat Launch	Constructed	44°41'5.94"N	69°37'52.13"W	October 13, 1992 61 FERC ¶ 62,024	Single lane concrete boat launch with launching dock
P-2322	Shawmut	Shawmut Canoe Portage	Take-out	Constructed	44°37'46.68"N	69°35'7.65"W	January 5, 1981 FERC Order Amending License and Issuing New Major License	Put-in and take-out with path between that is approximately 0.25-mile-long
P-2322	Shawmut	Shawmut Canoe Portage	Put-in	Constructed	44°37'42.28"N	69°34'55.74"W	January 5, 1981 FERC Order Amending License and Issuing New Major License	Put-in and take-out with path between that is approximately 0.25-mile-long

* Recreation amenities are the developed elements (e.g., structures, trails) that define the spectrum of recreation opportunities at each recreation site. A project recreation site may have one or more amenities at the site.

Hinckley Boat Launch

Location: Hinckley boat launch is located on the west side of the Project impoundment, approximately 5-miles upstream of the dam, where State Route 23 crosses the Kennebec River.

Description of Facilities: The boat launch (Photo 3-1) is accessible via a two-lane paved road. White Pine Hydro owns the site, and the town of Hinkley leases and manages the site. The boat launch is marked with a Part 8 sign at the entrance. The site consists of a single-lane concrete boat launch that is approximately 10-feet-wide. The ramp is surfaced with concrete planks. There is an ADA-compliant concrete dock that is 4-feet-wide by 44-feet-long, with a concrete base at the shore. There is one (1) ADA-compliant parking space, three (3) spaces for vehicles and trailers and five (5) spaces for vehicles without trailers (Photo 3-2). There is also a wooden kiosk and trash can at the site.

Site Regulations: The site is intended for day use. No site regulations are posted.

Photo 3-1 Hinckley Boat Launch

Photo 3-2 Hinkley Boat Launch Parking

Shawmut Canoe Portage

Location: The canoe portage is located on the west side of Shawmut Dam. The portage take-out and put-in locations are located within the Project boundary. The canoe portage take-out area (Photo 3-3 and Photo 3-4) is located approximately 430-feet upstream from the dam, and the canoe portage put-in (Photo 3-5) is approximately 600-feet-downstream from the dam just below the tailrace for the 1982 powerhouse.

Description of Facilities: The access road into the take-out is a two-lane paved road that turns into gravel with parking for approximately eight (8) vehicles. The access road into the put-in turns into a single-lane unpaved access road with parking for approximately five (5) vehicles. There are signs marking the canoe take-out and put-in locations. The path between the two areas is a dirt and gravel pathway that is approximately0.25-mile-long. The trail is partially located on project lands and partially on state lands (Maine Department of Inland Fisheries and Wildlife [MDIFW]). Angler access is provided at both the take-out and put-in locations; a portable toilet is available at the put-in.

Site Regulations: The site is intended for day use. "No Swimming" signs are posted at the take-out area. Signs prohibiting campfires and overnight parking are posted along the portage trail. A sign prohibiting overnight parking is posted at the put-in.

Photo 3-3 Canoe Portage Take-out

Photo 3-4 Canoe Portage Take-out

Photo 3-5 Canoe Portage Put-in

3.2 Existing Non-Project Recreation Sites and Informal Access Areas

There are two formal non-project recreation sites located at the Project: (1) Skowhegan Route 2 wayside picnic area and (2) Skowhegan boat launch. Three non-project, informal, unimproved public access areas at the Project include: (1) Route 2 informal fishing access areas (including the Route 2 east and west roadside access area), (2) River Road angler access area, and (3) east abutment informal angler access area. Summaries of these non-project recreation sites and access areas are provided in Table 3-3 and their locations are shows in Figure 3-1.

Table 3-3 Summary of Non-Project Recreation Sites and Access Areas Summary of Non-Project Recreation Sites and Access Areas

Recreation Site Name	Location	Recreation Facilities
Formal Non-Project Recreation Sites		
Skowhegan Route 2 Wayside Picnic Area	Non-project recreation site located immediately adjacent to the Skowhegan boat launch on the east side of the impoundment, approximately 11 miles upstream of the dam, near the town of Skowhegan along Route 2	• Picnic area with 9 picnic tables, 3 grills, 1 portable toilet, and informational signage • Provides shoreline fishing access to project waters • Parking lot with 23 designated parking spaces
Skowhegan Boat Launch	Non-project recreation site located on the east side of the impoundment, approximately 11 miles upstream of the dam, near the town of Skowhegan along Route 2	• Boat launch with a single lane concrete ramp, a portable toilet, and informational signage • Provides shoreline fishing and boating access to Project waters • Parking lot with 1 ADA parking space, space for 2 vehicles with trailers, and 3 to 4 spaces for vehicles without trailers
Informal Public Access Areas		
Route 2 Informal Fishing Access Areas	Two road-side parking pull-off areas along Route 2, south of Skowhegan	• Two road-side parking pull-off areas that provide anglers access to the impoundment • Several informal foot trails from these 2 parking areas to the impoundment • The pull-off located further east can accommodate approximately 3 vehicles • The pull-off located further west can accommodate approximately 9 or 10 vehicles
River Road Angler Access Area	Small gravel pull-off located off River Road on the east side of the river, approximately 0.5-mile downstream of the dam	• Small gravel pull-off located off River Road that can accommodate approximately 4 vehicles • Provides informal access to the shoreline via several informal foot trails to the Kennebec River
East Abutment Informal Angler Access	The east abutment tailwater area of the Project (rock ledge area downstream of dam)	Accessed by anglers from several informal 4x4 vehicle tracks and trails through privately owned lands and via a gated road through the woods

4.0 RECREATION FACILITIES MANAGEMENT

4.1 Project Recreation Site Management and Maintenance

The Licensee will ensure the management of all Commission-approved -project recreation sites (i.e., the Hinckley boat launch and the Shawmut canoe portage) to provide safe and appropriate public recreation access to the Project. The Licensee will ensure that all project recreation sites remain usable over the term of the new license.

Typical routine maintenance activities would include on a periodic basis: litter clean-up; removal of fallen trees, lawn mowing, and other vegetation management that hinders site use (including managing vegetation along informal angler access trails); and checking that project signage is in-place and readable. The Licensee would conduct improvements and/or repairs on an observed, as-needed basis.

4.2 Determining the Need for Additional Measures or Expansion of Existing Sites

In the event that an existing project recreation site has reached capacity, the need for additional access or improvements to existing sites would be evaluated.

5.0 SCHEDULE

The Licensee will implement this RFMP upon approval by the Commission.

6.0 MODIFICATIONS TO RFMP

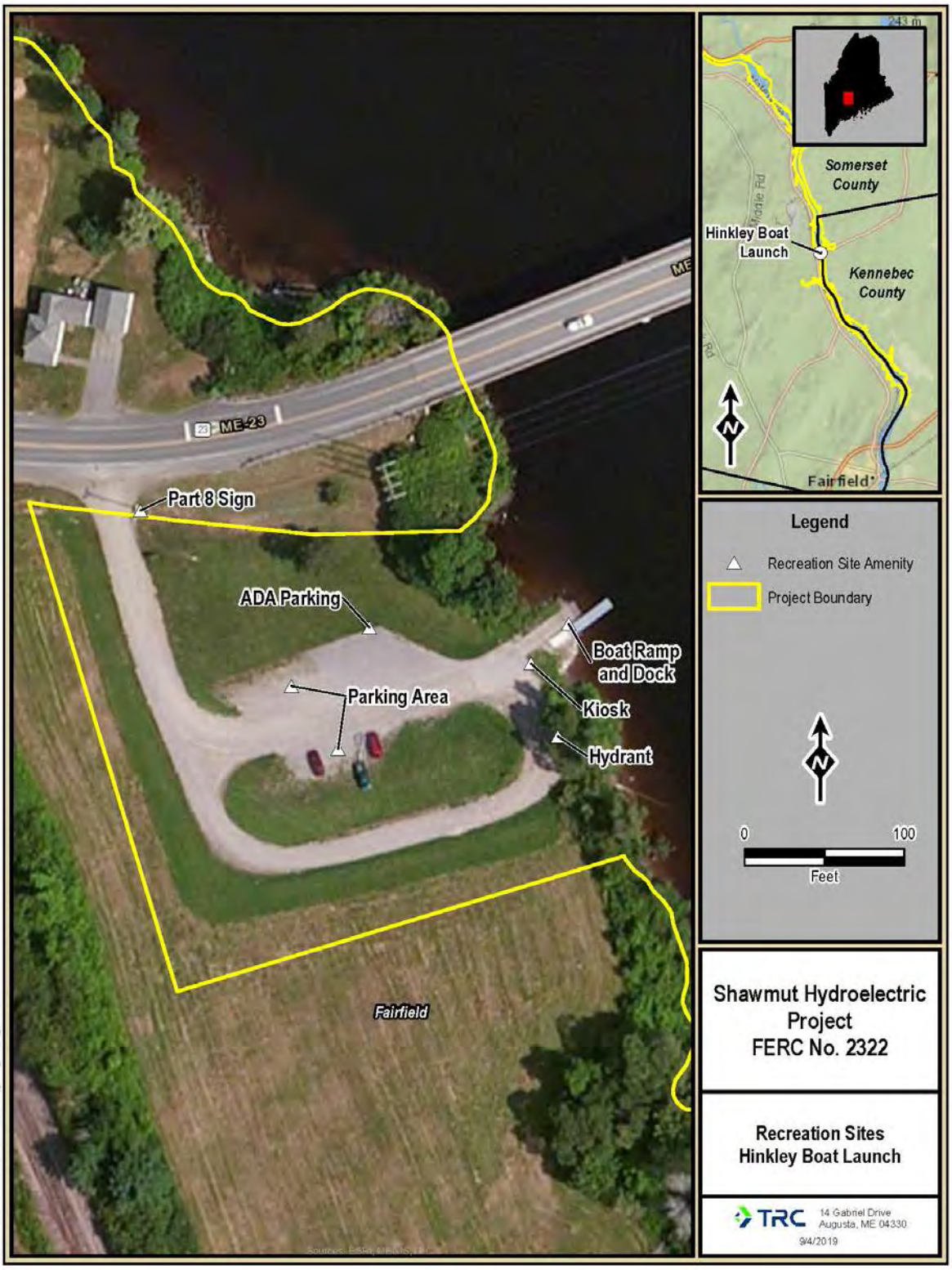
Any proposed modification to this RFMP would be submitted to appropriate agencies for review and comment prior to submittal to FERC.

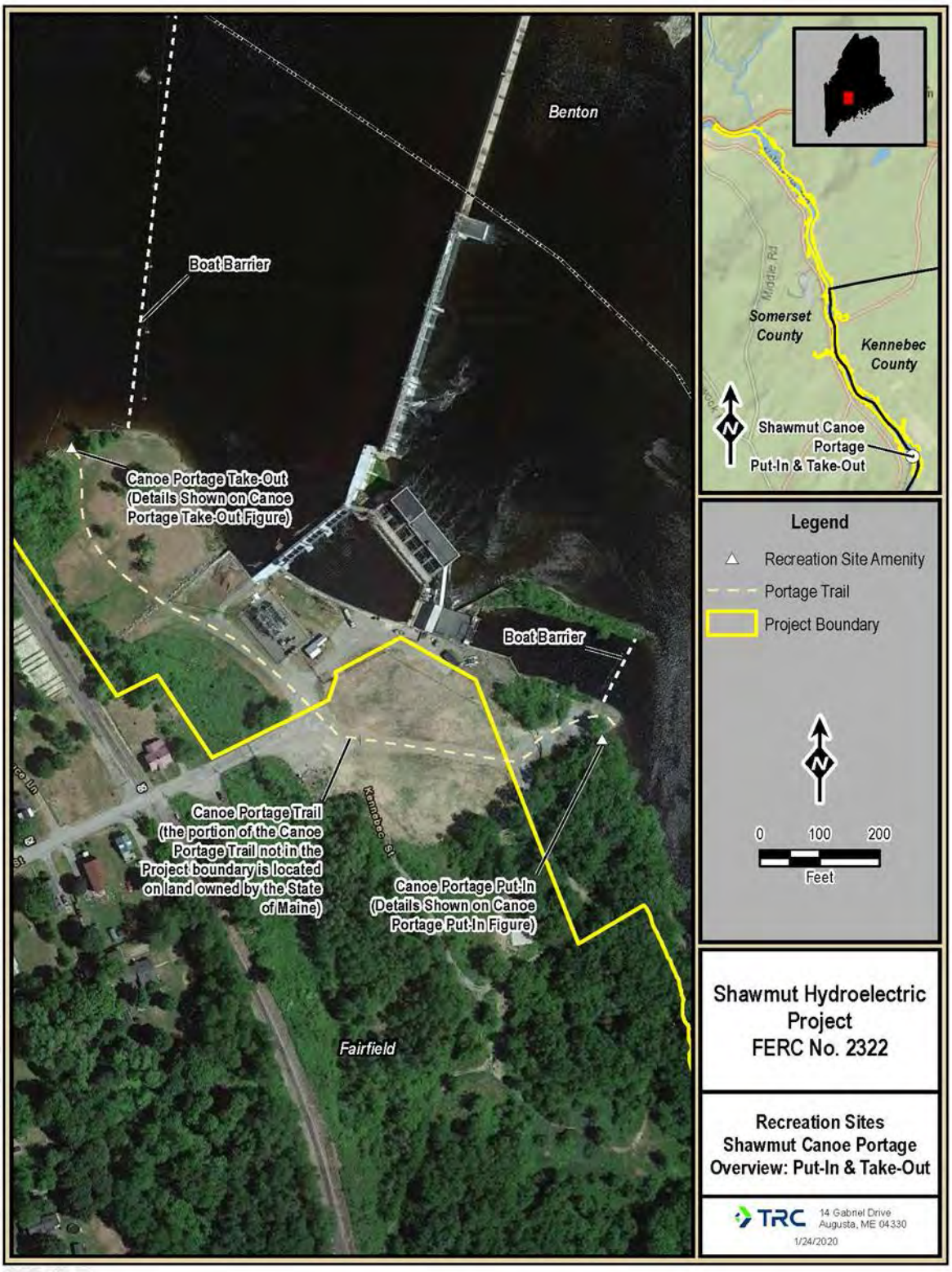
Any plans that may be developed for future recreational facilities would be provided to FERC for approval prior to construction. Any such plans would be provided along with drawings of facilities, documentation of consultation, and schedule. The Maine Historic Preservation Commission would be included in the consultation process regarding the construction of new facilities.

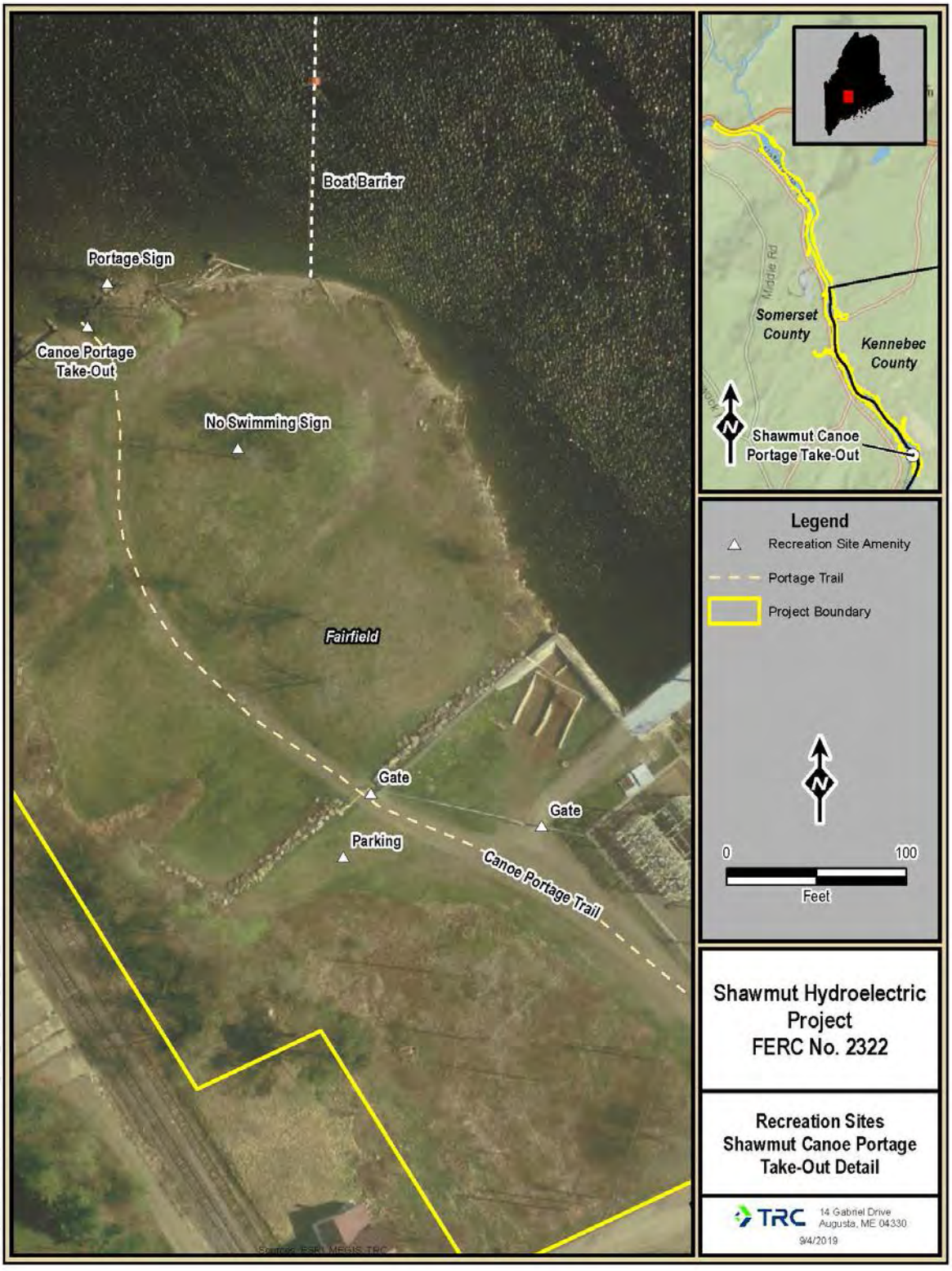
7.0 REFERENCES

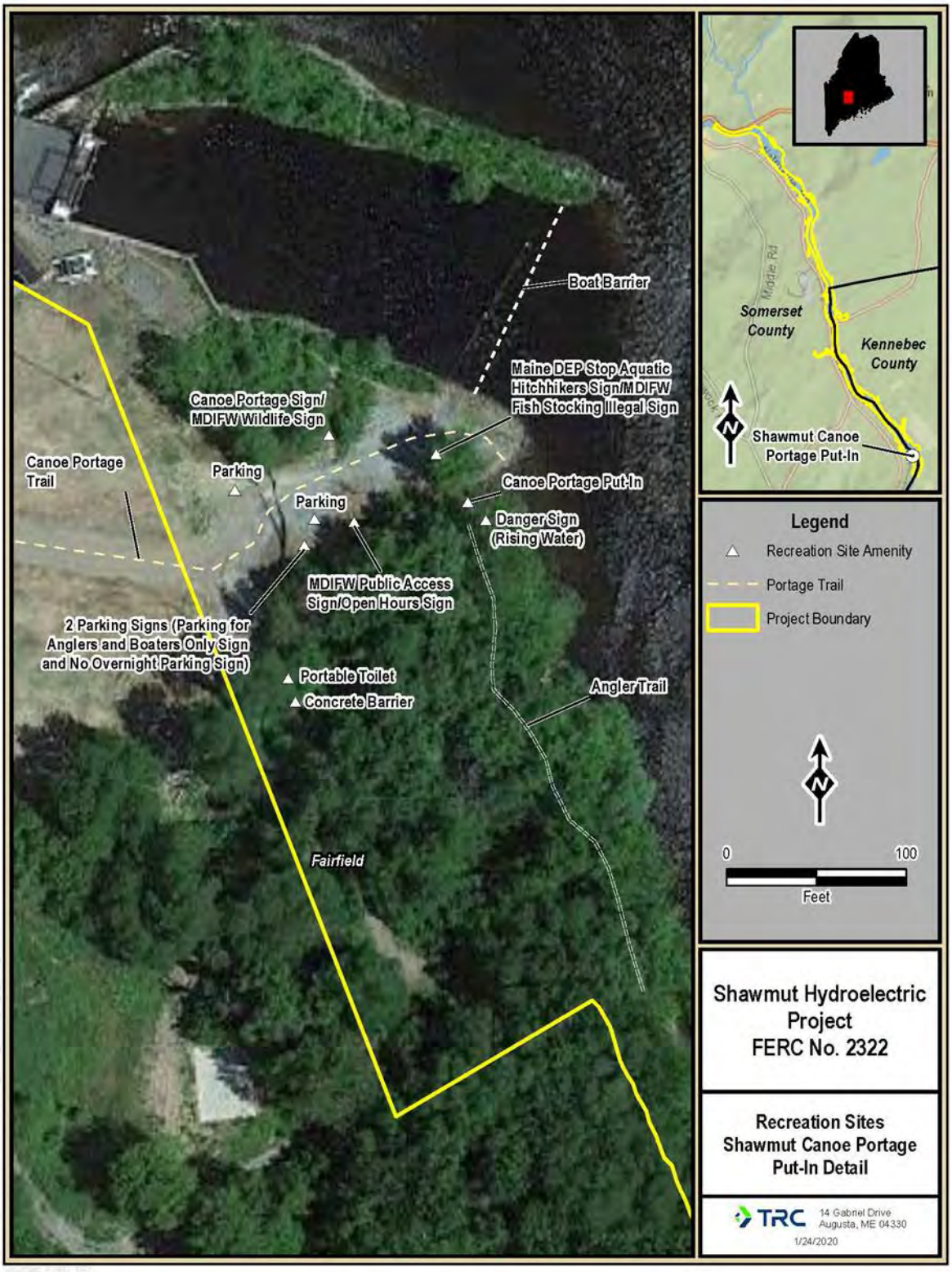
Brookfield White Pine Hydro, LLC. 2018. Updated Study Report for the Shawmut Hydroelectric Project (FERC No. 2322), Recreation Facilities Inventory and Public Recreation Use Assessment, filed with the Federal Energy Regulatory Commission on August 1, 2018.

APPENDIX RMP-1
Project Recreation Site and Amenities Figures


ME-23
Part 8 Sign
ADA Parking
Boat Ramp and Dock
Parking Area
Kiosk
Hydrant
Fairfield
Somerset County
Hinkley Boat Launch
Kennebec County
Fairfield
Legend
Recreation Site Amenity
Project Boundary
0
100
Feet
Shawmut Hydroelectric Project
FERC No. 2322
Recreation Sites
Hinkley Boat Launch
TRC
14 Gabriel Drive
Augusta, ME 04330
9/4/2019


Benton
Boat Barrier
Canoe Portage Take-Out
(Details Shown on Canoe
Portage Take-Out Figure)
Boat Barrier
Canoe Portage Trail
(the portion of the Canoe
Portage Trail not in the
Project boundary is located
on land owned by the State
of Maine)
Kennebec St
Canoe Portage Put-In
(Details Shown on Canoe
Portage Put-In Figure)
Fairfield
Middle Rd
Somerset
County
Kennebec
County
N
Shawmut Canoe
Portage
Put-In & Take-Out
Legend
Recreation Site Amenity
Portage Trail
Project Boundary
N
0
100
200
Feet
Shawmut Hydroelectric
Project
FERC No. 2322
Recreation Sites
Shawmut Canoe Portage
Overview: Put-In & Take-Out
TRC
14 Gabriel Drive
Augusta, ME 04330
1/24/2020


Boat Barrier
Portage Sign
Canoe Portage Take-Out
No Swimming Sign
Fairfield
Gate
Gate
Parking
Canoe Portage Trail
Middle Rd
Somerset County
Kennebec County
Shawmut Canoe Portage Take-Out
N
Legend
Recreation Site Amenity
Portage Trail
Project Boundary
N
0
100
Feet
Shawmut Hydroelectric Project FERC No. 2322
Recreation Sites Shawmut Canoe Portage Take-Out Detail
TRC
14 Gabriel Drive
Augusta, ME 04330
9/4/2019


Boat Barrier
Maine DEP Stop Aquatic Hitchhikers Sign/MDIFW Fish Stocking Illegal Sign
Canoe Portage Sign/ MDIFW Wildlife Sign
Canoe Portage Trail
Parking
Parking
Canoe Portage Put-In
Danger Sign (Rising Water)
MDIFW Public Access Sign/Open Hours Sign
2 Parking Signs (Parking for Anglers and Boaters Only Sign and No Overnight Parking Sign)
Portable Toilet
Concrete Barrier
Angler Trail
Fairfield
Somerset County
Kennebec County
Middle Rd
Shawmut Canoe Portage Put-In
Legend
Recreation Site Amenity
Portage Trail
Project Boundary
N
0
100
Feet
Shawmut Hydroelectric Project
FERC No. 2322
Recreation Sites
Shawmut Canoe Portage Put-In Detail
TRC
14 Gabriel Drive
Augusta, ME 04330
1/24/2020

APPENDIX E-6

DRAFT PROJECT OPERATIONS MONITORING PLAN

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DRAFT
Operations Monitoring Plan

Shawmut Hydroelectric Project
(FERC No. 2322)

Prepared for:

Brookfield White Pine Hydro LLC
Lewiston, Maine

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

January 2020

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DRAFT
Operations Monitoring Plan

Shawmut Hydroelectric Project
(FERC No. 2322)

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- 2.1 Project Structures 1
- 2.2 Impoundment 2
- 2.3 Regulatory Requirements 2

3.0 OPERATIONS MANAGEMENT 2
- 3.1 Typical Project Operations 2
- 3.2 High Water Operations 3
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DRAFT
Operations Monitoring Plan

Shawmut Hydroelectric Project
(FERC No. 2322)

1.0 BACKGROUND

The Shawmut Hydroelectric Project (Project) is an existing hydroelectric project located on the Kennebec River, in south-central Maine in Kennebec and Somerset Counties. The Project is located in the towns of Skowhegan, Fairfield, Clinton, and Benton. The Project is owned and operated by Brookfield White Pine Hydro LLC (White Pine Hydro or Licensee).

2.0 PROJECT DESCRIPTION

The Shawmut Project is located on the Kennebec River at RM 66 and is one of ten FERC-licensed hydropower projects on the mainstem of the Kennebec River. The Shawmut Project lies immediately upstream of the Hydro-Kennebec Project (FERC No. 2611) and downstream of the Weston Project (FERC No. 2325). The FERC Project Boundary for the Shawmut Project extends approximately 12.3 miles upstream from the Shawmut Dam.

2.1 Project Structures

The Shawmut Project facilities consist of a concrete gravity dam, an enclosed forebay, an intake and headworks section, two powerhouses, a tailrace, an interconnection with the local utility's transmission system, and appurtenant facilities. The dam is a concrete gravity type overflow section with the fixed crest at elevation 108.0' USGS datum. The spillway section is comprised of several sections totaling 1,135 feet in length with an average height of approximately 24 feet; the total dam is approximately 1,480 feet in length. The spillway has 380 feet of hinged flashboards 4 feet high serviced by a steel bridge with a gantry crane, a 730-foot long section topped with three sections of inflatable bladder, each 4.46 feet high when inflated, and a 25-foot wide sluice having a crest elevation of 104.0' USGS datum and equipped with a timber and steel gate. The dam includes a non-overflow section between the hinged flashboards and the forebay

headworks structure. An earthen dike with a concrete core wall is situated beyond the west abutment of the headworks structure.

2.2 Impoundment

The Shawmut Project impoundment has a surface area of approximately 1,310 acres at normal full pond elevation of 112.0' USGS datum. The Shawmut impoundment has an estimated volume of 4,960 acre-feet, but as the Project is operated in a run-of-river mode, the impoundment has no significant usable storage capacity at the normal full pond elevation.

2.3 Regulatory Requirements

On [date], FERC issued a new license for the Shawmut Project. The license is effective as of [date] and terminates [date]. Article [number] of the new license requires the Licensee to operate the Shawmut as a run-of-river facility with normal pond levels maintained within one foot of elevation 112'during normal operations. Article [number] of the new license requires the preparation of this Operations Monitoring Plan.

3.0 OPERATIONS MANAGEMENT

3.1 Typical Project Operations

The Shawmut Project is operated as a run-of-river facility and the impoundment experiences little fluctuation during normal operations, generally maintaining a pond elevation within one foot of elevation 112.0' during normal operations. The maximum hydraulic capacity of the turbines is 6,690 cubic feet per second (cfs). After maximum flow to the turbines has been achieved, excess water is spilled through the existing sluice. When flows exceed the capacity of the spillway sluice (1,840 cfs), sections of the rubber dam are deflated, and the hinged flashboards are dropped, to pass additional water. The Project units and spillway can pass approximately 40,000 cfs while maintaining a pond level of approximately 112' USGS datum.

Total Project outflow varies to a limited extent as units, gates, and spillway mechanisms (i.e., flashboards) are opened or closed to manage pond levels within a run-of-river mode. The inflatable bladder sections can only be operated in a fully inflated position or a fully deflated position; each section is capable of passing up to approximately 7,000 cfs when deflated, while

maintaining a pond level of approximately elevation 112.0'. The top elevation of the rubber bladders is elevation 112.5' to allow a six-inch freeboard above normal full pond. As is typical of operational conditions at any hydropower project, pond levels generally fluctuate within a limited range as the facilities (i.e., units, gates, hinged flashboards and rubber bladders) are operated to manage water levels and flows, as well as to manage variable inflows.

The Shawmut Project is remotely operated using a SCADA link to Brookfield White Pine Hydro's (Licensee) National System Control Center (NSCC) in Marlborough, Massachusetts.

3.2 High Water Operations

High flows in excess of 40,000 cfs may occur annually in the Kennebec River during the spring run-off period. The magnitude of spring flows varies considerably depending on the water content of the melting snow cover, the occurrence of coincidental heavy spring rainfall, and warm temperatures. Ice jams, another phenomenon often associated with the spring runoff period, can cause uncontrolled increases in river stages.

Under flood conditions, the inflatable rubber bladders on the dam spillway are lowered to help control upstream water levels and pass flows. When flow in the river reaches flood stage, the Operator will operate the Project's spillway capacities based upon the Project's High-Water Guidelines which outline the specific procedures to be followed during such flood events. The Licensee notifies the Maine Emergency Management Agency (MEMA) of flood conditions and control measures. MEMA has developed a volunteer monitoring network for flood stage observation and is responsible for public notification and warning.

3.3 Low Water Operations

With the existing regulation of the upstream storage facilities and reregulation of flows in the Kennebec River below the Williams Project (FERC No. 2335), the reductions in river flows and low inflows to the Shawmut Project due to adverse water conditions generally is minimal and infrequent. Generally, under low flow conditions, flows are passed through one or more generating units. In the event that Kennebec River flows drop below the hydraulic capacity of the Project generating unit(s) run-of-river operations and flows would be maintained by spilling water through the gates.

3.4 Maintenance Operations

The Shawmut Project is remotely operated using a SCADA link to the Licensee's National System Control Center (NSCC) in Marlborough, Massachusetts. A local operating crew is also available during weekdays and weekends, as necessary, to perform routine maintenance and operations of the facility. The dam is inspected routinely by White Pine Hydro engineering and operations staff. Project maintenance is carried out as needed. Inspections occur on a regular schedule, but there is no set schedule for significant maintenance activities. If planned maintenance activities are determined to require impoundment drawdown below normal levels or an interruption in run-of-river operations, the Licensee will first consult with the appropriate agencies[1] regarding potential temporary variances from the applicable terms of its FERC License and 401 Certification.

In some cases, planned maintenance may require separate permits from state and federal agencies, including possibly a Maine Waterway Development and Conservation Act (MWDCA) permit, and U.S. Army Corps of Engineers Section 404 permit. In such cases, the Licensee would apply for and obtain the necessary permits before initiating such maintenance, and will operate the Project in accordance with these permits until the maintenance is complete and normal Project operations have resumed.

In the event emergency maintenance or repairs are required, the Licensee will immediately notify the agencies, as outlined below, and will take all reasonable steps necessary to maintain downstream river flows and minimize impoundment drawdowns. Once the agencies have been notified, the Licensee will undertake emergency maintenance and repairs and will record the steps that were taken to minimize potential impacts to Project resources, including any that were discussed with the agencies. The Licensee will also notify FERC of all emergency maintenance activities.

[1] Unless otherwise specified, the agencies referred to throughout this plan include the Maine Department of Environmental Protection (MDEP), the Maine Department of Inland Fisheries and Wildlife (MDIFW), the Maine Department of Marine Resources (MDMR), the National Marine Fisheries Service (NMFS), and the U.S. Fish and Wildlife Service (USFWS).

3.4.1 Turbines

White Pine Hydro typically conducts an annual two-week shutdown of the Shawmut Project units for inspection and maintenance in September. Otherwise, turbine-generator unit shutdowns may occur, as needed, to perform repairs or unanticipated maintenance activities. Such activities do not generally occur on a set schedule and thus the frequency and duration of unscheduled repair or maintenance events is variable. During both scheduled and unscheduled maintenance and unit shutdown events, the Licensee will continue to pass inflow downstream through operation of the remaining units, through the spillway sluice, or through spill by deflating inflatable flashboard sections, as necessary.

In addition to planned unit maintenance activities, there will be times when an operator has to clear accumulated debris (leaves, trees, branches, etc.) from the intakes. This will require backing off the units to flush the debris away from the intake. The Licensee will continue to pass inflow downstream through the spillway sluice, or through spill by deflating inflatable flashboard sections during this activity.

3.4.2 Impoundment Drawdowns

Drawdown of the Shawmut impoundment will be required from time to time to perform major maintenance on Project structures or to accommodate requests or orders from Federal or state agencies and entities concerned with public safety, construction/maintenance of public works projects, and other similar activities. During planned drawdowns exceeding the normal operating parameters of the license, Licensee will consult with the agencies to maintain appropriate project operating parameters.

3.5 Fish Passage Operations

Operation of existing and authorized fish passage facilities at the Shawmut Project will be governed by the Fish Passage Operations and Maintenance Plan that was filed with FERC December 31, 2019 (and any subsequent revisions) and by the terms of the Species Protection Plan (SPP) that was developed by the Licensee in cooperation with the fishery agencies, and which was filed with FERC December 31, 2019 (and, as applicable, if subsequently revised).

3.5.1 Fish Stranding

At the Shawmut Project, the inflatable rubber dam sections are operated in a prioritized manner to minimize fish stranding potential. The rubber dam closest to the powerhouse and log sluice is lowered first and raised last and the rubber dam at the eastern side of the dam is lowered last and raised first. Licensee staff conduct periodic stranding checks of the river reach below the spillway section of the dam when bladder #3 (closest to the eastern side of the dam) is raised.

3.6 Unscheduled Operations

Project Works

The Shawmut Project generating units may occasionally trip unexpectedly (i.e. line fault, equipment failure, etc.). Under these circumstances the Licensee passes inflows downstream through the remaining units, through the spillway sluice, or through deflation of the inflatable dam sections. In the event that any such events cause the Project to deviate from run-of-river operations the Licensee will notify the agencies of the excursion within 24 hours (see Section 5.0, Reporting).

Impoundment

There may be occasions where the Licensee will need to initiate an unplanned drawdown to respond to emergencies beyond its control such as dam safety, public safety, or impending electrical system blackout emergencies. The Licensee will notify the agencies within 24 hours of such emergencies and include the date, time, and the reason for the emergency drawdown (see Section 5.0, Reporting).

4.0 OPERATIONS MONITORING

The Licensee will continue to monitor generation, inflows, and outflows at the Project to maintain run of river operation. A pressure-sensitive headwater sensor is in place at the dam that records impoundment levels. Records of pond level, generation, and outflows are maintained electronically. These records can be retrieved and be made available to the agencies upon request to confirm that operations are within the license parameters.

5.0 REPORTING

The Licensee will notify the agencies within 24 hours of any deviation from run-of-river operations or normal headpond elevations, other than high water events, as explained above. Agency notification will include a brief summary of the deviation and any observed adverse environmental or public safety impacts resulting from the incident. The headpond elevations may also be interrupted for short periods after consultation with the agencies.

The Licensee will notify FERC within ten days of any deviation from run-of-river operations or normal headpond elevations, other than high water events. The notification will contain, to the extent possible, the cause, severity and duration of the incident, and any observed or reported adverse environmental impacts resulting from the incident. The report will also provide pertinent Project data and a description of corrective measures and documentation of consultation with the agencies. A copy of the report will be provided to the agencies.

6.0 AGENCY CONSULTATION

This draft plan has been prepared for submittal to FERC as part of the final license application. The Licensee assumes finalizing the plan will occur as part of compliance with the operating and monitoring requirements of the new license. Comments and recommendations received from resource agencies and FERC will be discussed in this section of the final plan, including a description of how the comments and/or recommendations have been accommodated in the plan, prior to final filing with FERC.

APPENDIX E-7

HISTORIC ARCHAEOLOGY PHASE 1 STUDY REPORT FILED SEPARATELY AS PRIVILEGED

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APPENDIX E-8

PRECONTACT ARCHAEOLOGY PHASE 1B STUDY REPORT FILED SEPARATELY AS PRIVILEGED

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APPENDIX E-9

DRAFT HISTORIC PROPERTIES MANAGEMENT PLAN FILED SEPARATELY AS PRIVILEGED

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EXHIBIT F

GENERAL DESIGN DRAWINGS AND SUPPORTING DESIGN REPORT

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SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT F
GENERAL DESIGN DRAWINGS

The design drawings showing plan, elevations, and sections of the principal Project works have been filed with the Commission as follows:

Sheet No.	Title
Sheet 1	Dam Plan – Elevation Sections
Sheet 2	Forebay Area Plan – Sections
Sheet 3	1912 Powerhouse Plan – Sections
Sheet 4	1982 Powerhouse and Tailrace Plan & Sections
Sheet 5	1982 Powerhouse Plan & Sections
Sheet 6	1982 Powerhouse Elevations

In accordance with Federal Energy Regulatory Commission (FERC or Commission) regulations, certain sensitive information related to this relicensing proceeding is being filed under separate cover with the Commission only. Special handling of this material is required to protect the security of critical energy infrastructure.

In order to protect critical energy infrastructure, the Commission has enacted regulations to govern public access to certain information. The Exhibit F drawings and Supporting Design Report referenced herein contain sensitive and detailed engineering information that, if used improperly, may compromise the safety of the Project and those responsible for its operation. Therefore, the Exhibit F drawings and Supporting Design Report have been labeled "Contains Critical Energy Infrastructure Information - Do Not Release." The drawings and Supporting Design Report have been submitted to FERC under separate cover. Agencies may file a CEII request under 18 CFR § 388.113 or a Freedom of Information Act (FOIA) request under 18 CFR § 388.108 to obtain the Exhibit F drawings.

EXHIBIT G
PROJECT MAPS

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SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

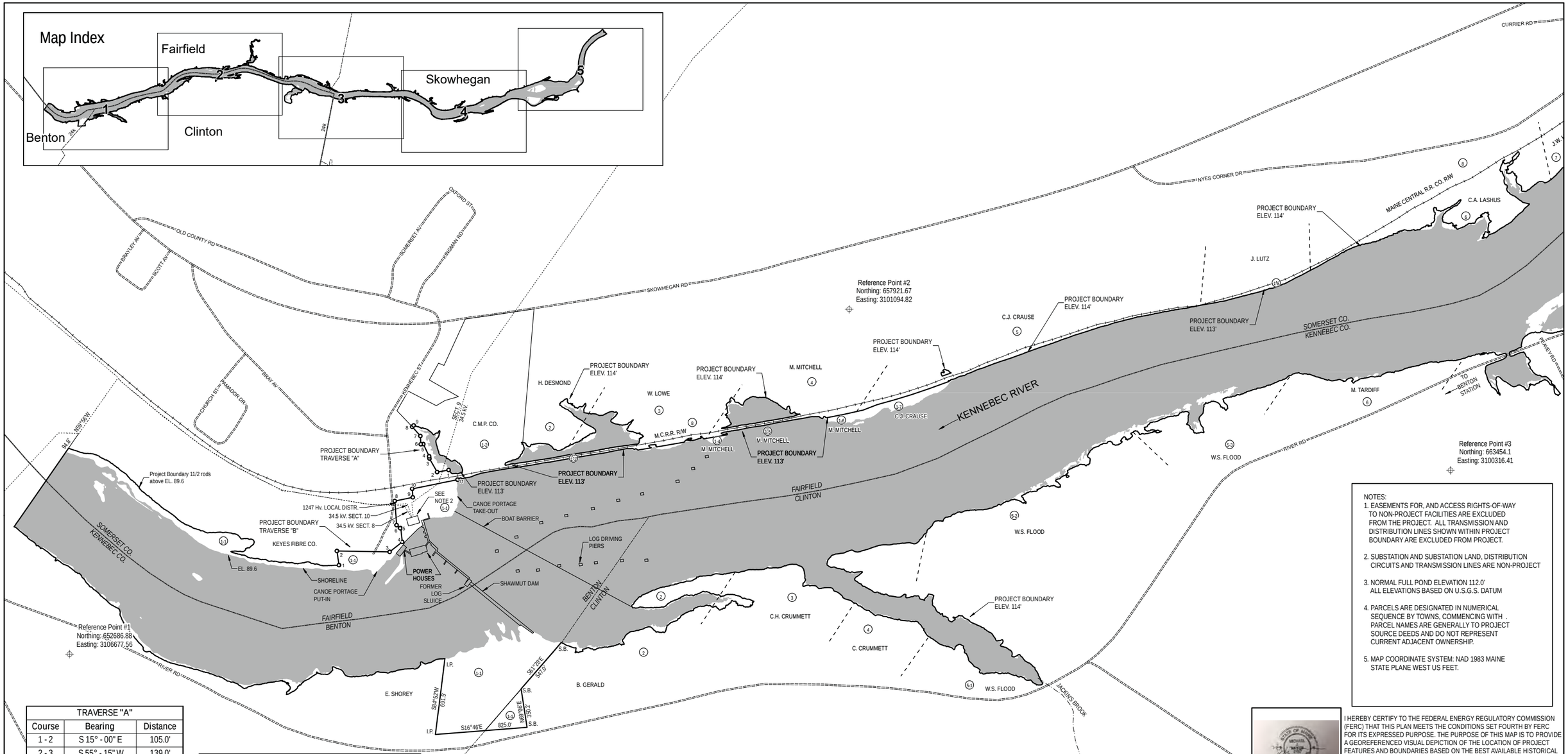
APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT G
PROJECT MAPS

The following maps define the location of the Shawmut Hydroelectric Project, principal features, and Project boundary:

Sheet No.	Title
Sheet 1	Project Boundary Detail Map and Index Map
Sheet 2	Project Boundary Detail Map
Sheet 3	Project Boundary Detail Map
Sheet 4	Project Boundary Detail Map
Sheet 5	Project Boundary Detail Map
Sheet 6	Project Boundary Detail Map

Licensee is proposing to remove two parcels from the Project boundary totaling approximately 28.6 acres of lands that are not needed for operation and maintenance of the Project nor for recreational or resource protection purposes. The attached detail maps show the proposed Project boundary. This proposal is discussed in Exhibit E, Section 3.3.3.



NOTES:

1. EASEMENTS FOR, AND ACCESS RIGHTS-OF-WAY TO NON-PROJECT FACILITIES ARE EXCLUDED FROM THE PROJECT. ALL TRANSMISSION AND DISTRIBUTION LINES SHOWN WITHIN PROJECT BOUNDARY ARE EXCLUDED FROM PROJECT.
2. SUBSTATION AND SUBSTATION LAND, DISTRIBUTION CIRCUITS AND TRANSMISSION LINES ARE NON-PROJECT
3. NORMAL FULL POND ELEVATION 112.0' ALL ELEVATIONS BASED ON U.S.G.S. DATUM
4. PARCELS ARE DESIGNATED IN NUMERICAL SEQUENCE BY TOWNS, COMMENCING WITH . PARCEL NAMES ARE GENERALLY TO PROJECT SOURCE DEEDS AND DO NOT REPRESENT CURRENT ADJACENT OWNERSHIP.
5. MAP COORDINATE SYSTEM: NAD 1983 MAINE STATE PLANE WEST US FEET.

TRAVERSE "A"		
Course	Bearing	Distance
1 - 2	S 15° - 00" E	105.0'
2 - 3	S 55° - 15" W	139.0'
3 - 4	S 77° - 32" W	20.0'
4 - 5	S 59° - 25" W	121.0'
5 - 6	S 8° - 22" E	21.9'
6 - 7	S 81° - 38" W	76.0'
7 - 8	S 42° - 56" W	110.0'
8 - 9	S 47° - 04" W	18.0'
TRAVERSE "B"		
Course	Bearing	Distance
1 - 2	S 78° - 04" W	153.2'
2 - 3	N 2° - 36" W	473.0'
3 - 4	N 41° - 51" W	144.0'
4 - 5	S 80° - 39" W	123.7'
5 - 6	S 0° - 09" W	6.6'
6 - 7	S 37° - 24" W	42.3'
7 - 8	S 82° - 14" W	216.5'
8 - 9	N 15° - 00" W	165.0'
9 - 10	S 82° - 14" W	76.0'
10 - 11	N 15° - 00" W	415.0'

REFERENCE POINT TABLE			
NAD 83 State Plane Maine West Zone US Feet			
SHEET	REFERENCE POINT #	NORTHING	EASTING
1	1	652686.88	3106677.56
1	2	657921.67	3101094.82
1	3	663454.1	3100316.41
2	4	662297.18	3097336.85
2	5	670704.14	3094430.64
2	6	671492.44	3089410.66
3	7	675423.4	3093296.59
3	8	682239.4	3088318.26
3	9	688175.46	3089993.31
4	10	689388.2	3089703.58
4	11	695690.09	3084207.55
4	12	701102.45	3084706.64
5	13	699654.86	3081281.50
5	14	707663.91	3079402.77
5	15	706633.37	3073045.20

Legend

- Project Boundary
- Reference Point
- Parcel Designation
- Transmission Line (Non-Project)
- Railroad
- Roads
- Stream
- Hydrography
- County Boundary
- Town Boundary

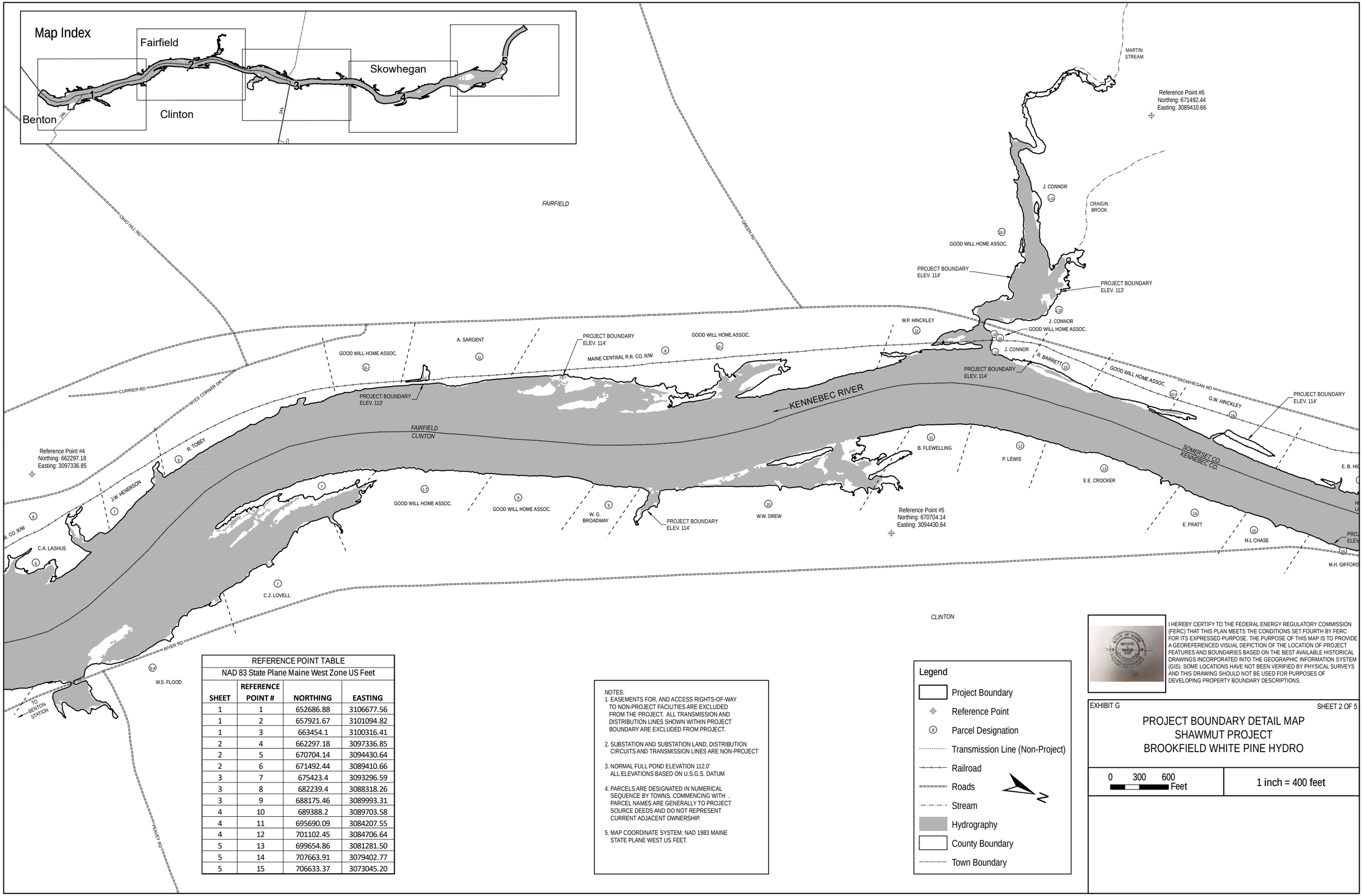
I HEREBY CERTIFY TO THE FEDERAL ENERGY REGULATORY COMMISSION (FERC) THAT THIS PLAN MEETS THE CONDITIONS SET FOURTH BY FERC FOR ITS EXPRESSED PURPOSE. THE PURPOSE OF THIS MAP IS TO PROVIDE A GEOREFERENCED VISUAL DEPICTION OF THE LOCATION OF PROJECT FEATURES AND BOUNDARIES BASED ON THE BEST AVAILABLE HISTORICAL DRAWINGS INCORPORATED INTO THE GEOGRAPHIC INFORMATION SYSTEM (GIS). SOME LOCATIONS HAVE NOT BEEN VERIFIED BY PHYSICAL SURVEYS AND THIS DRAWING SHOULD NOT BE USED FOR PURPOSES OF DEVELOPING PROPERTY BOUNDARY DESCRIPTIONS.

EXHIBIT G — SHEET 1 OF 5

PROJECT BOUNDARY DETAIL MAP
SHAWMUT PROJECT
BROOKFIELD WHITE PINE HYDRO

0 300 600 Feet

1 inch = 400 feet



REFERENCE POINT TABLE			
NAD 83 State Plane Maine West Zone US Feet			
SHEET	REFERENCE POINT #	NORTHING	EASTING
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2	5	670704.14	3094430.64
2	6	671492.44	3089410.66
3	7	675423.4	3093296.59
3	8	682239.4	3088318.26
3	9	688175.46	3089993.31
4	10	689388.2	3089703.58
4	11	695690.09	3084207.55
4	12	701102.45	3084706.64
5	13	699654.86	3081281.50
5	14	707663.91	3079402.77
5	15	706633.37	3073045.20

NOTES:
1. EASEMENTS FOR, AND ACCESS RIGHTS-OF-WAY TO NON-PROJECT FACILITIES ARE EXCLUDED FROM THE PROJECT. ALL TRANSMISSION AND DISTRIBUTION LINES SHOWN WITHIN PROJECT BOUNDARY ARE EXCLUDED FROM PROJECT.

2. SUBSTATION AND SUBSTATION LAND, DISTRIBUTION CIRCUITS AND TRANSMISSION LINES ARE NON-PROJECT

3. NORMAL FULL POND ELEVATION 112.0'
ALL ELEVATIONS BASED ON U.S.G.S. DATUM

4. PARCELS ARE DESIGNATED IN NUMERICAL SEQUENCE BY TOWNS, COMMENCING WITH . PARCEL NAMES ARE GENERALLY TO PROJECT SOURCE DEEDS AND DO NOT REPRESENT CURRENT ADJACENT OWNERSHIP.

5. MAP COORDINATE SYSTEM: NAD 1983 MAINE STATE PLANE WEST US FEET.

Legend
- Project Boundary
- Reference Point
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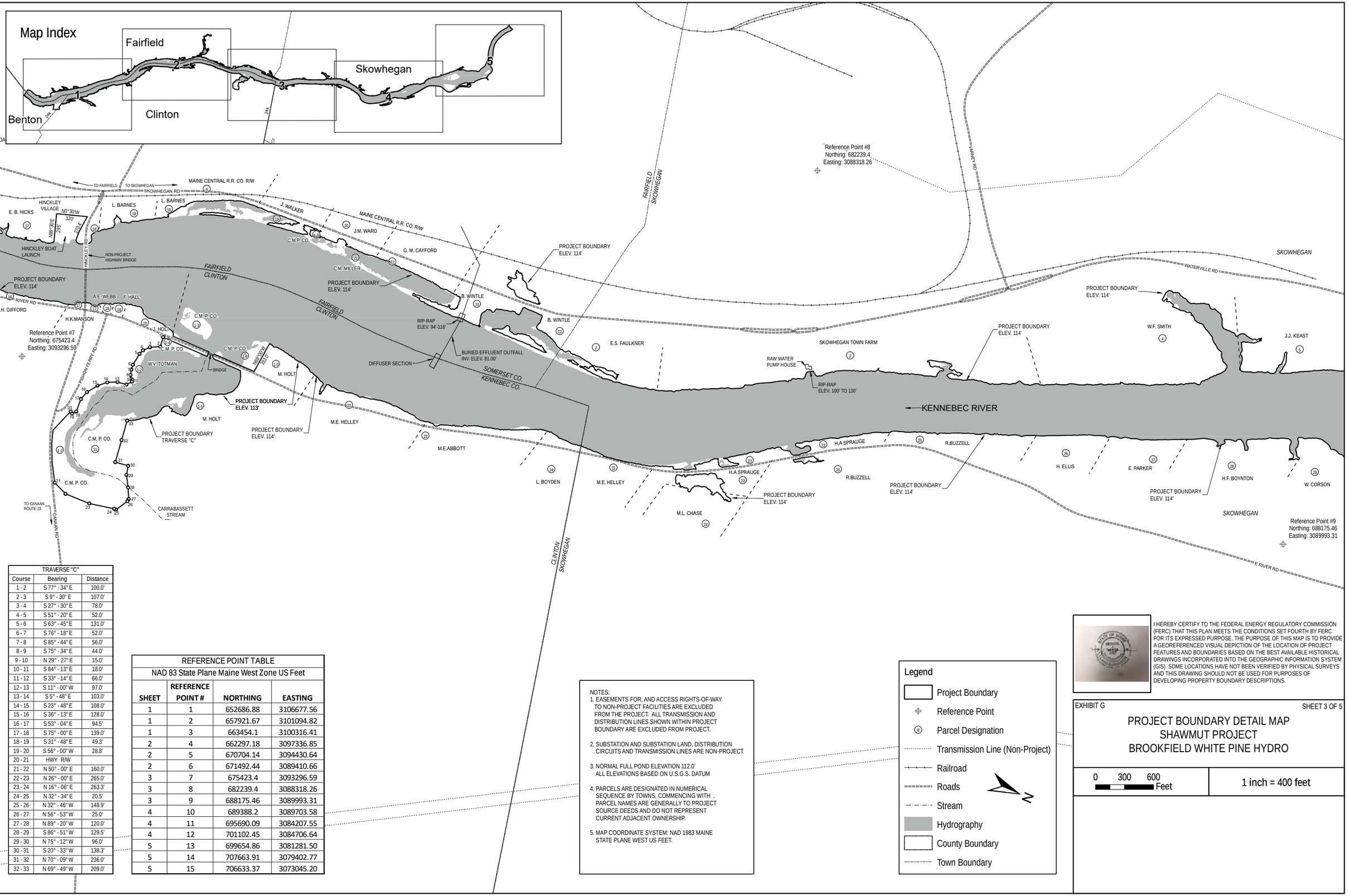
EXHIBIT G — SHEET 2 OF 5

PROJECT BOUNDARY DETAIL MAP
SHAWMUT PROJECT
BROOKFIELD WHITE PINE HYDRO

0 300 600 Feet

1 inch = 400 feet



TRAVERSE "C"		
Course	Bearing	Distance
1 - 2	S 77° - 34' E	100.0'
2 - 3	S 9° - 30' E	107.0'
3 - 4	S 27° - 30' E	78.0'
4 - 5	S 51° - 20' E	52.0'
5 - 6	S 63° - 45' E	131.0'
6 - 7	S 76° - 18' E	52.0'
7 - 8	S 85° - 44' E	56.0'
8 - 9	S 75° - 34' E	44.0'
9 - 10	N 29° - 27' E	15.0'
10 - 11	S 84° - 13' E	18.0'
11 - 12	S 33° - 14' E	66.0'
12 - 13	S 11° - 00' W	97.0'
13 - 14	S 5° - 48' E	103.0'
14 - 15	S 23° - 48' E	108.0'
15 - 16	S 36° - 13' E	128.0'
16 - 17	S 53° - 04' E	94.5'
17 - 18	S 75° - 00' E	139.0'
18 - 19	S 31° - 48' E	49.3'
19 - 20	S 56° - 00' W	28.8'
20 - 21	HWY R/W	
21 - 22	N 50° - 00' E	160.0'
22 - 23	N 26° - 00' E	265.0'
23 - 24	N 16° - 06' E	263.3'
24 - 25	N 32° - 34' E	20.5'
25 - 26	N 32° - 46' W	148.9'
26 - 27	N 56° - 53' W	25.0'
27 - 28	N 89° - 20' W	120.0'
28 - 29	S 86° - 51' W	129.5'
29 - 30	N 75° - 12' W	96.0'
30 - 31	S 20° - 33' W	138.3'
31 - 32	N 70° - 09' W	236.0'
32 - 33	N 69° - 49' W	209.0'

REFERENCE POINT TABLE			
NAD 83 State Plane Maine West Zone US Feet			
SHEET	REFERENCE POINT #	NORTHING	EASTING
1	1	652686.88	3106677.56
1	2	657921.67	3101094.82
1	3	663454.1	3100316.41
2	4	662297.18	3097336.85
2	5	670704.14	3094430.64
2	6	671492.44	3089410.66
3	7	675423.4	3093296.59
3	8	682239.4	3088318.26
3	9	688175.46	3089993.31
4	10	689388.2	3089703.58
4	11	695690.09	3084207.55
4	12	701102.45	3084706.64
5	13	699654.86	3081281.50
5	14	707663.91	3079402.77
5	15	706633.37	3073045.20

NOTES:
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- Transmission Line (Non-Project)
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EXHIBIT G — SHEET 3 OF 5

PROJECT BOUNDARY DETAIL MAP
SHAWMUT PROJECT
BROOKFIELD WHITE PINE HYDRO

0 300 600 Feet

1 inch = 400 feet

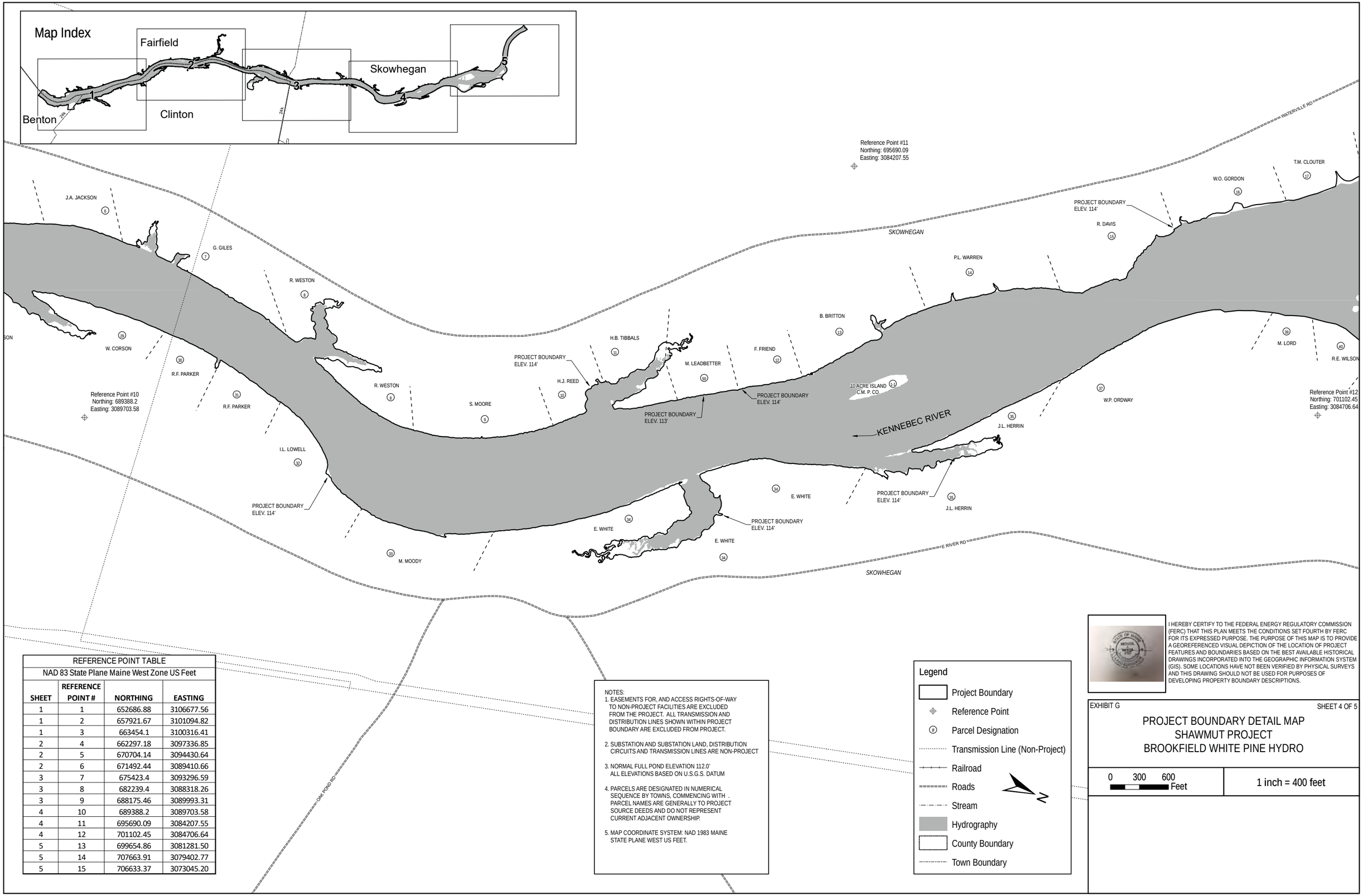

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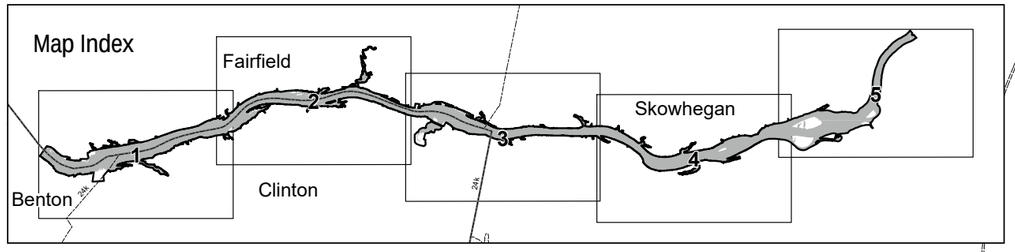
EXHIBIT G

SHEET 4 OF 5

PROJECT BOUNDARY DETAIL MAP
SHAWMUT PROJECT
BROOKFIELD WHITE PINE HYDRO

0 300 600 Feet

1 inch = 400 feet



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5	15	706633.37	3073045.20

Reference Point #15
Northing: 706633.37
Easting: 3073045.2

Reference Point #13
Northing: 699654.86
Easting: 3081281.5

Reference Point #14
Northing: 707663.91
Easting: 3079402.77

WALLACE FARM RD
WATER ST
ROBIN ST
SKOWHEGAN
TO SKOWHEGAN
PROJECT BOUNDARY ELEV. 114'
C.M. P. CO.
KENNEBEC RIVER
PHILBRICK DR
PARKMAN HILL RD
STATE PUBLIC PICNIC GROUND & LAUNCH RAMP
M.P. MERRILL
A. STEWARD
PROJECT BOUNDARY ELEV. 113'
WESSERRUNSET STREAM
SKOWHEGAN CAMPS, TENT SITES, BOAT LAUNCH RAMP (PRIVATE)
L.L. SANFORD
ROSES CT
WATERVILLE RD
CEMETERY RD
B.D. DUNLOPE
C.H. MCLAUGHLIN
M. LORD
A.E. SMITH
T.M. CLOUTER
GREAT ISLAND
B. DUNLOPE
OAKES ISLAND
GOOD WILL HOME ASSOCIATION
R.E. WILSON
V. BUZZELL
E RIVER RD
SWAIN HILL RD
CANAAN RD

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EXHIBIT G — SHEET 5 OF 5

PROJECT BOUNDARY DETAIL MAP
SHAWMUT PROJECT
BROOKFIELD WHITE PINE HYDRO

0 300 600 Feet

1 inch = 400 feet

EXHIBIT H
DESCRIPTION OF PROJECT MANAGEMENT
AND NEED FOR PROJECT POWER

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SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT H
DESCRIPTION OF PROJECT MANAGEMENT AND NEED FOR PROJECT POWER

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Appendix H-1 – Single Line Diagram

SHAWMUT HYDROELECTRIC PROJECT
(FERC NO. 2322)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT H
DESCRIPTION OF PROJECT MANAGEMENT AND NEED FOR PROJECT POWER

1.0 INTRODUCTION

The Shawmut Project (or Project) is an existing hydroelectric project owned by, and licensed to, Brookfield White Pine Hydro LLC (White Pine Hydro or Licensee). The Licensee is an independent power producer and, as such, does not provide electric service to any particular group or class of customers. The Project generates clean, carbon-free, renewable power that is currently sold to the New England wholesale market administered by the non-profit Independent System Operator (ISO) for New England (ISO New England). ISO New England administers all significant aspects of the New England Power Pool (NEPOOL) power market including: (i) the NEPOOL Open Access Transmission Tariff; (ii) the dispatch, billing and settlement system for interchange power in NEPOOL; (iii) NEPOOL energy and automatic generation control markets; and (iv) the NEPOOL installed capability market.

2.0 INFORMATION TO BE SUPPLIED BY ALL APPLICANTS

2.1 Plans and Ability of Owners of Shawmut Dam to Operate and Maintain the Project

2.1.1 Plans to Increase Capacity or Generation

The Licensee has no current plans to increase the capacity or generation of the Project.

2.1.2 Plans to Coordinate the Operation of the Project with Other Water Resource Projects

The current FERC license requires that the Shawmut Project be operated in a run-of-river mode.

Seasonal flows and daily inflow to the Project impoundment varies based largely on the operation of the Kennebec River basin upstream storage facilities and hydroelectric projects, and to some degree upon unregulated inflow from the Carrabassett and Sandy rivers and Wesserunsett Stream which are the major tributaries entering the Kennebec River above the Project. Under typical operations of the upstream storage and flow reregulation (Williams) projects, inflow to the Shawmut Project is relatively steady throughout each day.

The ten hydroelectric generation stations that benefit from the Upper Kennebec River storage system and that collectively generate approximately 250 megawatts (MW) of clean renewable electric power on the Kennebec River system, shown on Figure 2-1, are listed below:

Brassua Project No. 2615
Harris Project No. 2142
Wyman Project No. 2329
Williams Project No. 2335
Anson Project No. 2365
Abenaki Project No. 2364
Weston Project No. 2325
Shawmut Project No. 2322
Hydro-Kennebec Project No. 2611
Lockwood Project No. 2574

These stations provide clean, carbon-free, renewable energy to the electric system, displacing the operation of fossil-fueled power plants and thus reducing air pollution, greenhouse gases (which contribute to climate change), and the use of imported fuels. These plants each benefit from the storage and regulation of flows provided by the upstream Kennebec River storage system.

The Licensee is proposing to operate the Shawmut Project essentially as it has been operated in the past, but with some resource enhancements. Because the Project will continue to operate as run-of-river, there will be no changes to the fundamental operation of the Project impoundment, Project outflows, or the flow regime in the Kennebec River downstream.

The Shawmut Project provides 8.650 MW of clean renewable power. Average annual generation for the period 2010-2019 was 51,088 MWh per year.

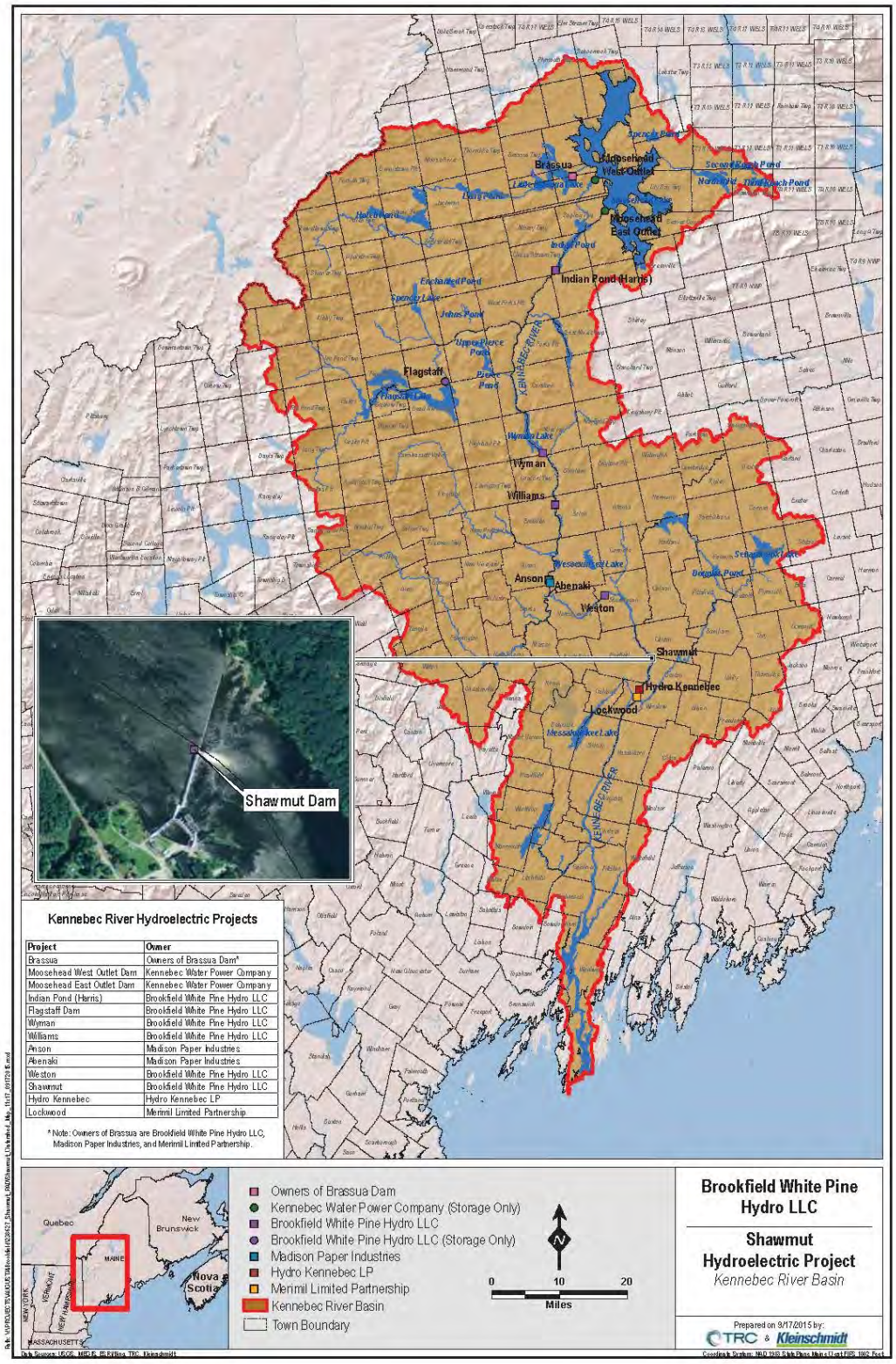


Figure 2-1 Kennebec River Hydro System

2.1.3 Plans to Coordinate the Operation of the Project with Other Electrical Systems

White Pine Hydro is an independent power producer and member of NEPOOL that currently sells power wholesale from the Project to ISO New England. NEPOOL is a voluntary association whose members include not only traditional vertically integrated electric utilities, but independent power producers such as White Pine Hydro that are participating in the competitive wholesale electricity marketplace. ISO New England serves as the independent system operator to operate the regional bulk power system and to administer the wholesale marketplace. The primary responsibilities of ISO New England are to coordinate, monitor, and direct the operations of the major generating and transmission facilities in the region while its objective is to promote a competitive wholesale electricity marketplace while maintaining the electrical system's integrity and reliability. ISO New England seeks to assure both maximum reliability and economy of the bulk power supply for New England.

To this end, the electric facilities of NEPOOL member companies are operated as if they comprised a single power system. ISO New England accomplishes this by central dispatching of available power resources, and using the lowest cost generation and transmission equipment available at any given time consistent with meeting reliability requirements. As a result of this economic dispatch, utilities and their customers realize significant savings annually. NEPOOL participants also have strengthened the reliability of the bulk power system through shared operating reserves and coordinated maintenance scheduling.

ISO New England staff constantly monitors and directs the operation of more than 300 generators and more than 7,600 miles of transmission lines in New England. ISO New England is also responsible for forecasting the various levels of daily electricity demand that will occur throughout the region and scheduling resources to meet the demand.

2.2 Need for the Electricity Generated by the Project

2.2.1 The Reasonable Costs and Availability of Alternative Sources of Power

The Project generates carbon-free, renewable power and the electrical output from the Project is sold wholesale into the ISO New England administered market.

The replacement of energy and capacity provided by the Project would be met through other sources, likely to be fossil-fired generating units, whose fuel and other variable costs would be significantly higher than those of the Project. As the lowest variable cost resource among power supply alternatives, hydroelectric assets such as the Project can bid energy into the ISO New England market at lower prices than alternative resources. Therefore, loss of a low-variable cost resource such as the Shawmut Project would result in upward pressure on the clearing prices in the NEPOOL market, thereby affecting the prices paid by electric consumers in New England.

The Project provides carbon-free, renewable power, without the emissions of air pollutants or greenhouse gases that the marginal fossil fuel plants produce. This is an increasingly important fact in New England where all six New England states have enacted legislation to reduce the dependence on fossil fired generation through the introduction of Renewable Portfolio Standards (RPS), or similar legislation, that encourages and requires the use of renewable power sources in the state's total resource output. Many of these RPS programs include an annual escalating supply requirement to further encourage reliance on renewable power sources. Legislation that has been enacted is designed to increase the amount of renewable power supply in the region's mix of generation resources or, alternatively, reduce the amount of fossil fired generation as a percentage of the total resource output.

As these statues and rules are implemented or adopted in New England, clean, carbon-free hydroelectric generation becomes an even more important and valuable part of the fuel mix for electric suppliers in the region.

2.2.2 Increase in Costs if the Licensee is not Granted a License

If the Licensee is not granted a license, this Project would cease to provide affordable, clean and carbon-free electricity to the NEPOOL likely resulting in an unquantified increase in costs to the New England electric consumer.

2.2.3 Effects of Alternative Sources of Power

2.2.3.1 Effects on Licensee's Customers

This section is not applicable to the Licensee, since the Licensee is a wholesale supplier.

2.2.3.2 Effect on Licensee's Operating and Load Characteristics

The Licensee is an independent power producer and, as such, does not maintain a separate transmission system which could be affected by replacement or alternative power sources.

2.2.3.3 Effect on Communities Served by the Project

See the discussion above in Sections 2.2.1, The Reasonable Costs and Availability of Alternative Sources of Power, and 2.2.2, Increase in Costs if the Applicant is not Granted a License, regarding the loss of the Project's generation. Because the Licensee cannot predict with any certainty the actual type or location of a potential alternative facility providing replacement power, it cannot specifically discuss potential effects on any particular community. However, if ISO New England must replace the power benefits generated at the Project, the cost would be significantly more than the projected cost of operating the Project under the new license.

2.3 Need, Reasonable Cost, and Availability of Alternative Sources of Power

The Licensee is an independent power producer and, as such, does not have an obligation or need to prepare load and capability forecasts in reference to any particular group or class of customers. For the region, those obligations and tasks remain within the scope of services provided by ISO New England and NEPOOL.

2.4 Effect of Power on Licensee's Industrial Facility

This section is not applicable to White Pine Hydro which does not own industrial facilities.

2.5 Need of Indian Tribe Licensee for Electricity Generated by the Project

This section is not applicable to the Licensee.

2.6 Impacts on the Operations and Planning of Licensee's Transmission System

Because the Licensee is an independent power producer and does not own the local transmission system, this section is not applicable to the Licensee. However, power generated by the Project is currently transmitted to the Central Maine Power's (local utility) transmission/distribution system as shown in the Single Line Diagram for the Shawmut Project (Appendix 1 of this Exhibit).

2.7 Statement of Need for Modifications

The Licensee is not proposing any fundamental changes to the Project facilities or operation.

Relicensing and continued operation of the Project would continue to be compatible with the comprehensive development and utilization of the waterway, and conform to the various comprehensive natural resource plans developed by resource management agencies, as discussed below.

2.8 Consistency with Comprehensive Plans

Section 10(a)(2) of the Federal Power Act (FPA) requires the Federal Energy Regulatory Commission (FERC or Commission) to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, and conserving waterways affected by the project. In accordance with Section 10(a) (1) of the FPA, the list of FERC-approved federal and state comprehensive plans was reviewed to determine applicability to the Shawmut Project. The federal resource agencies, as well as the State of Maine, have prepared a number of comprehensive plans, which provide a general assessment of a variety of environmental conditions in Maine. These plans address water quality, water pollution control, wetlands, recreation, and land management issues. In addition, the State of Maine's plans include policies related to ensuring that the State's energy needs are met and supporting hydropower, a renewable, carbon-free, and indigenous source, as a valuable portion of the energy mix. The Shawmut Project's consistency with pertinent state and federal comprehensive plans is discussed below.

2.8.1 FERC-Approved State of Maine Comprehensive Plans[1]

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

In 1982, the Maine State Planning Office submitted to FERC the Maine Comprehensive Rivers Management Plan, which was comprised of two volumes and approved by FERC in October 1982. In 1987, the Maine State Planning Office (MSPO, eliminated in July 2012) submitted to

[1]Unless otherwise noted, these plans have not been updated or updates have not been submitted to FERC for approval since the development dates noted.

FERC a three-volume update to the Comprehensive Rivers Management Plan. Volumes 1 and 2 of the Plan included the Comprehensive Hydropower Plan and Executive Department Orders and other river-related plans. Volume 3 of the Plan, included in the updated submittal in 1987, contained hydro-related core laws, Executive Orders, and other plans. In 1992 and 1993, the State of Maine produced Volumes 4 and 5 of the Comprehensive Rivers Management Plan, respectively. These volumes have also been approved by FERC and include the Kennebec River Resource Management Plan. Each volume and its respective components are described in greater detail below.

State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 1

Volume 1 contains the Comprehensive Hydropower Plan issued by the Maine Office of Energy Resources (MOER) in October 1982.[2] The Comprehensive Hydropower Plan consists of three parts: (1) Maine Rivers Policy, (2) the Projected Contribution of Hydroelectric Generation to Meeting Maine's Electricity Needs in 1990 and 2000, and (3) the Statewide Fisheries Plan, Summary.

(1) Maine Rivers Policy, Executive Order No. 1, Fiscal Year (FY) 82/83

On July 6, 1982, then Governor Joseph E. Brennan issued the Maine Rivers Policy which designated certain river stretches as meriting special protection. The Order stated that no new dams shall be constructed on these stretches and that additional development or redevelopment of existing dams on these stretches be designed and executed in a manner that either enhances significant resources values or does not diminish them. This policy was adopted legislatively as part of the Maine River Act.

The section of the Kennebec River on which the Project is located is not one of the listed river segments meriting special protection. Therefore, the Project conforms to this portion of the Plan.

(2) The Projected Contribution of Hydroelectric Generation to Meeting Maine's Electricity Needs in 1990 and 2000 (Maine Office of Energy Resources, October 1982)

[2] The Office of Energy Resources has since been disbanded. The State Planning Office was responsible for oversight and development of Maine's comprehensive plans until it was disbanded in July 2012, although the Department of Agriculture, Conservation, and Forestry does provide municipal level assistance in municipal level comprehensive planning.

Executive Order No. 1, FY82/83 directed MOER to prepare an estimate of the contribution that hydropower could make to meet the State of Maine's electricity needs in the years 1990 and 2000. The report was prepared in 1982; therefore, a majority of the information in the MOER report is outdated. However, the report does stress that Maine's energy policy "call for increased reliance on indigenous and renewable resources, such as hydro, in preference to imported and nonrenewable resources, such as oil." This projection does not appear to have been revised or updated since publication.

The Project currently conforms to this portion of the Plan in that it contributes hydroelectric generation (an indigenous, carbon-free, and renewable resource) in meeting Maine's electricity needs. The new license for the Project is projected to be issued in 2022. Assuming that the Project will continue to generate electricity, it conforms to this portion of the Plan.

(3) Statewide Fisheries Plan, Summary (Maine Department of Inland Fisheries and Wildlife, June 1982)

The Statewide Fisheries Plan evaluates, by river basin, whether new or improved fish passage facilities may be needed at hydroelectric projects and specifies the fishery agencies' management goals, as they existed in 1982. This Plan represents the policies of the three author agencies (Maine Department of Inland Fisheries and Wildlife (MDIFW), Department of Marine Resources (DMR), and Atlantic Sea-Run Salmon Commission (ASC)) regarding conservation, management, and enhancement of river fishery resources in Maine. The Plan also identifies and evaluates significant river fisheries based upon several criteria.

A discussion of existing fishery resources in the Project area is contained in Exhibit E.

State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 2

Volume 2 of the State of Maine Comprehensive Rivers Management Plan consists of the 1982 Maine Rivers Study. The Maine Rivers Study, generated by the Maine Department of Conservation (MDOC) and the National Park Service (NPS), defines a list of unique and natural recreation rivers and classifies the rivers as A, B, C, or D. The Kennebec River from the Fairfield-Skowhegan town boundary to the Shawmut dam is designated as a Class C water. The Kennebec River downstream of the Shawmut dam is designated as a Class B water.

Details regarding the unique or significant resources that are located in the Project area can be found in Exhibit E.

State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 3, Part I

Volume 3 of the State of Maine Comprehensive Rivers Management Plan contains two parts. Part I is a compilation of laws which affect the construction, operation, maintenance, and licensing of hydropower projects in Maine, including:

- Maine Rivers Act 12 M.R.S.A.§401 et. seq.
- Maine Waterway Development and Conservation Act (MWDCA) 38 M.R.S.A.§630 et. seq.
- An Act concerning Fishways in Dams and Other Artificial Obstructions in Inland Waterways – 12 M.R.S.A.§7701-A
- An Act concerning Fishways in Dams and Other Artificial Obstructions in Coastal Waters – 12 M.R.S.A.§6121
- An Act to amend the classification system for Maine Waters and Change the Classification of Certain Waters – 38 M.R.S.A.§464 et. seq.
- Alteration of rivers, streams and brooks – 38 M.R.S.A.§425 et. seq.
- Mandatory shoreland zoning and subdivision control – 38 M.R.S.A.§435 et. seq.
- Land subdivision – 30-A M.R.S.A.§4401-4407, and
- Land use regulations – 12 M.R.S.A. §681 et. seq.

The applicability of these Core Laws to the Shawmut Project is discussed below.

(1) Maine Rivers Act

In the Maine Rivers Act 12 M.R.S.A.§401 et. seq., the Legislature expressly found:

> *…..the state's rivers comprise one of its most important natural resources, historically vital to the state's commerce and industry; that the value of the state's rivers and streams has increased due to the growth in demand for hydropower; that the rivers and streams afford Maine people with major opportunities for economic expansion through the development of hydropower; and that "the best interests of the state's people are served by a policy which recognizes the importance that their rivers and streams have for meeting portions of several public needs, provides guidance for striking a balance among the various uses which affords the public the maximum benefit and seeks harmony rather than conflict among these uses.* 38 M.R.S.A.§402(6).

The Licensee has consulted with and actively worked to resolve issues as they were raised by appropriate federal and state agencies, tribes, local governments, and non-governmental organizations (NGOs) during the relicensing process. This process has identified the importance of continued operation of the Project while identifying the relative importance of the river and its resources for various uses in providing public benefits. Where the Licensee has worked with the various interests to develop a proposal that balances all of the applicable needs, the Project conforms to this portion of the Plan.

(2) Maine Waterway Development and Conservation Act 38 M.R.S.A.§630 et. seq.

The MWDCA replaced several earlier laws and requires the developer to obtain one permit from the Maine Department of Environmental Protection (MDEP). The legislature emphasized the importance of hydropower to the State of Maine when it enacted the MWDCA.

The legislature found and declared that the surface waters of the State constitutes a valuable indigenous and renewable energy resource; and that hydropower development utilizing these waters is unique in its benefits and impacts to the natural environment, and makes a significant contribution to the general welfare of the citizens of the State for the following reasons:

- Hydropower is the State's only economically feasible, large-scale energy resource which does not rely on combustion of a fuel, thereby avoiding air pollution, solid waste disposal problems and hazards to human health from emissions, wastes and by-products. Hydropower can be developed at many sites with minimal environmental impacts, especially at sites with existing dams or where current type turbines can be used.
- Like all energy generating facilities, hydropower projects can have adverse effects; in contrast with other energy sources, they may also have positive environmental effects. For example, hydropower dams can control floods and augment downstream flow to improve fish and wildlife habitats, water quality and recreation opportunities.
- Hydropower is presently the State's most significant indigenous resource that can be used to free our citizens from their extreme dependence on foreign oil for peaking power.

The Licensee is proposing to continue to operate the Project for power generation in coordination with upstream storage facilities in the Kennebec River system to provide a source of renewable energy available to the people of Maine and a reliable flow of water to downstream municipal, commercial, and recreational users. Therefore, the continued operation of the Project is consistent with the policies expressed by the Maine legislature. By continuing to operate the

Project, the energy-related benefits noted above will continue, in addition to fish and wildlife habitat, water quality, and recreation opportunities.

(3) An Act Concerning Fishways in Dams and Other Artificial Obstructions in Inland Waterways – 12 M.R.S.A.§7701-A

This Act was enacted with the intent of conserving, developing, or restoring anadromous or migratory fish resources by requiring the construction or repair of fishways. Under the Act, the decision to require a fishway at a dam must be based on the restoration of one or more fish species of anadromous or migratory fish to the area upstream of the obstruction. The decision to require a fishway may be justified by the protection or enhancement of any rare, threatened, or endangered fish species.

The Project area contains both riverine and impoundment fisheries habitats (Exhibit E, Section 4.6). Upstream and downstream fish passage is being provided at the Project due to the presence of anadromous or other migratory fish runs within the Project area. The Licensee's proposals for continued operation of Shawmut Project fishways are discussed in detail in Exhibit E, Section 4.6.

(4) An Act Concerning Fishways in Dams and Other Artificial Obstructions in Coastal Waters – 12 M.R.S.A.§6121

This act is not pertinent to the Shawmut Project given the Project's location along an inland waterway.

(5) The Maine Dam Inspection, Registration, and Abandonment Act – 38 M.R.S.A.§815 et. seq. [3]

This law allows MDEP to establish water level regimes and minimum flow requirements for impoundments not within the jurisdiction of FERC. The Licensee currently holds a valid FERC license for Project operation and is currently submitting a License Application to FERC; therefore, the Project is not subject to MDEP jurisdiction regarding establishment of water levels for non-FERC jurisdictional projects.

[3] Legislative actions in recent years have changed the scope of this act.

(6) An Act to Amend the Classification System for Maine Waters and Change the Classification of Certain Waters – 38 M.R.S.A.§464 et. seq.

This Act was enacted to restore and maintain the chemical, physical, and biological integrity of the State's waters and to preserve certain pristine state waters. Water quality standards for fresh surface waters established by the Act that are pertinent to the Shawmut Project designated Class B and C waters. The Kennebec River from the Fairfield-Skowhegan town boundary to the Shawmut dam is designated as a Class C water. The Kennebec River downstream of the Shawmut dam is designated as a Class B water.

> *Class B and C waters must be of such quality that they are suitable for the designate uses of drinking water after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation; navigation; and as habitat for fish and other aquatic life.*

The operation of the Project and its consistency with these standards is discussed in Exhibit E, Section 4.5.

(7) Alteration of Rivers, Streams and Brooks – 38 M.R.S.A.§425 et. seq.

This article prohibited the alteration of a river, stream, or brook or areas adjacent to rivers, streams, or brooks due to dredging, filling, or construction such that any dredged spoil, fill or structure may fall or be washed into these waters without first obtaining a permit from the Department of Environmental Protection. This Act was replaced with the Natural Resources Protection Act (NRPA), 38 M.R.S.A.§480-A et. seq. which regulates similar activities along the State's waters. However, projects that are reviewed under the MWDCA are not subject to review under NRPA.

The Licensee is not proposing any construction or redevelopment of the Project under the new license that would require an NRPA permit. If any such construction is proposed in the future, the appropriate permits will be obtained.

(8) Mandatory Shoreland Zoning and Subdivision Control – 38 M.R.S.A.§435 et. seq.

This article requires that lands within 250 feet of the normal high water mark of certain waters or wetlands be subjected to municipal zoning and subdivision control.

The Shawmut Project area falls under the towns of Skowhegan, Fairfield, Clinton, and Benton. All four towns have Shoreland Zoning Ordinances that are designed to protect environmentally sensitive areas within the shoreland zone which are designated in the Ordinance as an area within 250 feet of any great pond, stream, or inland wetland.

(9) Land Subdivision – 30-A M.R.S.A.§4401-4407

This article grants special protection from land subdivisions to particular river reaches identified in the Article.

This Article does not mention any Project lands. Land use and shoreline issues are discussed in Exhibit E, Section 4.3 and 4.4. The Project conforms to this portion of the Plan.

(10) Land Use Regulations – 12 M.R.S.A. §681 et. seq

This article requires the sound planning, zoning, and subdivision control of the unorganized and organized townships of the State.

The Shawmut Project is consistent with the towns of Skowhegan, Fairfield, Clinton, and Benton's regulations and zoning. Land use and shoreline issues are discussed in Exhibit E, Section 4.3. and 4.4.

State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 3, Part II

Part II is a compilation of Executive Department Orders and other plans that include: Maine Rivers Policy Executive Order No. 1, FY82/83; Recreation Management and Resource Protection for Maine's Rivers; Designating the State Agencies Responsible for Water Quality Certification, Executive Order No. 5, FY85/86 Note: Updated Order No. 3, 96/97. (Note: A discussion of revised laws and Executive Orders implemented after the submittal of Volume 3 to the FERC in 1987 is contained in Volume 4 of the State of Maine Comprehensive Rivers Management Plan submitted to FERC in 1992, see discussion below.)

(1) Maine Rivers Policy Executive Order No. 1, FY82/83

The Project's compliance with the Maine Rivers Policy has previously been discussed under Part I, Volume 3 of the State of Maine Comprehensive Rivers Management Plan.

(2) Recreation Management and Resource Protection for Maine's Rivers

This is a 1985 summary report of the 1983 study titled "Maine Rivers Access and Easement Plan" by Joseph W. Hardy. This document summarizes a strategy developed in 1983 by the MDOC (MDOC: predecessor to the current Maine Department of Agriculture, Conservation and Forestry) for protecting unique natural values and for maintaining recreational opportunities along Maine's rivers.

The Licensee's proposal for continued operation of the Shawmut Project is consistent with this document. The Licensee manages the Project impoundment and riverine areas to provide public recreational access for fishing, and both motorized and non-motorized boating opportunities at the Project.

(3) Designating the State Agencies Responsible for Water Quality Certification, Executive Order No. 5, FY85/86 Note: Updated Order No. 3, 96/97

This Executive Order identifies the State agencies responsible for reviewing and authorizing water quality certifications for hydropower projects. MDEP has jurisdiction for water quality certification for the relicensing of the Shawmut Project.

The Licensees will apply for water quality certification from MDEP. Proof of receipt of delivery of the 401 Water Quality Certification Application to MDEP will be filed with the Commission when it is available.

State of Maine Comprehensive River Management Plan – December 1992 – Volume 4, Part

Volume 4 of the State of Maine Comprehensive River Management Plan consists of three sections. Part I is a summary of the revised Core Hydro Laws subsequent to those contained in Volume 3 which were approved in 1987.

The revisions to the Core Hydro Laws contained in Volume 4 of the Plan are not all pertinent to the Shawmut Project. The revised Core Hydro Laws that are pertinent to the Project are discussed below.

(1) Special Protection for Outstanding Rivers

This law identifies river segments that are protected from further hydroelectric development in the State of Maine.

The Project is not located on an Outstanding River segment, and is therefore compliant with this plan.

(2) Hydropower Relicensing Standards

These standards require that existing hydropower impoundments be managed to protect habitat and aquatic life criteria commensurate with the appropriate water quality classifications. The standards are pertinent to the Shawmut Project in that the project area is subject to Class B and C water quality standards. Maine Statutes at 38 M.R.S.A. Subsection 464(10) clarifies that hydropower projects with riverine impoundments must satisfy the aquatic life criteria contained in 38 M.R.S.A. Subsection 465(4)(c), which states that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.

The Shawmut Project is consistent with the Hydropower Relicensing Standards in that Project waters support all species of indigenous fish and maintains the structure and function of the resident biological community (Exhibit E, Sections 4.5 and 4.6).

State of Maine Comprehensive River Management Plan – December 1992 – Volume 4, Part II – Compilation of Executive Orders and Other Plans

Part II is a compilation of Executive Orders and other plans including Maine resource agency policy regarding hydropower. Part II of Volume 4, Implementing Plans and Orders, contains State resource agency plans and policies regarding hydropower. The following plans and orders are discussed:

(1) State of Maine Statewide River Fisheries Management Plan, June 1982

This Plan is discussed previously under State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 1.

(2) Lower Kennebec River Anadromous Fish Restoration Plan and Inland Fisheries Management Overview, August 1986

This Plan recommends trapping and sorting facilities at "strategic fish passage facilities" on the main stem of the Kennebec River. The subsequent 1998 Kennebec Hydro Developers Group (KHDG) Agreement included timetables or triggers for fish passage at Kennebec River hydro facilities, including Shawmut. As discussed in detail in Exhibit E, Section 4.6, White Pine Hydro is currently developing upstream fish passage for migratory species at Shawmut, including Atlantic salmon, in consultation with resource agencies. Construction of fish passage facilities was authorized by FERC under the existing license.

(3) Maine Comprehensive Hydropower Plan, July 1992

This Plan assessed the then current and future demand for hydropower in the State of Maine. Hydropower is recognized as a significant resource available for use in meeting current and future energy needs.

Operation of the Shawmut Project is consistent with this Plan as it will continue to produce reliable, efficient, renewable, carbon-free, indigenous energy from hydropower to meet the State of Maine energy needs.

(4) Maine State Agency Hydropower Policy Statements

These policy statements provide the basis for agency comments on hydropower project license applications.

These statements are not directly applicable to the Shawmut Project as they set out the policy for State agencies to follow in commenting on hydropower projects in general. Agency comments on the Shawmut Project are addressed in the appropriate sections of Exhibit E and copies of agency and stakeholder relicensing consultation correspondence are provided in Appendix E-2.

(5) Executive Order Designating the State Agencies Responsible for Water Quality Certification

This order identifies MDEP as the agency responsible for reviewing and providing water quality certification.

The Licensee will apply for water quality certification from MDEP. Proof of receipt of delivery of the 401 Water Quality Certification Application to MDEP will be filed with the Commission when it is available.

(6) Feasibility Study of Maine's Small Hydropower Potential

This study was performed for the MOER and examined the potential for development/expansion of hydropower development of Maine's low head dams.

This Plan is not applicable to the Shawmut Project.

(7) Maine Hydropower Licensing and Relicensing Status Report 1989-91

These reports update hydropower licensing and relicensing activities in the State of Maine for 1989 through 1991.

The Shawmut Project relicensing began after this report was written and is not included in this summary of licensing activities.

State of Maine Comprehensive River Management Plan – December 1992 – Volume 4, Part III – Hydropower and Relicensing Reports and Studies

This section of Volume 4 of the State of Maine Comprehensive River Management Plan described the regulations for hydropower relicensing and reported the status of Maine projects with regard to the federal relicensing process.

The studies and reports contained in Part III of the State of Maine Comprehensive River Management Plan are not pertinent to the Shawmut Project.

State of Maine Comprehensive River Management Plan –February 1993 -Volume 5

Volume 5 of the State of Maine Comprehensive River Management Plan contains the MSPO[4] Natural Resources Policy Division's publication entitled Kennebec River Resource Management Plan: Balancing Hydropower Generation and Other Uses. This document provides a description of the various resources and beneficial uses contained in the Kennebec River Basin and provides recommendations on balancing the needs of these resources and uses.

Operation of Shawmut Project would continue to balance the need for reliable energy with stewardship of the environment. Further information on resources within the Project area can be found in Exhibit E, Section 4.0.

Management of Atlantic Salmon in the State of Maine: A Strategic Plan – July 1984, Maine Atlantic Sea-Run Salmon Commission

This Plan lists as its objectives the maintenance of Atlantic salmon populations in rivers where they currently exist, and the restoration of Atlantic salmon populations in historical salmon rivers. The plan identifies specific strategies to achieve the stated objectives, including fishway installation or improvement, increased hatchery capacity, and diversion of hatchery stocks once natural reproduction increases in stocked rivers.

Since several of Maine's rivers including the Kennebec have been designated as critical habitat for ESA listed Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon[5] the management plans developed by NMFS and USFWS for the GOM DPS of Atlantic salmon in the Kennebec River supersede the State's strategic plan. In December 2019, White Pine Hydro filed with FERC a Species Protection Plan (SPP) for the Shawmut Project which includes measures to be undertaken by the Licensee to protect salmon and salmon habitat at the Shawmut Project. These measures, including provisions for upstream and downstream fish passage facilities at Shawmut for migratory species, including Atlantic salmon, are being implemented under the existing Project license and will be continued under the new Project license.

[4] The SPO was disbanded in July 2012.
[5] On June 19, 2009, the National Marine Fisheries Service (NMFS) noticed the listing of the Distinct Population Segment of Atlantic Salmon under the Endangered Species Act.

Maine State Comprehensive Outdoor Recreation Plan 2014-2019, Maine Department of Conservation, Bureau of Parks and Lands

The 2003 - 2008 State Comprehensive Outdoor Recreation Plan (SCORP) is included in the FERC Comprehensive Plan, however, it was updated in 2009 and again in 2014. This plan serves as the State's official policy document for statewide outdoor recreation planning and for acquisition and development of public outdoor recreation areas and facilities. The plan identifies outdoor recreation issues of statewide importance based upon, but not limited to, input from the public participation program and also provides information about the demand for and supply of outdoor recreation resources and facilities in the state. SCORP satisfies the requirements of the Land and Water Conservation Fund (LWCF) Act (P.I. 88-578) which dictates that each state have an approved SCORP available on file with the National Park Service to participate in the LWCF program. The SCORP contains an implementation program that identifies the State's strategies, priorities, and actions for the obligation of its LWCF apportionment. The SCORP also includes a wetlands priority component with Section 303 of the Emergency Wetlands Resources Act of 1986. This wetland component provides information on state wetland conservation planning efforts as reflected in the Maine Wetlands Priority Conservation Plan published in 1988.

The SCORP does not contain any recommendations or assessments that are specific to the Shawmut Project area. The Licensee has consulted with MDIFW on access and other recreation issues in the Project area throughout the relicensing process. Details on existing recreation sites and facilities are provided in Exhibit E, Section 4.9. The Licensee is in compliance with the strategies outlined in this plan.

2.8.2 FERC-Approved Federal Comprehensive Plans

Atlantic Salmon Restoration in New England, Final Environmental Impact Statement 1989-2021. U.S. Fish and Wildlife Service, 1989

This document discusses the stated purpose of the USFWS relative to Atlantic salmon (i.e., the restoration of self-sustaining populations of Atlantic salmon by the year 2021 to several rivers). Several of Maine's rivers including the Kennebec have been designated as critical habitat for ESA listed DPS of Atlantic salmon. Subsequently, in December 2019, White Pine Hydro filed with FERC a SPP for the Shawmut Project which includes measures to be undertaken by the

Licensee to protect salmon and salmon habitat at the Shawmut Project. These measures, including the development of upstream fish passage facilities design plans for migratory species at Shawmut, including Atlantic salmon, are being implemented under the existing Project license and will be continued under the new Project license.

Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service (Policy)

This policy, under the auspices of the 1988 National Recreational Fisheries Policy (National Policy), encompasses the guiding principles, goals, and objectives set forth by the National Policy. The National Policy defines the USFWS's stewardship role in management of the Nation's recreational fishery resources, which include not only angling, but fish watching and photographing. With Fisheries USA, USFWS committed to accomplish three goals:

- Usability – to optimize the opportunities for people to enjoy the Nation's recreational fisheries.
- Sustainability – to ensure the future of quality and quantity of the Nation's recreational fisheries; and
- Action – to work in partnership with other federal governmental agencies, states, tribes, conservation organizations, and the public to effectively manage the Nation's recreational fisheries.

Throughout the relicensing process, the Licensee has consulted with USFWS and other applicable resource agencies and organizations on the topics of protection of fish resources and provisions of recreational opportunities within the Project area. Sections 4.6 and 4.9 of Exhibit E describe the existing fish resource and recreational opportunities the Project provides.

Hydrology of Floods, Kennebec River, Maine (Part I) – 1985 U.S. Army Corps of Engineers, New England Division

This report reviews and analyzes the hydrology of floods on the Kennebec River, including basin description, climatology, flood history, and flood events. The report notes the storage capacities and flood flow contributions of several hydroelectric and water storage projects. The report recommended a further phase of hydrologic studies to include an investigation of potential seasonal reservoir regulation guide curves and to establish the viability of temporarily using

surcharge storage at the reservoirs in the interest of downstream flood control. (The results of these additional hydrologic studies are presented in Part II.)

The Shawmut Project is not mentioned in this report. The Shawmut Project is not considered a storage project.

Hydrology of Floods, Kennebec River Basin, Maine, Part II – May 1988 U.S. Army Corps of Engineers, New England Division

This document expanded upon the previously described U.S. Army Corps of Engineers (USACE) Kennebec River Hydrology document of 1985. It examined in more detail the opportunity for greater flood flow control by enhanced regulation of the upper Kennebec River reservoirs, i.e. Brassua Reservoir, Moosehead Lake, and Flagstaff Reservoir. The study also analyzed the potential effectiveness of any new flood control storage in currently uncontrolled watersheds.

All season reservoir regulation guide curves were developed by trial through multi-year sequential hydrologic system simulations. In applying the guide curves to past flood events, it was found impossible in most instances to prevent spillage.

The Shawmut Project is not specifically mentioned in this report, but it is assumed that Project waters were analyzed as part of this survey and that the Project is in compliance with the report.

Kennebec River Basin, Maine, Water Resources Study-Reconnaissance Report – March 1989 U.S. Army Corps of Engineers, New England Division. Two Volumes

This investigation examined the potential for various improvements in several communities which experienced significant ($500K or more) damage during the April 1987 flood of the Kennebec River. Types of improvements considered included: flood control reservoirs; automated flood warning systems for the Kennebec River basin; structural and non-structural local flood protection projects; and adoption of monthly guide curves for upper basin storage projects to maximize these projects' utility for flood flow regulation.

The Shawmut Project is not mentioned in this report. The Shawmut Project is not considered a storage project.

Nationwide Rivers Inventory (National Park Service, January 1982, updated 1995)

In 1981, the Nationwide Rivers Inventory (NRI), was completed for New England. It is a survey of the nation's rivers conducted to identify segments meeting the minimum criteria for further study and/or potential inclusion into the National Wild and Scenic Rivers System (NWSRS). Once included on the NRI, a river is protected to the extent that pursuant to Section f(d) of the Wild and Scenic Rivers Act, and in accordance with a Presidential Directive and guidance in the form of "Procedures for Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory," issued by the Council on Environmental Quality:

> "*Each federal agency shall, as part of its normal planning and environmental review process, take care to avoid or mitigate adverse effects on Rivers identified in the Nationwide Inventory*." [6]

This directive provides guidance to federal agencies on protecting the resources that cause the river to qualify for listing on the NRI.

The Project is not located on any of the river segments listed by NRI. The Licensee has included the NPS on all distributions throughout the relicensing process.

North American Waterfowl Management Plan – 1986 U.S. Fish and Wildlife Service and Canadian Wildlife Service

This plan identifies waterfowl population goals and outlines the requirements of a waterfowl management and conservation program that would attain these goals. The plan addresses 37 species of the family *Anatidae*, (i.e., ducks, geese and swans) which occur in both the United States and Canada. The plan also discusses groups of similar species in terms of their ecological niche, distribution, abundance, breeding, population status and outlook, and causes of population declines or increases. The plan outlines a variety of initiatives and recommendations which would enhance and protect waterfowl resources, including: financial incentives for landowners for habitat maintenance; outright purchase of significant habitat; protective zoning; private land conservation promotion; financial participation of private conservation organizations; prioritization of public land management to enhance waterfowl resources; public works planning which considers and mitigates waterfowl resource impacts; and encouragement of joint ventures

[6] Presidential Directive, August 2, 1979.

between private and public groups to enhance and preserve waterfowl habitat. Specific recommendations identify areas to be preserved, bag limits, and other hunting limitations for certain species and survey activities.

The majority of initiatives and recommendations contained in this plan are beyond the scope of the Licensee's operation of the Shawmut Project. The most relevant goals involve habitat protection and maintenance. The Project provides habitat for a number of the species discussed in this Plan. The Project is located within the North Atlantic Flyway, and therefore Project waters are available for use by a variety of transient and migrating waterfowl species such as Canada goose, black duck, common merganser, and mallard duck. Continued operation of the Shawmut Project, as proposed, would have no new effects to Project wildlife or their habitats, but would continue to provide waterfowl habitat for both local and migratory species, as described in Exhibit E, Section 4.7. Additionally, the Licensee's proposal to protect and maintain the fishery and botanical resources, both of which represent potential forage sources for waterfowl, are identified in Exhibit E, Sections 4.7.

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

The goals of this plan are to protect and enhance the number of American eel in the inland waters of Atlantic states and to provide a sustainable fishery by preventing overharvesting of eels of any life stage. The plan obligates Maine to instate a management plan and implement the requirements therein.

The Project will comply with the guidelines of the Maine eel management plan. The Licensee provides both upstream and downstream passage for American eel, which will continue under a new license. A discussion of American eel and eel passage provisions at the Project is contained in Exhibit E, Section 4.6.

Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon – December 2018 National Marine Fisheries Service.

The Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon was originally listed as endangered in December 2000, and after publishing the 2005 recovery plan, was ruled

to be expanded in June 2009 by the NMFS and the USFWS. This expanded GOM DPS includes all anadromous Atlantic salmon in a freshwater range covering the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River; an area which includes the Kennebec River.

This recovery plan specifically addresses the planning requirements of the ESA for the GOM DPS of Atlantic salmon listed in 2009. The goal of this plan is to provide recovery goals, strategies, and objectives (based on the species biological/ecological needs as well as threats and conservation accomplishments) on which all stakeholders can cooperatively work.

Components of the recovery plan that are applicable to the lower Kennebec River, including the Shawmut Project area, have been fully accounted for in the SPP that was filed with FERC December 31, 2019. SPP measures for the continued provision of, and enhancement to, fish passage for Atlantic salmon at the Shawmut Project are included in the SPP and are discussed in Exhibit E, Section 4.6.

2.9 Financial and Personnel Resources

The Licensee has considerable experience operating not only the Shawmut Project but other hydroelectric and water storage projects as well. White Pine Hydro has operated the Project and multiple other hydroelectric and water storage projects since 1999. White Pine Hydro has available, a complete staff of engineers, biologists, operators, mechanics, and electricians that are trained and experienced in the operation of hydroelectric projects. For example, for White Pine Hydro's Kennebec hydropower system there are maintenance/operations personnel, the operations clerk, and the operations manager. If required, White Pine Hydro can also utilize staff from its other nearby rivers and projects, or contract with contractors to undertake larger scale maintenance or upgrade projects. In addition, White Pine Hydro has available the administrative, licensing, and support personnel that are needed to maintain compliance with the terms of the license.

Information regarding the Project's expected annual costs and value are provided in Exhibit D, of the License Application.

2.10 Notification of Affected Land Owners

The Licensee does not propose to expand the Project to encompass additional lands of others. Therefore, notification of adjacent landowners is not applicable. The Licensee proposes to remove two small parcels of land from the Project boundary, as these lands are not needed for Project purposes. The Licensee is the owner of all the lands proposed for removal from the Project, so landowner notification of this change is not applicable.

2.11 Applicant's Electricity Consumption Efficiency Improvement Program

Because the Licensee is an independent power producer, this section is not applicable to the Project.

2.12 Identification of Indian Tribes Affected by the Project

There are no Native American Indian Tribes affected by the Shawmut Project. The following Tribes were consulted throughout the relicensing process, and no comments from any of these Tribes were received.

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

Penobscot Indian Nation
12 Wabanaki Way
Indian Island, ME 04468

Passamaquoddy Native American Nation
Pleasant Point Reservation
Tribal Building Office
Route No. 190
Perry, ME 04667

Houlton Band of Maliseet
88 Bell Road
Littleton, ME 04730

3.0 INFORMATION TO BE PROVIDED BY AN APPLICANT WHO IS AN EXISTING LICENSEE

3.1 Measures Planned to Ensure Safe Management, Operation, and Maintenance of the Project

The Shawmut Project is remotely operated using a supervisory control and data acquisition (SCADA) link to Brookfield Renewable's National System Control Center (NSCC) in Marlboro, Massachusetts. Local operators are available during weekdays, and weekends as necessary, to perform routine maintenance and operations of the facility. Daily logs of pond level, flow, and outages are maintained electronically for the Project. As part of its license application, the Licensee is proposing to monitor the operations of the Project under the provisions of a Project Operations Monitoring Plan; a draft of which is included in Appendix E-6.

The Licensee has a sound compliance history for the Shawmut Project. Additionally, Part 12 inspections are conducted by the FERC's New York Regional Office on a regular basis. The Licensee completes all necessary corrective actions to address comments and recommendations arising from FERC inspections in a timely manner.

The dam is inspected routinely by Brookfield White Pine Hydro engineering and operations staff, as well as after local earthquakes of magnitude 3.0 or greater and floods in the Project vicinity.

The Project is exempt from FERC's Emergency Action Plan (EAP) requirements. White Pine Hydro personnel routinely evaluate the conditions upstream and downstream of the Project to verify that no changes have occurred that would reasonably be expected to adversely affect public health, safety, or property in the event of a dam failure. Further, White Pine Hydro maintains and annually verifies the accuracy of a contact list to be used in the event of a dam failure at the Project. An independent inspection by the Licensee's engineering staff is conducted annually and routine repairs are performed as needed. Local operations staff are on call 24 hours a day at the Shawmut Project.

3.1.1 Existing and Planned Operation of the Project During Flood Conditions

The Shawmut Project does not contribute to available storage capacity of the basin for flood control. The three storage projects in the Kennebec River storage system, Brassua, Moosehead, and Flagstaff, account for 20 percent, 53 percent and 27 percent, respectively, of the nearly 45 billion cubic feet (bcf) of useable water storage available in the Kennebec River storage system. Based on the recommendations of the USACE after the 1987 flood, Licensee and Kennebec Water Power Company (Licensee for the Moosehead Project, FERC No. 2671) implemented a winter drawdown target to 27 percent of the gross storage capacity of the entire Kennebec storage system, which is then available for managing spring inflows. This target was established for two principle reasons. First, if runoff and precipitation are near the historical averages, the probability is good that the reservoirs will refill, allowing the storage cycle to begin for another year. Second, the 27 percent of full target provides significant flood control benefits while at the same time providing flexibility to draw more water from the system to maintain downstream uses in the event that spring runoff begins later than normal.

This storage of heavy spring run-in helps prevent or reduce flooding in the system. After the spring refill, natural flow levels in the Kennebec River are such that the storage reservoirs must be used to supplement downstream flows to support hydroelectric generation and the industrial and municipal uses on the river. During the fall rains and at other times of the year the reservoirs are used to absorb high inflows which reduces flooding down river.

When flows in the Kennebec River approaches flood flows, the operator will operate the Project's gate and spillway capacities based upon the Project's High Water Guidelines which outline the specific procedures to be followed during such flood events.

A detailed description of the existing and planned operation of the Project during normal conditions is contained in Exhibit B of this License Application.

3.1.2 Warning Devices Used to Ensure Downstream Public Safety

There are numerous safety signs at the Shawmut Project and along the Kennebec River advising the public of the Project and safety considerations. These signs are in addition to the signs attached to the upstream safety barrier (installed during the summer boating season upstream of

the spillway gates and intake to protect boaters using the impoundment) and the recreational and information signs posted in the vicinity of the Project. The Licensee's Public Safety Plan for the Project was filed with the Commission in November 2015 as CEII.

3.1.3 Proposed Changes Affecting the Existing Emergency Action Plan

As noted above (Section 3.1) the Project is exempt from FERC's EAP requirements. White Pine Hydro conducts an annual field reconnaissance upstream and downstream of the Project to verify that no changes have occurred that would reasonably be expected to adversely affect public health, safety, or property in the event of a dam failure. Further, White Pine Hydro maintains and annually verifies the accuracy of a contact list to be used in the event of a dam failure at the Project.

3.1.4 Existing and Planned Monitoring Devices

Exhibit F - Supporting Design Report provides a complete description of existing monitoring devices at the Project.

3.1.5 Project's Employee and Public Safety Record

The Licensee has an excellent record of operating in a work-safe environment. During the past 15 years, there have been no employee deaths or recordable injuries at the Project.

There have been no Project-related deaths or serious injuries to members of the public within the Project boundary during the past 15 years.

The Licensee is committed to maintaining and operating its facilities in a manner that allows the public to safely enjoy recreational activities. An upstream safety barrier is installed during the summer boating season upstream of the spillway gates and intake to protect boaters using the impoundment, and warning signs are posted at numerous locations around the Project and on the Kennebec River.

3.2 Current Operation of the Project

A description of the Project operation is contained in Exhibit B of this License Application.

3.3 Project History

A description of the Project history is contained in Exhibit C of this License Application.

3.4 Lost Generation Due to Unscheduled Outages

Table 3-1 lists the record of unscheduled outages and related lost generation for the period 2016-2019. Rack raking resulted in approximately 200 outages averaging approximately 2.5 hours per event, resulting in lost generation of approximately 550 MWh from 2016 through 2019.

Table 3-1 Shawmut Project Unscheduled Outages and Lost Generation, 2016-2019.

Unit	Date/Time Unavailable	Date/Time Available	Reason for Unit Unavailability	Estimated MW Hours Lost
526-Shawmut 7	1/5/2016 13:22	1/5/2016 14:19	Unit tripped offline.	1.9
527-Shawmut 8	1/5/2016 13:22	1/5/2016 14:17	Unit tripped offline.	1.8
527-Shawmut 8	3/14/2016 13:28	3/14/2016 14:02	Unit offline for cleaning racks.	1.09
520-Shawmut 1	7/3/2016 3:06	7/3/2016 4:07	Unit tripped offline due to low intake cooling water pressure.	
522-Shawmut 3	7/27/2016 13:00	7/27/2016 13:20	Unit tripped off line cause by actuator malfunction	
520-Shawmut 1	10/5/2016 6:42	10/5/2016 6:56	High wheel pit level	
526-Shawmut 7	11/5/2016 1:07	11/5/2016 5:18	Failed Start - Overspeed Alarm	3.66
527-Shawmut 8	11/5/2016 1:07	11/5/2016 9:00	Failed Start - Overspeed Alarm	5.75
520-Shawmut 1	12/17/2016 8:34	12/17/2016 10:41	Intake plug racks	1.39
522-Shawmut 3	12/28/2016 9:23	12/28/2016 10:59	Low oil pressure governor	0.93
520-Shawmut 1	3/4/2017 4:26	3/4/2017 9:20	High rack differential	4.29
521-Shawmut 2	3/4/2017 5:12	3/4/2017 9:10	High rack differential	3.47
522-Shawmut 3	3/4/2017 5:09	3/4/2017 9:48	High rack differential	4.07
523-Shawmut 4	3/4/2017 4:55	3/4/2017 9:39	High rack differential	4.15
524-Shawmut 5	3/4/2017 5:02	3/4/2017 9:02	High rack differential	3.5
525-Shawmut 6	3/4/2017 5:02	3/4/2017 9:16	High rack differential	3.71

Unit	Date/Time Unavailable	Date/Time Available	Reason for Unit Unavailability	Estimated MW Hours Lost
526-Shawmut 7	3/4/2017 5:13	3/7/2017 12:07	High rack differential	115.19
527-Shawmut 8	3/4/2017 4:55	3/7/2017 8:52	High rack differential	110.89
521-Shawmut 2	3/22/2017 22:36	3/23/2017 8:19	Lockout due to Overspeed and Loss of AC	9.93
520-Shawmut 1	4/11/2017 21:21	4/12/2017 9:56	Cannot run due to high intake rack differential	11.94
520-Shawmut 1	4/11/2017 9:17	4/11/2017 12:05	High rack differential	2.66
521-Shawmut 2	4/11/2017 9:09	4/11/2017 12:06	High rack differential	2.8
522-Shawmut 3	4/11/2017 9:09	4/11/2017 12:31	High rack differential	3.19
523-Shawmut 4	4/11/2017 9:08	4/11/2017 12:06	High rack differential	2.82
524-Shawmut 5	4/11/2017 9:09	4/11/2017 12:17	High rack differential	2.97
525-Shawmut 6	4/11/2017 0:01	4/11/2017 12:13	High rack differential	11.58
527-Shawmut 8	4/11/2017 9:06	4/11/2017 12:16	High rack differential	5.55
520-Shawmut 1	4/12/2017 20:49	4/13/2017 9:46	Taken off line via the PT.	12.29
522-Shawmut 3	4/12/2017 4:25	4/12/2017 9:51	Taken off line at 4.7 ft. diff.	5.16
523-Shawmut 4	4/12/2017 2:09	4/12/2017 9:47	Tripped off line	7.24
523-Shawmut 4	4/12/2017 20:42	4/13/2017 9:46	Unit tripped off line most likely high rack differential.	12.4
525-Shawmut 6	4/12/2017 7:31	4/12/2017 9:38	Tripped offline	2.01
523-Shawmut 4	5/2/2017 1:48	5/3/2017 6:33	High rack differential	27.28
527-Shawmut 8	7/2/2017 1:23	7/2/2017 5:42	Unit didn't start due to loss of primary power	
520-Shawmut 1	7/8/2017 13:47	7/8/2017 14:51	Station trip due to CMP line event	0.93
521-Shawmut 2	7/8/2017 13:46	7/8/2017 14:56	Station trip due to CMP line event	1.02
522-Shawmut 3	7/8/2017 13:46	7/8/2017 15:00	Station trip due to CMP line event	0.99

Unit	Date/Time Unavailable	Date/Time Available	Reason for Unit Unavailability	Estimated MW Hours Lost
523-Shawmut 4	7/8/2017 13:46	7/8/2017 15:21	Station trip due to CMP line event	
524-Shawmut 5	7/8/2017 13:46	7/8/2017 15:08	Station trip due to CMP line event	1.1
525-Shawmut 6	7/8/2017 13:46	7/8/2017 15:13	Station trip due to CMP line event	
526-Shawmut 7	7/8/2017 13:46	7/8/2017 14:39	Station trip due to CMP line event	1.29
527-Shawmut 8	7/8/2017 13:46	7/8/2017 14:42	Station trip due to CMP line event	
522-Shawmut 3	7/11/2017 1:03	7/11/2017 9:45	Unit tripped clogged intake strainer	7.62
523-Shawmut 4	9/5/2017 9:16	9/7/2017 8:03	Unit off line in outage for broken switch	
523-Shawmut 4	11/2/2017 4:31	11/3/2017 11:13	High rack differential	31.38
522-Shawmut 3	12/4/2017 13:00	12/8/2017 10:18	Broken chain on governer	51.08
527-Shawmut 8	12/6/2017 11:55	12/6/2017 16:41	Unit unable to come online due to overspeed trip speed sensor issue	6.96
522-Shawmut 3	12/14/2017 4:15	12/14/2017 11:14	ISO system balancing required unit off line	5.1
523-Shawmut 4	12/14/2017 4:17	12/14/2017 9:07	ISO system balancing with DNR required unit off line	4.23
525-Shawmut 6	12/14/2017 4:15	12/14/2017 9:18	ISO system balancing required a DNE taking unit off line	4.42
527-Shawmut 8	12/14/2017 4:25	12/14/2017 6:17	ISO system balancing with DNE required unit off line	1.36
524-Shawmut 5	12/16/2017 4:57	12/16/2017 16:36	Unit failed to start due to low lube oil level	6.8
523-Shawmut 4	12/25/2017 14:36	12/26/2017 14:20	Fail to Start due to intake ice	12.13
523-Shawmut 4	1/1/2018 14:41	1/2/2018 12:48	Fuse on KT2L Breaker blown	20.99
524-Shawmut 5	1/1/2018 14:41	1/2/2018 12:48	Fuse on KT2L Breaker blown	19.37
525-Shawmut 6	1/1/2018 14:41	1/2/2018 12:48	Fuse on KT2L Breaker blown	20.18
523-Shawmut 4	1/22/2018 10:04	1/22/2018 10:47	Breaker Open for unit work on brushes	0.63
524-Shawmut 5	1/27/2018 16:31	1/27/2018 16:57	Unit taken offline for testing.	0.41

Unit	Date/Time Unavailable	Date/Time Available	Reason for Unit Unavailability	Estimated MW Hours Lost
520-Shawmut 1	3/17/2018 6:35	3/17/2018 16:15	High rack differential	9.17
521-Shawmut 2	3/17/2018 7:09	3/17/2018 10:12	High rack differential	2.67
523-Shawmut 4	3/17/2018 7:38	3/17/2018 16:04	High rack differential	8
526-Shawmut 7	3/22/2018 8:31	9/24/2018 9:08	Water found in stub shaft needs to be replaced or welded	2385.18
527-Shawmut 8	3/22/2018 10:35	3/22/2018 11:07	CMP switching	0.7
527-Shawmut 8	3/26/2018 10:39	3/26/2018 11:33	Work being done at the station on U7 required the unit to be down.	1.31
520-Shawmut 1	3/30/2018 13:43	3/30/2018 17:40	Investigating leak near intake canal wall	3.46
522-Shawmut 3	3/30/2018 13:41	3/30/2018 17:22	Investigating leak near intake canal wall	3.23
523-Shawmut 4	3/30/2018 13:40	3/30/2018 17:06	Investigating leak near intake canal wall	3.01
524-Shawmut 5	3/30/2018 13:36	3/30/2018 17:22	Investigating leak near intake canal wall	3.02
527-Shawmut 8	3/30/2018 13:45	3/30/2018 16:53	Investigating leak near intake canal wall	5.49
527-Shawmut 8	4/17/2018 11:56	4/17/2018 14:16	Dewater unit 7	4.09
527-Shawmut 8	4/21/2018 0:37	4/25/2018 13:21	Unit Tripped Offline.	174.63
521-Shawmut 2	4/27/2018 22:34	5/2/2018 12:42	Unit Offline due to rack differential.	61.65
522-Shawmut 3	4/27/2018 11:15	5/2/2018 12:53	Unit Offline due to rack differential.	74.24
524-Shawmut 5	4/29/2018 21:10	5/2/2018 12:48	Unit offline due to high rack differential	25.46
520-Shawmut 1	5/6/2018 8:37	5/9/2018 13:05	High rack differential	50.24
521-Shawmut 2	5/7/2018 8:23	5/9/2018 12:12	Unit Offline due to High Rack Differential.	34.04
523-Shawmut 4	5/7/2018 23:47	5/8/2018 8:31	Trip due intake rack diff	5.74
522-Shawmut 3	5/9/2018 21:03	5/22/2018 8:29	Exciter loss of AC	218.59
523-Shawmut 4	5/9/2018 0:21	5/9/2018 12:34	Emergency shutdown trip due intake diff	7.13

Unit	Date/Time Unavailable	Date/Time Available	Reason for Unit Unavailability	Estimated MW Hours Lost
527-Shawmut 8	5/10/2018 1:04	5/10/2018 1:49	Tripped offline for rack diff	1.1
527-Shawmut 8	5/18/2018 9:34	5/18/2018 9:48	Overspeed/Overvoltage trip-line bump	0.34
523-Shawmut 4	5/22/2018 8:21	5/24/2018 11:05	Unit being worked on voltage relay replaced	40.74
524-Shawmut 5	7/5/2018 23:23	7/6/2018 3:13	Unit tripped offline clogged intake strainer	2.52
527-Shawmut 8	7/31/2018 23:45	8/1/2018 9:27	Over Voltage/Over Speed Alarms- potential line bump	0.47
521-Shawmut 2	8/14/2018 12:30	8/14/2018 13:00	Governor oil leak	0.36
523-Shawmut 4	8/14/2018 11:00	8/14/2018 12:27	Brake won't close	
527-Shawmut 8	8/16/2018 1:45	8/16/2018 9:22	Unit Tripped offline- clogged intake .	5.56
526-Shawmut 7	10/5/2018 10:25	9/23/2019 8:30	Broken stub shaft	7530.15
526-Shawmut 7	10/5/2018 10:25	9/23/2019 8:30	Broken stub shaft	7530.15
527-Shawmut 8	11/14/2018 2:11	11/14/2018 7:29	Line Bump	7.74
527-Shawmut 8	12/14/2018 9:17	12/14/2018 14:39	Removal of parts from powerhouse.	7.84
527-Shawmut 8	12/15/2018 8:14	12/15/2018 12:14	U7 shaft removal	5.84
524-Shawmut 5	12/28/2018 8:48	12/28/2018 9:13	Unit Offline for Exciter work.	0.73
527-Shawmut 8	1/15/2019 9:11	1/15/2019 12:54	Unit offline for worker safety	6.51
522-Shawmut 3	1/19/2019 20:03	1/19/2019 21:26	Failed to start- exciter loss of AC	1.41
520-Shawmut 1	1/24/2019 11:24	1/29/2019 12:07	Unit OOS due to failed Actuator Oil Pump	123.37
521-Shawmut 2	1/29/2019 10:07	1/29/2019 10:45	Brush replacement	0.65
525-Shawmut 6	1/29/2019 10:47	1/29/2019 11:08	Brush replacement	0.36
521-Shawmut 2	4/1/2019 2:53	4/1/2019 7:51	tripped offline	5.08
521-Shawmut 2	4/14/2019 14:55	4/17/2019 12:44	Unit Taken Offline due to High Rack Differential/preventing more	71.35

Unit	Date/Time Unavailable	Date/Time Available	Reason for Unit Unavailability	Estimated MW Hours Lost
			debris from accumulating in the forebay	
523-Shawmut 4	4/14/2019 14:54	4/14/2019 14:55	Unit Taken Offline due to High Rack Differential.	0.02
523-Shawmut 4	4/14/2019 14:55	4/17/2019 12:44	Unit Taken Offline due to High Rack Differential/preventing more debris from accumulating in the forebay	71.35
524-Shawmut 5	4/14/2019 14:55	4/17/2019 12:44	Unit Taken Offline due to High Rack Differential/preventing more debris from accumulating in the forebay	71.35
525-Shawmut 6	4/14/2019 14:55	4/17/2019 12:44	Unit Taken Offline due to High Rack Differential/preventing more debris from accumulating in the forebay	71.35
527-Shawmut 8	4/14/2019 14:55	4/17/2019 12:44	Unit Taken Offline due to High Rack Differential/preventing more debris from accumulating in the forebay	127.42
523-Shawmut 4	4/21/2019 18:34	4/22/2019 11:28	Low real power-rack differential	17.27
520-Shawmut 1	4/22/2019 8:27	4/22/2019 10:56	Units taken offline due to high rack differential	2.54
521-Shawmut 2	4/22/2019 6:41	4/22/2019 8:26	Units taken offline due to high rack differential	1.79
521-Shawmut 2	4/22/2019 8:27	4/22/2019 10:56	Units taken offline due to high rack differential	2.54
522-Shawmut 3	4/22/2019 8:27	4/22/2019 10:56	Units taken offline due to high rack differential	2.54
524-Shawmut 5	4/22/2019 6:41	4/22/2019 8:26	Units taken offline due to high rack differential	1.79
524-Shawmut 5	4/22/2019 8:27	4/22/2019 10:56	Units taken offline due to high rack differential	2.54
525-Shawmut 6	4/22/2019 6:41	4/22/2019 8:26	Units taken offline due to high rack differential	1.79
525-Shawmut 6	4/22/2019 8:27	4/22/2019 10:56	Units taken offline due to high rack differential	2.54
527-Shawmut 8	4/22/2019 8:27	4/22/2019 10:56	Units taken offline due to high rack differential	4.35
522-Shawmut 3	5/3/2019 12:32	5/3/2019 14:27	Brush service	1.96

Unit	Date/Time Unavailable	Date/Time Available	Reason for Unit Unavailability	Estimated MW Hours Lost
527-Shawmut 8	6/14/2019 11:15	6/14/2019 11:22	Unit tripped offline due to bump in line	0.22
527-Shawmut 8	6/24/2019 2:15	6/24/2019 8:51	Unit tripped offline- line bump	8.19
525-Shawmut 6	7/17/2019 11:17	7/17/2019 15:52	Requires brush replacement	
525-Shawmut 6	7/17/2019 20:19	7/18/2019 9:19	Unit offline due to gov oil temp	7.59
525-Shawmut 6	7/30/2019 21:22	7/31/2019 8:38	Unit Failed to start synch issue.	7.4
527-Shawmut 8	8/23/2019 6:02	8/23/2019 6:46	Unit failed to start. excitation voltage issue	1.07
526-Shawmut 7	10/4/2019 10:28	10/18/2019 10:08	Equipment maintenance	
527-Shawmut 8	10/4/2019 10:28	10/18/2019 10:09	OOS due to proximity to unit 7	
526-Shawmut 7	10/18/2019 20:00	10/19/2019 4:00	Nightly eel passage	14.02
527-Shawmut 8	10/18/2019 10:09	10/23/2019 12:34	Head cover in draft tube	89.36
526-Shawmut 7	10/19/2019 20:00	10/20/2019 4:00	Nightly eel passage	12.26
527-Shawmut 8	10/24/2019 5:06	10/24/2019 10:47	Overspeed- exciter under voltage	9.96
520-Shawmut 1	10/25/2019 16:56	10/28/2019 11:53	Rack differential	58.65
521-Shawmut 2	10/25/2019 18:00	10/28/2019 11:56	Unit offline due to high rack differential	57.76
523-Shawmut 4	10/26/2019 19:22	10/28/2019 12:03	Unit offline due to high rack differential	35.64
526-Shawmut 7	10/26/2019 5:15	10/26/2019 7:56	Failed to start. overspeed excitation alarm	4.7
526-Shawmut 7	10/27/2019 5:19	10/27/2019 6:48	Unable to start remotely- plc locked	2.17
527-Shawmut 8	10/28/2019 5:11	10/28/2019 6:46	Unit failed to start. overspeed excitation issues	2.05
523-Shawmut 4	10/30/2019 19:09	10/31/2019 12:11	Unit trip rack diff	16.16
527-Shawmut 8	10/30/2019 5:19	10/30/2019 6:46	Overspeed alarm-exciter voltage under	2.12
522-Shawmut 3	10/31/2019 2:45	10/31/2019 12:15	Rack differential	9.02

Unit	Date/Time Unavailable	Date/Time Available	Reason for Unit Unavailability	Estimated MW Hours Lost
527-Shawmut 8	10/31/2019 5:00	10/31/2019 7:44	Overspeed alarm no start-excitation issue	3.99
526-Shawmut 7	11/1/2019 16:00	11/1/2019 16:43	High winds caused trip	1.05
527-Shawmut 8	11/1/2019 16:00	11/1/2019 16:45	High winds caused trip	1.1
526-Shawmut 7	11/9/2019 3:20	11/9/2019 3:31	Unit trip speed interrupted	0.27
526-Shawmut 7	11/9/2019 8:42	11/9/2019 9:59	Unit Tripped Offline.	1.87
526-Shawmut 7	11/9/2019 5:48	11/9/2019 7:50	Unit Tripped Offline. No other alarms received.	2.97
526-Shawmut 7	11/9/2019 10:37	11/12/2019 10:50	Unit trips offline speed interruption	105.44
520-Shawmut 1	11/12/2019 12:35	11/12/2019 13:36	Unit offline in order to change out U3 bad IO block	1.48
521-Shawmut 2	11/12/2019 12:35	11/12/2019 13:36	Unit offline in order to change out U3 bad IO block	1.48
522-Shawmut 3	11/12/2019 12:35	11/12/2019 13:36	Unit offline in order to change out U3 bad IO block	0.59
526-Shawmut 7	11/23/2019 9:21		Vibration detected	302.87
525-Shawmut 6	12/9/2019 21:22	12/9/2019 23:07	Unit Failed to start/lockout excitation voltage	1.15
527-Shawmut 8	12/27/2019 13:30	12/27/2019 14:12	U7 rack out	1.53
Total				20154.19

3.5 Licensee's Record of Compliance

The Project has a good record of compliance with the terms and conditions of the existing license. A review of the Licensee's records indicates no violations of the terms and conditions of the license. In addition, the Licensee has not received any communication from FERC indicating possible noncompliance.

3.6 Actions Affecting the Public

The Licensee generally allows public access to the Shawmut impoundment and the surrounding Project lands. However, if necessary, the Licensee will restrict public access to specific areas that pose a threat to public safety. On the Kennebec River above the dam, and downstream, fishing is the most frequency recreational activity, followed by paddling/boating. The Licensee provides public recreation access at two formal recreation sites that provide opportunities for bank fishing, motorized and non-motorized boating, and canoe portage. Several other non-Project formal and information recreation sites provide additional recreational access to Project waters. A full description of the recreation sites and facilities provided by the Licensee, and the recreational enhancement proposed is provided in Exhibit E, Section 4.9 of this application. The Licensee's plans for management of the Project recreation sites, facilities and amenities under the new license are contained in the Shawmut Project Recreation Facilities Management Plan (Appendix E-5).

Generation at hydropower facilities generally offsets the need for increased operation at existing baseload facilities, such as oil or coal-fueled generation plants. Fossil-fueled plants produce atmospheric pollutants that must be controlled at significant costs. The avoided cost of air pollution, therefore, is a public benefit of hydroelectric generation. In addition, the Shawmut Project, like all hydropower projects, is a carbon-free generation source, and therefore does not contribute to climate-change—another significant public benefit.

The Licensee's regard for public safety is demonstrated by its active program of installing warning signs and safety devices at the Project. These are described in the Public Safety Plan which was filed with the Commission in 2015 as CEII.

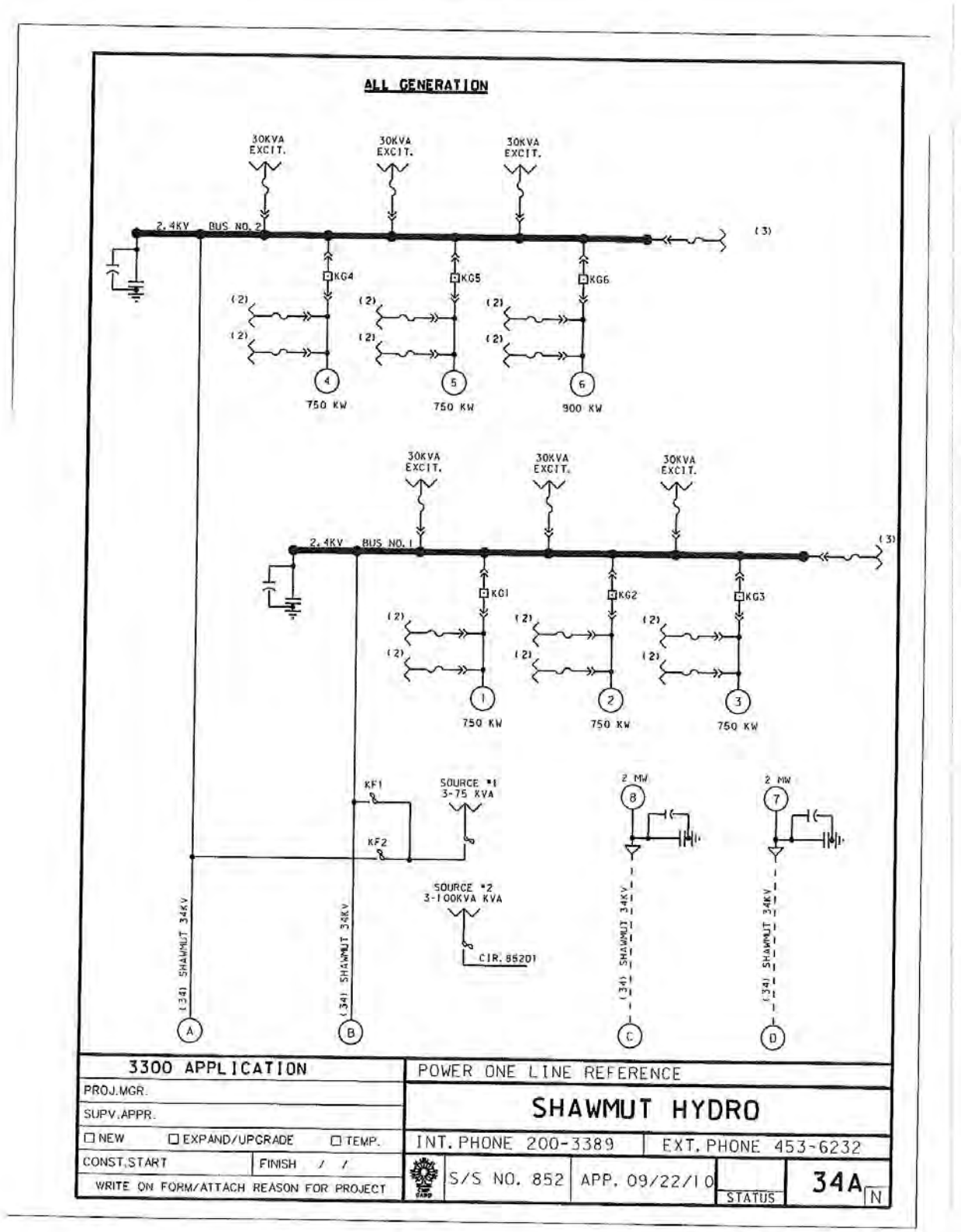
3.7 Ownership and Operating Expenses that would be Reduced if the License Were Transferred

The Licensee is applying for a long-term license to continue to maintain and operate the Project. Additionally, there is no competing application to take over the Project. Because there is no proposal to transfer the Project license, this section is not applicable to the Shawmut Project.

3.8 Annual Fees for Use of Federal or Native American Lands

This section is not applicable to the Shawmut Project since it uses no federal or Native American lands.

APPENDIX H-1
SINGLE LINE DIAGRAM


ALL GENERATION
30KVA EXCIT.
30KVA EXCIT.
30KVA EXCIT.
2.4KV BUS NO. 2
(3)
KG4
KG5
KG6
(2)
(2)
(2)
(2)
(2)
(2)
4
5
6
750 KW
750 KW
900 KW
30KVA EXCIT.
30KVA EXCIT.
30KVA EXCIT.
2.4KV BUS NO. 1
(3)
KG1
KG2
KG3
(2)
(2)
(2)
(2)
(2)
(2)
1
2
3
750 KW
750 KW
750 KW
KF1
KF2
SOURCE #1 3-75 KVA
SOURCE #2 3-100KVA KVA
CIR. 85201
(34) SHAWMUT 34KV
(34) SHAWMUT 34KV
2 MW
8
(34) SHAWMUT 34KV
2 MW
7
(34) SHAWMUT 34KV
A
B
C
D
3300 APPLICATION
PROJ.MGR.
SUPV.APPR.
☐ NEW ☐ EXPAND/UPGRADE ☐ TEMP.
CONST.START
FINISH / /
WRITE ON FORM/ATTACH REASON FOR PROJECT
POWER ONE LINE REFERENCE
SHAWMUT HYDRO
INT. PHONE 200-3389
EXT. PHONE 453-6232
S/S NO. 852
APP. 09/22/10
STATUS
34A N