EXHIBIT 9

Brookfield

Brookfield Renewable Energy Group
Black Bear Hydro Partners, LLC
26 Katherine Drive
Hallowell, ME 04347

Tel 207.629.1800
Fax 207.623.3913
www.brookfieldrenewable.com

July 10, 2015
VIA E-FILING

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

Ellsworth Hydroelectric Project FERC No. 2727
Draft License Application

Dear Secretary Bose:

In accordance with 18 CFR § 5.16(c), the Licensee for the Ellsworth Hydroelectric Project, Black Bear Hydro Partners, LLC (Black Bear 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 and Supporting Design Report, 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 Black Bear's proposal for continued maintenance and operation of the Ellsworth Project. Black Bear's proposal is to continue the existing fundamental operation of the Project including 1) the provision of 105 cfs (July 1 through April 30) and 250 cfs (May 1 through June 30) seasonal minimum flows from the Project facilities, 2) the management of the Graham Lake impoundment to include an annual fluctuation between 104.2' and 93.4' to provide seasonal storage and short term peaking flows, and 3) the management of the Lake Leonard impoundment to include a normal daily fluctuation of no more than one foot, between 65.7' and 66.7', in order to manage generation flows. Based upon the results of the Generation Enhancement Study, Black Bear is not proposing the addition of any turbine-generator units at the Project as part of this relicensing.

Exhibit E discusses the results of the studies completed to date 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 Black Bear's proposal. In support of this proposal, Exhibit E evaluates the potential impacts to environmental, recreational and cultural resources that may occur as a result of continued project operation under a new license. As appropriate, Exhibit E includes Black Bear's preliminary proposals for the protection and mitigation of effects on, or enhancement to, resources that are associated with

EXHIBIT 9

the continued operation of the Project. Included in the appendices is a draft Recreation Management Plan.[1]

It should be noted that several studies have recently been or will soon be completed and will be filed as components of the Updated Study Report (USR), which is currently scheduled for submittal on or around August 14, 2015.[2] This is approximately midway in the Draft License Application review period. Additionally, because the field component of the Upstream Atlantic Salmon Passage Study, and the Downstream American Eel Passage Study will not be completed until after the required submittal date of the USR, final results of those studies will be presented in the Final License Application. Finally, in response to the study modification letter from the Commission and following consultation with National Marine Fisheries Service (NMFS), Maine Department of Marine Resources (Maine DMR), and the U.S. Fish and Wildlife Service (FWS), Black Bear submitted the Atlantic Salmon Smolt Downstream Passage Study Plan on March 31, 2015. In the plan Black Bear proposed to conduct the study in 2016 due to the time needed to obtain a research permit under the Endangered Species Act. In a letter dated April 21, 2015, the Commission approved Black Bear's study plan without modifications. Therefore, final results of the Atlantic Salmon Smolt Downstream Passage Study will not be available until December 31, 2016.

In accordance with FERC regulations (18 CFR § 5.16(e)), participants and Commission staff may submit comments to Black Bear regarding the DLA within 90 days following this filing, i.e. by October 8, 2015. 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 by phone at (207) 629-1817 or by email at Frank.Dunlap@BrookfieldRenewable.com.

Sincerely,

Frank H. Dunlap
Licensing Specialist

---

[1] A draft Historic Properties Management Plan is being prepared for review by the Maine Historic Preservation Officer prior to submittal for review by the Commission.

[2] According to the FERC Issued Process Plan and Schedule, the USR is due to be filed no later than September 9, 2015. The USR studies include the Marsh Nesting Bird Study, Benthic Macroinvertebrate Sampling, Impoundment Aquatic Habitat Study, Outlet Stream Aquatic Habit Study, Instream Flow and Union River Tributary Access Study, Brook Floater Mussel Survey, Whitewater Boating Assessment, Project Generation Enhancement Study, Upstream Fish Passage Alternatives Study, and the Phase II Pre-Contact Archaeological Report.

Attachment: Draft License Application for the Ellsworth Hydroelectric Project

cc: R. Dewechter, Brookfield
J. Clere, Brookfield
Distribution List

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Distribution List
Ellsworth Project DLA
July 10, 2015

Federal Agencies

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

Gerald Cross
Regional Engineer
Federal Energy Regulatory Commission
New York Regional Office
19 W. 34th St., Room 400
New York, NY 10001-3006

Sean McDermott
National Oceanic & Atmospheric Administration
New England Regional Office
55 Great Republic Drive
Gloucester, MA 01930

Jeffery Murphy
Fisheries Biologist
National Oceanic & Atmospheric Administration
Maine Field Office
17 Godfrey Drive - Suite 1
Orono, ME 04473

Michael Black
Director
Bureau of Indian Affairs
U.S. Dept. of the Interior Headquarters
1849 C Street NW MS 2624 MIB
Washington, DC 20240

Greg Stewart
Data Section Chief
United States Geological Survey
196 Whitten Road
Augusta, ME 04333

Nicholas Palso
Federal Energy Regulatory Commission
888 First Street, NE
Room 62-30
Washington, DC 20426

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

U.S. Environmental Protection Agency
Director
Water Quality Control Branch (WQB)
5 Post Office Square, Suite 100
Boston, MA 02109-3946

Steve Shepard
Maine Hydro Licensing Coordinator
U.S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473

Mr. Kevin Mendik
NER Hydro Program Coordinator
U.S. National Park Service
15 State Street, 10th Floor
Boston, MA 02109-3572

Alex Hoar, Senior Biologist
Ecological Services
US Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035

State Agencies

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

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Distribution List
Ellsworth Project DLA
July 10, 2015

Thomas Schaeffer
Regional Wildlife Biologist
Maine Dept. of Inland Fisheries & Wildlife – Region C
P.O. Box 220
Jonesboro, ME 04648

Pat Keliher
Maine Dept. Marine Resources
State House Station 21
Augusta, ME 04333-0021

Mr. Earle Shettleworth
Director
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333

Kathy Howatt
Hydro Coordinator
Maine Dept. of Environmental Protection
17 State House Station
Ray Building – AMHI Complex
Augusta, ME 04330-0017

Kathleen Leyden
Director
Maine Coastal Program
Maine Dept. of Agriculture, Conservation and Forestry
Bureau of Geology
93 State House Station
Augusta, ME 04333-0093

Gail Wippelhauser
Maine Department of Marine Resources
21 State House Station
Augusta, ME 04333

Randy Spencer
Maine Department of Marine Resources
650 State Street
Bangor, ME 04401

Gregory Burr
Regional Fisheries Biologist
Maine Dept. of Inland Fisheries & Wildlife – Region C
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John Perry, Environmental Coordinator
Maine Dept. of Inland Fisheries & Wildlife
284 State Street
State House Station 41
Augusta, ME 04333

Jim Vogel
Senior Planner
Division of Parks and Public Lands
Dept. of Agriculture, Conservation and Forestry
18 Elkins Lane, Harlow Building
22 State House Station
Augusta, ME 04333-0022

Tribes

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

Chris Sockalexis
THPO
Cultural and Historic Preservation Program
Natural Resources Department
Penobscot Indian Nation
12 Wabanaki Drive
Indian Island, ME 04468

Chief
Aroostook Band of Micmacs
8 Northern Road
Presque Isle, ME 04769

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

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Tribal Governor
Passamaquoddy Tribe
Pleasant Point Reservation
P.O. Box 343
Route 190
Perry, ME 04667

Donald Soctomah
Tribal Historic Preservation Officer
Passamaquoddy Tribe
Indian Township Reservation
P.O. Box 343
Route 190
Perry, ME 04667

Non-Governmental Agencies

Ken Cline
Union River Watershed Coalition
105 Eden Street
Bar Harbor, ME 04609

Barb Witham
Union Salmon Association
61 Birch Lawn Drive
Lamoine, ME 04605

Atlantic Salmon Federation
Atlantic Office
P.O. Box 807
Calais, ME 04619-0807

Gary Arsenault
ME Council – ASF
292 Hammond Street
Bangor, ME 04401

Dwayne Shaw
Downeast Salmon Federation
P.O. Box 201
Columbia Falls, ME 04623

George Leinbaugh
Downeast Salmon Federation
P.O. Box 201
Columbia Falls, ME 04263

Alan Kane
Downeast Salmon Federation
P.O. Box 201
Columbia Falls, ME 04263

Robin Alden
Executive Director
Penobscot East Resource Center
13 Atlantic Avenue
Stonington, ME 04681

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Penobscot East Resource Center
P.O. Box 27
Stonington, ME 04681

Aaron Dority
Downeast Groundfish Initiative Director
Penobscot East Resource Center
13 Atlantic Avenue
PO Box 27
Stonington, ME 04681

Local Governments

Penny Weinstein
Administrative Assistant
City of Ellsworth
1 City Hall Plaza
Ellsworth, ME 04605

Town Clerk
Town of Mariaville
1686 Mariaville Road
Mariaville, ME 04605

Town Clerk
Town of Waltham
1520 Waltham Road
Waltham, ME 04605

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Distribution List
Ellsworth Project DLA
July 10, 2015

Individuals

Doug Watts
131 Cony Street
Augusta, ME 04330

Mark Whiting
145 Gary Moore Road
Ellsworth, ME 04605

Licensee

Frank Dunlap
Brookfield Renewable Energy Group
Brookfield White Pine Hydro LLC
26 Katherine Drive
Hallowell, ME 04347

Jason Clere
Brookfield Renewable Energy Group
Brookfield White Pine Hydro LLC
26 Katherine Drive
Hallowell, ME 04347

Dave Dominie
TRC
14 Gabriel Drive
Augusta, ME 04330

EXHIBIT 9

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EXHIBIT 9

Ellsworth Hydroelectric Project
FERC No. 2727

Draft Application for New License
for Major Water Power Project – Existing Dam

Initial Statement and Exhibits A, B, C, D, E, F, G, and H

Submitted by:

Black Bear Hydro Partners, LLC
26 Katherine Drive
Hallowell, ME 04347

July 2015

Brookfield

EXHIBIT 9

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ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

DRAFT APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

CONTENTS

This draft Application for New License for the Ellsworth Hydroelectric Project (FERC No. 2727) consists of the following exhibits:

EXHIBIT 9

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EXHIBIT 9

INITIAL STATEMENT

EXHIBIT 9

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EXHIBIT 9

BEFORE THE
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Brookfield White Pine Hydro LLC	)	**Project No. 2727**
	)	**Ellsworth Hydroelectric Project**
	)	

APPLICATION FOR NEW LICENSE
FOR MAJOR WATER POWER PROJECT – EXISTING DAM

INITIAL STATEMENT

1. Black Bear Hydro Partners, LLC (hereinafter "Applicant", "Licensee" or "Black Bear") applies to the Federal Energy Regulatory Commission (hereinafter FERC) for a new license for the Ellsworth Hydroelectric Project (FERC No. 2727) (Project), licensed major project – existing dam, as described in the attached exhibits. The current license for the Ellsworth Project was issued by order dated December 28, 1987. The license was for a period effective January 1, 1988 and has a termination date of December 31, 2017. 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 or territory:	Maine
County:	Hancock County
Townships or nearby towns:	Ellsworth, Waltham, Mariaville, Fletchers Landing Township
Stream or other body of water:	Union River

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

Black Bear Hydro Partners, LLC
26 Katherine Drive
Hallowell, Maine 04347
ATTN: C. Todd Wynn, Vice President
Telephone: (857) 313-7706

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

Mr. Jason Clere, Manager of Licensing and Compliance
Brookfield Renewable Energy Group
26 Katherine Drive
Hallowell, Maine 04347
Telephone: (207) 629-1824

The Applicant requests that copies of all correspondence pertaining to this application be provided to:

Frank Dunlap
Brookfield Renewable Energy Group
26 Katherine Drive
Hallowell, Maine 04347
E-mail: Frank.Dunlap@BrookfieldRenewable.com
Telephone: (207) 629-1817

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

David Dominie
TRC Companies, Inc.
14 Gabriel Drive
Augusta, ME 04330
E-mail: ddominie@trcsolutions.com
Telephone: (207) 620-3835

4. The Applicant is:

Black Bear Hydro Partners, LLC, a Delaware limited liability company, is Licensee for the water power project designated as Project No. 2727 in the records of the Federal Energy Regulatory Commission[1]. The Licensee is not claiming preference under section 7(a) of the Federal Power Act. See 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] Black Bear Hydro Partners, LLC, a Delaware limited liability company, is an indirect subsidiary of Brookfield Renewable Energy Group.

(1) Maine Waterway Development and Conservation Act, 38 M.R.S.A. §§ 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 an easement or flowage rights to all Project lands and waters.

6. The Ellsworth Hydroelectric Project is located on the lower reach of the Union River in the City of Ellsworth, and the towns of Waltham and Mariaville and Fletchers Landing Township in Hancock County, Maine (FIGURE A-1). The Project consists of a lower dam with a small (90 –acre) impoundment (Lake Leonard) and an upper dam with a large (10,000-acre) storage reservoir (Graham Lake). Integral to the lower dam, known as Ellsworth Dam is a powerhouse and appurtenant facilities. The powerhouse contains four (4) turbine-generator units with a total FERC-authorized capacity of 8.9 MW. A transmission line of approximately 320 feet conducts generator voltage to the Project's step-up transformers located in Emera Maine's adjacent substation (non-Project). See Exhibit A, Project Description and Exhibit F, General Design Drawings for a complete description of the Project.

7. No lands of the United States are affected by the Project.

8. This is an existing Project and no new construction is planned in association with this relicensing.

9. Black Bear Hydro Partners, LLC owns, and, as Licensee for the project, will maintain any proprietary right necessary to construct, operate, and maintain the Project.

10. The names and mailing addresses of:

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

The Project is located entirely within Hancock County.

Hancock County Government
50 State Street, Suite 7
Ellsworth, Maine 04605

There are no Federal facilities used by the Project.

(ii) *Every 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 municipalities of Ellsworth, Mariaville, and Waltham:

Ellsworth City Hall
1 City Hall Plaza
Ellsworth, Maine 04605

Mariaville Town Office
1686 Mariaville Road
Mariaville, Maine 04605

Waltham Town Office
1520 Waltham Road
Waltham, Maine 04605

The Project impoundment is also partially located in the unorganized territory of Fletchers Landing Township, which falls under the jurisdiction of the Maine Land Use Planning Commission, which was created by the Maine Legislature in 1971 and is defined as an agency which serves "as the planning and zoning authority for areas of the state that do not have the capacity to administer land use controls (principally, townships and plantations) (LURC, 2012[2])."

Maine Land Use Planning Commission
22 State House Station
Augusta, Maine 04333

[2] Land Use Regulation Commission (LURC). 2012.

(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, drainage or special purpose political subdivisions associated with 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 districts or subdivisions that are likely to be interested in or affected by the notification.

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

There are no Native American tribes affected by the Project. The following Native American tribes may have some level of interest in the region surrounding the Project and have been included in the distribution list for the Project; Aroostook Band of Micmacs, Passamaquoddy Tribe, Houlton Band of Maliseet Indians, Penobscot Indian Nation.

Chief
Penobscot Indian Nation
12 Wabanaki Way
Indian Island, ME 04468
(207) 817-7350
kfrancis@penobscotnation.org

Chris Sockalexis
THPO
Cultural and Historic Preservation Program
Natural Resources Department
Penobscot Indian Nation
12 Wabanaki Drive
Indian Island, ME o4468
chris.sockalexis@penobscotnation.org

Chief
Aroostook Band of Micmacs
8 Northern Road
Presque Isle, ME 04769
(207)764-1972

Tribal Governor
Passamaquoddy Tribe
Pleasant Point Reservation
P.O. Box 343
Route 190
Perry, ME 04667
(207) 853-2600

Donald Soctomah
Tribal Historic Preservation Officer
Passamaquoddy Tribe
Indian Township Reservation
P.O. Box 343
Route 190
Perry, ME 04667
(207) 796-2301
soctomah@ainop.com

Chief
Houlton Band of Maliseet Indians
88 Bell Road
Littleton, ME 04730
(207) 532-4273 ext. 218
tribal.chief@maliseets.com

11. The Applicant has in accordance with 18 CFR Section 5.18 (a)(3)(i) made a good faith effort to notify, by certified mail, the following entities of the filing of this application:

(i) *Every property owner of record of any interest in the property within the bounds of the project; and [to be provided in Final License Application]*

(ii) *The entities identified in paragraph (10) above, as well as other Federal, state, municipal or other local government 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. *[to be provided in Final License Application]*

12. In accordance with 18 CFR Sections 4.51 and 16.10 of the Commission's regulations, the following Exhibits are attached to and made a part of this application:

Exhibit A – Project Description

Exhibit B – Project Operation and Resource Utilization

Exhibit C – Construction History and Proposed Construction Schedule

Exhibit D – Statement of Costs and Financing

Exhibit E – Environmental Report

Exhibit F – General Design Drawings and Supporting Design Report
(CEII; filed under separate cover)

Exhibit G – Project Maps

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

SUBSCRIPTION

This Application for New License for the Ellsworth Hydroelectric Project, FERC No. 2727 is executed in the State of Maine, County of Kennebec, by C. Todd Wynn, Vice President, Black Bear Hydro Partners, LLC, 26 Katherine Drive, Hallowell, Maine 04347, 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 Black Bear Hydro Partners, LLC. The undersigned has signed this application this ________day of December, 2015.

BLACK BEAR HYDRO PARTNERS, LLC

By ________________________________
C. Todd Wynn
Vice President
Black Bear Hydro Partners, LLC

VERIFICATION

Subscribed and sworn to before me, a Notary Public of the State of Maine this ___ day of December, 2015.

____
(Notary Public)

(My Commission Expires ______________)/seal

EXHIBIT 9

EXHIBIT A

PROJECT DESCRIPTION

EXHIBIT 9

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ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT A

PROJECT DESCRIPTION

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LIST OF TABLES

LIST OF PHOTOS

EXHIBIT 9

ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT A
PROJECT DESCRIPTION

1.0 INTRODUCTION

The Ellsworth Hydroelectric Project (Project) is owned and operated by Black Bear Hydro Partners, LLC (Black Bear) and is located on the lower reach of the Union River in the City of Ellsworth, the Towns of Waltham and Mariaville, and the Township of Fletchers Landing, an unincorporated township, in Hancock County, Maine. The Project consists of two developments, the Ellsworth Development and the Graham Lake Development.

The Ellsworth Development consists of the Ellsworth Dam, which forms the 90-acre Lake Leonard, and the associated generating facilities. The Ellsworth Dam forms the upper limit of tidal influence of the Union River. The Graham Lake Development consists of a dam with a large storage reservoir (Graham Lake). There are no generating facilities at the Graham Lake Development.

The Project is operated for water storage and power generation. Operationally, the Project is typically run as a peaking facility, with water being released from the Graham Lake reservoir and then used to generate electricity at the downstream Ellsworth powerhouse. Black Bear is not proposing any changes to operations.

2.0 PROJECT DESCRIPTION

The Ellsworth Project is located in Downeast Maine on the Union River, approximately 3 miles upstream of the Union River Bay, which flows into the Atlantic Ocean. The Project includes Graham Lake, Graham Lake Dam, a 3-mile stretch of the Union River, Lake Leonard, and Ellsworth Dam and powerhouse.

2.1 Project Facilities

Ellsworth Development

Construction of the Ellsworth Dam was completed in 1907. The Ellsworth Dam is an Ambursen-style dam that was filled in part with concrete in the early 1990s. The non-overflow section includes a gatehouse; turbine-generator Unit No. 1 is served by a 10-foot diameter vertical penstock contained in the gatehouse. The non-overflow section is connected to an intake structure containing three additional penstocks: two 8-foot diameter penstocks serving turbine-generator Units No. 2 and 3, and one 12-foot diameter penstock serving turbine-generator Unit No. 4. The four units contained in the Ellsworth powerhouse have a total FERC-authorized capacity of 8.9 megawatts (MW) and an average annual generation of 30,333,000 megawatt hours (MWh).

Graham Lake Development

The Graham Lake Dam was completed in 1924. Graham Lake Dam is a non-generating facility located about four miles upstream from the Ellsworth Dam. Graham Lake Dam consists of an earthen dike and concrete gate structure. There is a flood control structure immediately downstream of Graham Lake Dam. No powerhouse is associated with the Graham Lake Dam and reservoir. A summary of Project structures and features associated with the Ellsworth Project is provided in Table A-1.

Table A-1: Ellsworth Project Specifications

GENERAL INFORMATION
Owner and Operator: Black Bear Hydro Partners, LLC
FERC Project Number: 2727
Current License Term: January 1, 1998 to December 27, 2017
County: Hancock County
Nearest Town: Ellsworth, Maine
Watershed: Union River
River: Union River
Drainage Area: 547 square miles at the Ellsworth Dam

Ellsworth Development	**Graham Lake Development**
Normal Maximum Water Surface Elevation (msl)	
Lake Leonard	**Graham Lake**
66.7' (includes 1.7 foot flashboards)	104.2'
Normal Tailwater Elevation	
Varies with tidal fluctuations	80.5'
Reservoir Length	
1 mile	10 miles
Shoreline Length	
4.4 miles	80 miles (not including islands)
Surface Area at Maximum Water Surface	
Lake Leonard	**Graham Lake**
90 acres	Approximately 10,000 acres
Gross Storage Lake Leonard 0.107 billion cubic feet	Useable Storage Graham Lake – 5.4 billion cubic feet between elevations 104.2' and 93.4'
Structures	
Ellsworth Dam	**Graham Lake Dam**
Concrete buttress dam	Earth fill dam with concrete core walls
Total Length 377 feet	Total Length 750 feet
Penstock: 10-foot diameter vertical penstock serving Unit 1; two 8-foot diameter penstocks serving powerhouse Units No. 2 and 3, and a 12-foot diameter penstock serving Unit No. 4	N/A
Dam height 65 feet	Dam height 30 feet
Powerhouse: reinforced concrete and concrete block masonry structure 52.5 feet x 68 feet with an attached 15 feet x 30 feet switch house annex	N/A
Turbine Rated Capacity:* Unit 1 – 3,800 hp (2,850kW) (vertical shaft propeller) Unit 2 – 2,900 hp (2,175 kW) (Kaplan) Unit 3 – 2,900 hp (2,175 kW) (Kaplan) Unit 4 – 3,800 hp (2,850 kW) (vertical shaft propeller)	N/A
Generator Rated Capacity:** Unit 1 – 3,125 kVA @ power factor 0.8; 2,500 kW Unit 2 – 2,500 kVA @ power factor 0.8; 2,000 kW Unit 3 – 2,500 kVA @ power factor 0.8; 2,000 kW Unit 4 – 3,000 kVA @ power factor 0.8; 2,400 kW	N/A

*The total combined maximum hydraulic capacity of the turbines is estimated to be 2,460 cfs.

**The total FERC authorized capacity of the facility, based on the limiting unit components, is 8.9MW.

2.1.1 Dams

Ellsworth Development

The Ellsworth Dam is a concrete structure 65-feet high and 377 feet long including a 275-foot spillway. The overflow spillway and non-overflow section are comprised of a reinforced concrete buttress dam with 22 bays. These were partially filled in 1993 to create a concrete gravity dam. The overflow spillway has a flashboard crest elevation of 66.7'. A fish passage facility consisting of a vertical slot fishway and trap is operated at the Ellsworth Dam providing for upstream fish passage and the commercial harvest of river herring by the City of Ellsworth under a cooperative management agreement with the Maine Department of Marine Resources.

Photo A-1: Ellsworth Dam Spillway with Associated Powerhouse

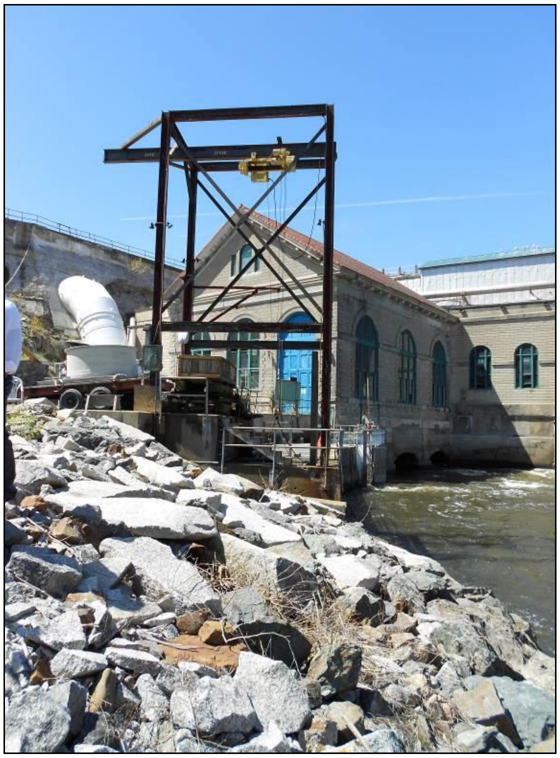

Photo A-2: Ellsworth Dam Powerhouse and Fish Lift

Photo A-3: Ellsworth Dam Facility with Lake Leonard

Graham Lake Development

The Graham Lake Dam is 30 feet high and consists of 670-foot-long earth dike and an 80-foot-long concrete gate structure plus abutments. The concrete gate structure contains three 20-foot-wide radial gates and an eight-foot wide sluice that is used for downstream fish passage. There is a concrete flood control structure associated with the Graham Lake Dam. The flood control structure consists of a concrete flood wall approximately 720 feet long, a 65-foot diameter steel cell (formerly part of the construction coffer dam) and a 71-foot-long wing wall extension that connects to the gate structure and serves as an emergency overflow spillway.

Photo A-4: Graham Lake Dam Gate Structure

Photo A-5: Graham Lake Dam Flood Control Structure

2.1.2 Impoundments

The Ellsworth Project has a drainage area of approximately 547 square miles at the Ellsworth Dam. The lake impounded by the Ellsworth Dam, Lake Leonard, has a surface area of 90 acres at its normal maximum elevation of 66.7'msl and a reservoir length of one mile. Normal water levels in Lake Leonard vary between 65.7' and 66.7' over the course of the year. The upper reservoir, Graham Lake, has a normal maximum surface area of approximately 10,000 acres and a maximum length of approximately 10 miles. Annual water levels in Graham Lake are typically managed between elevations 93.4' and 104.2'. Drawdown of Graham Lake in the summer/fall and more extensively at the beginning of the year provides significant downstream flood control benefits. The ability to store a large water volume when the lake is drawn down is a particularly valuable asset given the location of downtown Ellsworth just below the Ellsworth Dam. Drawdown of Graham Lake also can provide important flow augmentation during dry periods so that minimum flows can be maintained in the Union River below Graham Lake Dam.

2.1.3 Transmission

A transmission line of approximately 320 feet conducts generator voltage to the Project step-up transformers located in the adjacent non-Project substation owned by the local utility.

2.1.4 Appurtenant Equipment

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

3.0 LANDS OF THE UNITED STATES

There are no federal lands within the Project boundary.

EXHIBIT 9

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EXHIBIT 9

EXHIBIT B

PROJECT OPERATION AND RESOURCE UTILIZATION

EXHIBIT 9

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EXHIBIT 9

ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT B
PROJECT OPERATION AND RESOURCE UTILIZATION

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EXHIBIT 9

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ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT B
PROJECT OPERATION AND RESOURCE UTILIZATION

1.0 PROJECT OPERATION

The Ellsworth Hydroelectric Project (Project or Ellsworth Project) consists of a lower dam with a small impoundment (Leonard Lake) and an upper dam with a large storage reservoir (Graham Lake) separated by a 3-mile stretch of the Union River. The FERC-authorized nameplate rated capacity of the Ellsworth Project is 8.9 MW. The Project generated an average of 30,333,000 kWh per year for the period 1994-2014. The rated dependable capacity for ISO-New England is 9.050 MW, based on the ISO-NE Winter Claimed Capacity as of April 1, 2006.

1.1 Existing Operating Mode

1.1.1 Normal Operations

The Ellsworth Project is operated automatically via a Programmable Logic Controller (PLC) system. This system monitors and controls project operations including headpond levels at each development. The Project is monitored by Black Bear on a 24-hour basis and is typically visited at least 3-5 times each week by a roving operator. Daily logs of elevation and flow data, as well as any outages are maintained for the Project.

The project is comprised of two developments on the Union River: Ellsworth Dam and Graham Lake Dam. Ellsworth Dam operates in a run-of-river mode automatically via pond level control; Graham Lake Dam provides storage and has no power facilities. Timed releases at Graham Lake are used at Ellsworth Dam for power production and may result in minor (up to approximately 1 foot) surface elevation changes in Lake Leonard. The Union River has an average annual flow of 550 cubic feet per second (cfs). As part of the current license requirements the Licensee is required to release a continuous minimum flow of 105 cfs from the Ellsworth Dam and the Graham Lake Dam from July 1 through April 30 and 250 cfs from May 1 through June 30 (FERC 1987b). Black Bear is proposing no changes to the current minimum flow requirements. The ability to store and release water at Graham Lake allows the Ellsworth plant to operate in a peaking mode during periods of variable inflow or high electric demand.

1.1.2 Adverse and High Water Condition Operations

Low Flow

Under the current license the Ellsworth Project is required to release a continuous minimum flow of 105 cfs from July 1 through April 30 and 250 cfs from May 1 through June 30. The minimum flow requirements from the Project dams have been developed to maintain fish habitat, to facilitate fish migration, and to protect downstream water quality. Minimum flows can be temporarily modified if required by operating emergencies beyond control of Black Bear, and for short periods upon agreement among Black Bear, the United States Fish and Wildlife Service (USFWS) and the Maine Department of Environmental Protection (MDEP). Drawdown of Graham Lake provides important flow augmentation during dry inflow periods so that minimum flows can be maintained in the Union River below Graham Lake Dam. This capacity benefits both water quality and aquatic habitat and organisms in the river.

High Flow

The Ellsworth Project is normally operated as a peaking plant, with water being released from the Graham Lake reservoir and then used to generate electricity at the downstream Ellsworth powerhouse. During periods of high inflows, primarily in the spring and fall, the project may generate at full load up to 24 hours a day.

The ability to store large volumes of inflow in the spring is also valuable given the location of downtown Ellsworth just below the Ellsworth Dam. In a potential flood situation, Black Bear dam operators work in concert with emergency management personnel to manage water levels along the Union River in order to minimize risk and flood damage.

1.1.3 Annual Plant Factor

The nameplate rated capacity of the Ellsworth Project is 8.9 MW. The Ellsworth Dam generates an average annual energy output of 30,333,000 kWh at a plant factor of 39 percent.

1.2 Proposed Operating Mode

Black Bear proposes to continue the current licensed mode of operation.

2.0 DEPENDABLE CAPACITY AND AVERAGE ANNUAL ENERGY PRODUCTION

The rated dependable capacity for ISO-New England is 9.050 MW, based on the ISO-NE Winter Claimed Capacity as of April 1, 2006. The ISO- NE determines the monthly capacity values for the developments. The values are called “seasonal claim capacity” (SCC) and are divided in to the summer (June 1 through September 30) and winter (October 1 through May 31) periods. The current claimed values are presented in Table B-1.

Table B-1: Seasonal Claimed Capacity Values at Ellsworth Dam

Summer SCC (MW)	Winter SCC (MW)
9.044	9.050

2.1 Summary of Project Generation Records

The Ellsworth Project generated an average annual energy output of 30,333,000 kWh at a plant factor of 39 percent for the period 1994-2014. Table B-2 shows historical monthly generation at the Project for the period January 1994 through December 2014.

Table B-2: Summary of Project Generation 1994 to 2014

ELLSWORTH HYDRO GENERATION - 1994 TO 2014 (MWh)													
YEAR	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**TOTAL**
1994	4,022	4,064	4,521	5,031	3,370	1,730	644	649	519	757	585	1,744	27,636
1995	2,941	3,517	4,870	1,733	3,252	2,193	134	447	465	538	4,295	3,601	27,986
1996	2,737	4,836	3,275	4,876	5,095	2,261	4,321	2,257	1,775	1,092	834	4,258	37,617
1997	4,768	2,464	2,364	3,549	5,051	2,033	2,100	999	811	707	626	845	26,317
1998	1,156	4,035	5,576	2,863	2,091	2,206	2,976	968	442	1,186	647	480	24,626
1999	2,984	4,697	6,011	4,083	1,358	1,072	516	347	981	2,626	2,646	4,398	31,719
2000	3,702	2,839	4,891	5,412	3,342	1,838	710	1,037	981	1,125	563	986	27,426
2001	1,644	2,177	1,776	2,525	1,613	1,049	511	600	496	500	281	203	13,375
2002	237	604	4,737	5,555	3,036	1,301	1,343	918	577	417	1,548	3,993	24,266
2003	3,873	1,443	3,342	5,215	3,093	2,256	440	554	1,488	2,193	6,050	5,616	35,563
2004	3,380	948	2,130	2,350	2,618	1,440	679	1,917	2,025	768	654	3,145	22,054
2005	4,070	1,538	4,306	5,058	6,175	3,604	1,304	1,275	607	4,550	4,241	4,171	40,899
2006	5,324	4,992	1,678	1,059	3,510	4,330	680	0	0	2,761	4,120	4,000	32,454
2007	4,202	1,426	3,841	5,397	3,169	2,177	664	735	0	215	2,991	3,270	28,087
2008	4,161	4,597	6,335	4,856	2,921	1,290	1,011	2,296	2,614	3,959	2,880	6,436	43,356
2009	2,949	2,888	2,775	5,540	2,322	3,680	3,771	1,084	1,175	2,892	4,235	3,364	36,675
2010	3,326	4,127	3,261	3,303	1,483	1,284	1,040	1,121	619	736	4,893	5,225	30,418
2011	2,638	2,979	4,903	4,805	3,820	1,091	858	1,826	1,724	2,116	1,680	3,034	31,474
2012	2,958	1,144	1,550	2,563	4,976	2,736	1,356	696	1,803	3,621	4,421	1,805	29,629
2013	2,864	3,405	3,451	2,247	2,376	3,300	1,928	1,887	4,422	1,305	625	1,908	29,718
2014	5,341	3,481	2,486	5,141	2,802	2,642	2,961	1,881	857	676	2,418	5,021	35,707
Average	3,299	2,962	3,718	3,960	3,213	2,167	1,426	1,119	1,161	1,654	2,440	3,214	30,333

2.2 Flow Data

Flow statistics for the Project area were calculated from generation data for Ellsworth Dam collected at the facility, as there is no USGS Gage associated with the project area. Flow duration curves were estimated from 2001-2012 generation data plus fish passage weir flows. Table B-3 provides the monthly minimum, average and maximum out flows from Ellsworth Dam while the facility was in operation. Annual and monthly outflow duration curves for the Project are presented in Appendix B-1 of this Exhibit.

Table B-3: Annual and Monthly Maximum, Average and Minimum Flow (cfs) for the Ellsworth Dam

Ellsworth Dam Monthly Minimum, Average, and Maximum Flows - 1994-2014 (cfs)												
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Maximum	1984	2053	2353	2132	2294	1662	1605	853	1698	1690	2323	2391
Average	1226	1209	1381	1520	1194	832	530	436	493	615	937	1161
Minimum	88	248	576	407	504	403	50	129	170	80	108	76

Table B-4: Monthly Average River Flow 1994-2014 for Ellsworth Dam

CALCULATED DAILY RIVER FLOW - 1994-2014 (cfs)												
YEAR	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
1994	1494	1672	1680	1931	1252	664	239	241	199	281	225	648
1995	1093	1447	1809	665	1208	842	50	166	179	200	1649	1338
1996	1017	1921	1217	1872	1893	868	1605	838	681	406	320	1582
1997	1771	1013	878	1363	1876	781	780	371	311	263	240	314
1998	430	1660	2072	1099	777	847	1105	359	170	441	248	178
1999	1109	1932	2233	1568	504	412	192	129	3767	976	1016	1634
2000	1376	1127	1817	2078	1242	706	264	385	377	418	216	366
2001	611	896	660	969	599	403	190	223	191	186	108	76
2002	88	248	1760	2132	1128	500	499	341	221	155	594	1483
2003	1439	594	1241	2002	1149	866	163	206	571	815	2323	2086
2004	1256	376	791	902	973	553	252	712	777	285	251	1168
2005	1512	633	15100	1942	2294	1384	485	474	233	1690	1628	1550
2006	1978	2053	623	407	1304	1662	253	0.0	0.0	1026	1582	1486
2007	1561	587	1427	2072	1177	836	247	273	0.0	80	1148	1215
2008	1546	1826	2353	1864	1085	495	376	853	1003	1471	1106	2391
2009	1096	1188	1031	2127	863	1417	1401	403	451	1074	1626	1250
2010	1236	1697	1211	1268	551	493	386	416	238	273	1878	1941
2011	980	1226	1822	1845	1419	419	319	678	662	786	645	1127
2012	1099	454	576	984	1849	1050	504	259	692	1345	1697	671
2013	1064	1400	1282	863	883	1267	716	701	1698	485	240	709
2014	1984	1432	924	1973	1041	1014	1100	699	329	251	928	1865

Installed generator capacity: 8.9 MW
Installed Hydraulic capacity: 2460 CFS
kW/CFS = 3.618

2.3 Project Storage

The usable storage capacity of Graham Lake is 5.4 billion cubic-feet.

2.4 Hydraulic Capacity of the Project

The Ellsworth turbine units have a combined estimated maximum hydraulic capacity of 2,460 cfs.

The Graham Lake Dam contains no generating equipment.

2.5 Tailwater Rating Curve

Tailwater rating curves for the Ellsworth Dam are provided in Appendix B-2 of this Exhibit.

2.6 Power Plant Capability versus Head

Capacity versus head curves are provided in Appendix B-3 of this Exhibit.

3.0 UTILIZATION OF POWER PROJECT

The primary purpose of the Project is to supply power to the New England ISO, a Regional Transmission Organization. The New England ISO serves Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

Black Bear sells the power produced at the Project to the New England ISO-administered energy markets.

4.0 PLANS FOR FUTURE DEVELOPMENT

Black Bear has not proposed any new generating development as part of the application for a new license.

EXHIBIT 9

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APPENDIX B-1

ANNUAL and MONTHLY FLOW DURATION CURVES

EXHIBIT 9

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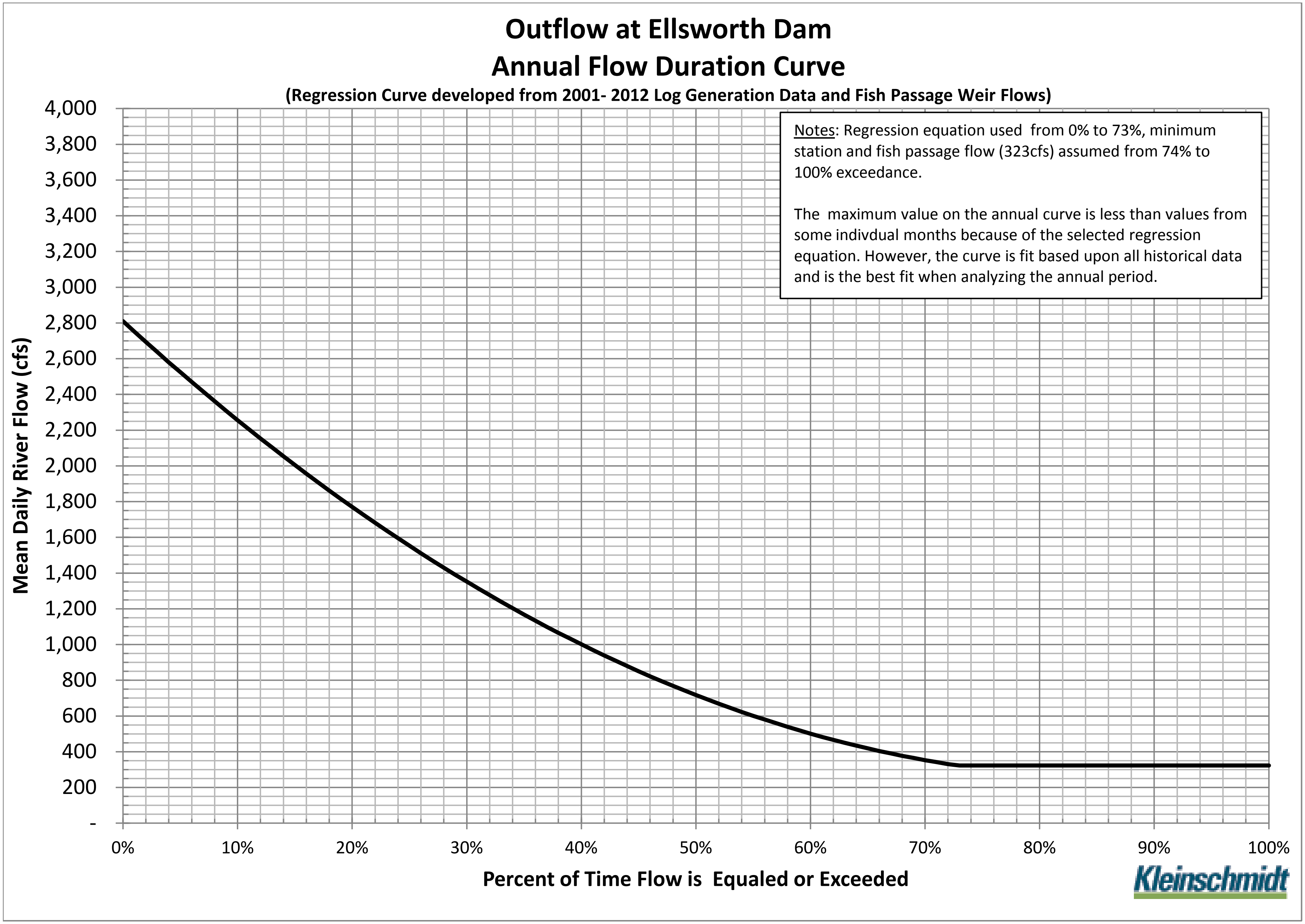
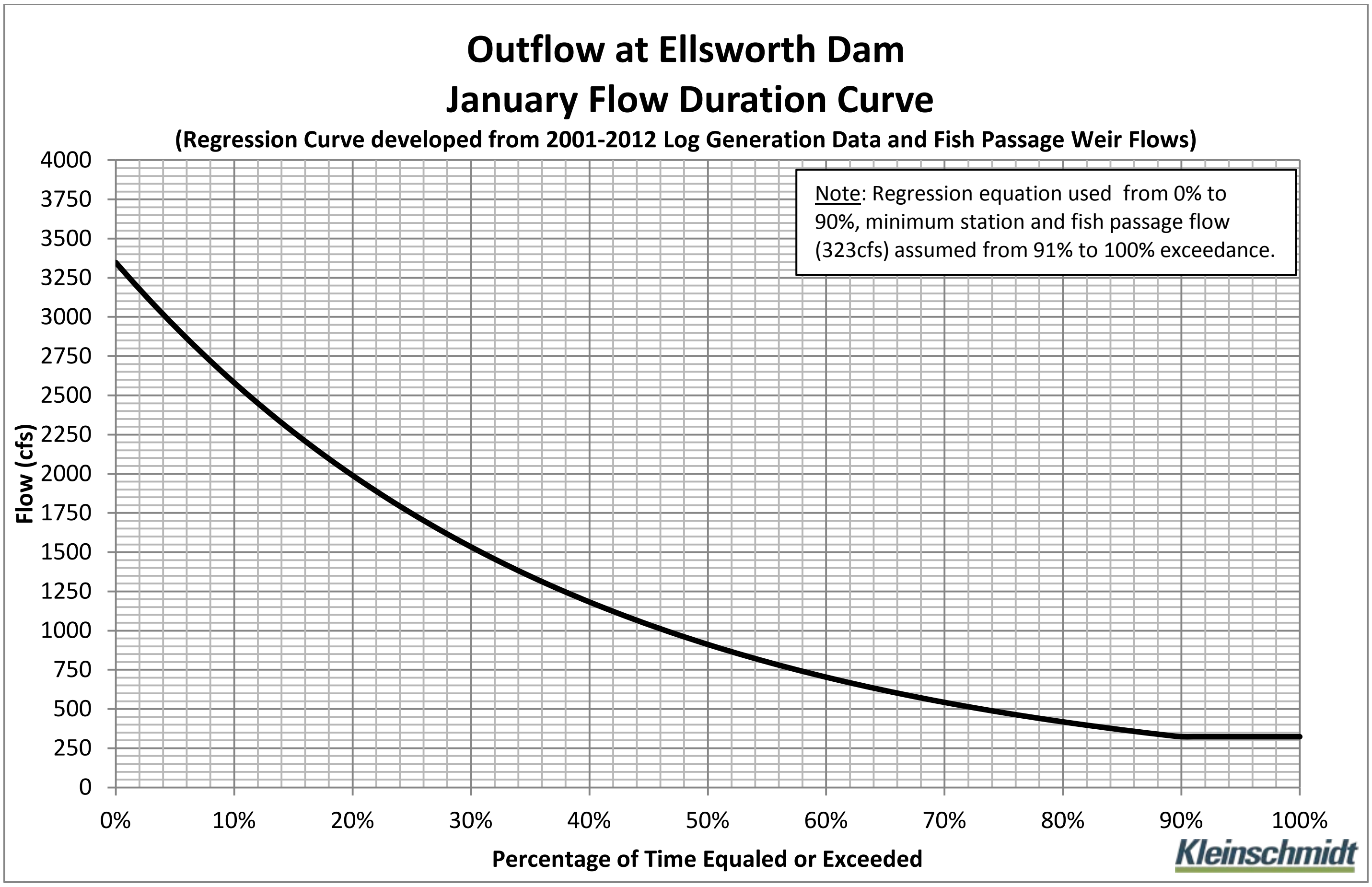
EXHIBIT 9

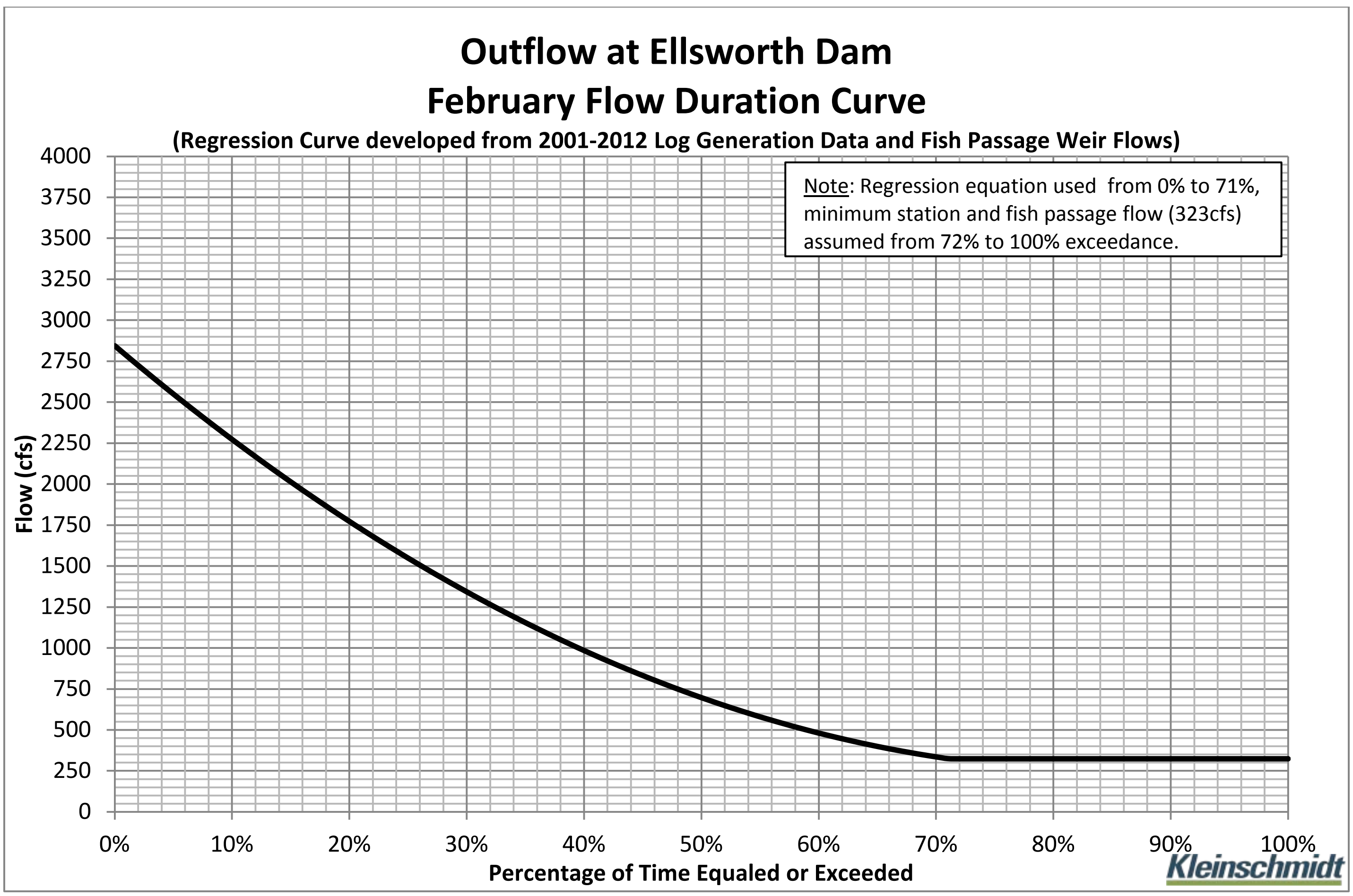


Outflow at Ellsworth Dam
Annual Flow Duration Curve
(Regression Curve developed from 2001- 2012 Log Generation Data and Fish Passage Weir Flows)
Notes: Regression equation used from 0% to 73%, minimum station and fish passage flow (323cfs) assumed from 74% to 100% exceedance.
The maximum value on the annual curve is less than values from some indivdual months because of the selected regression equation. However, the curve is fit based upon all historical data and is the best fit when analyzing the annual period.
Mean Daily River Flow (cfs)
4,000
3,800
3,600
3,400
3,200
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
-
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Flow is Equaled or Exceeded
Kleinschmidt

EXHIBIT 9

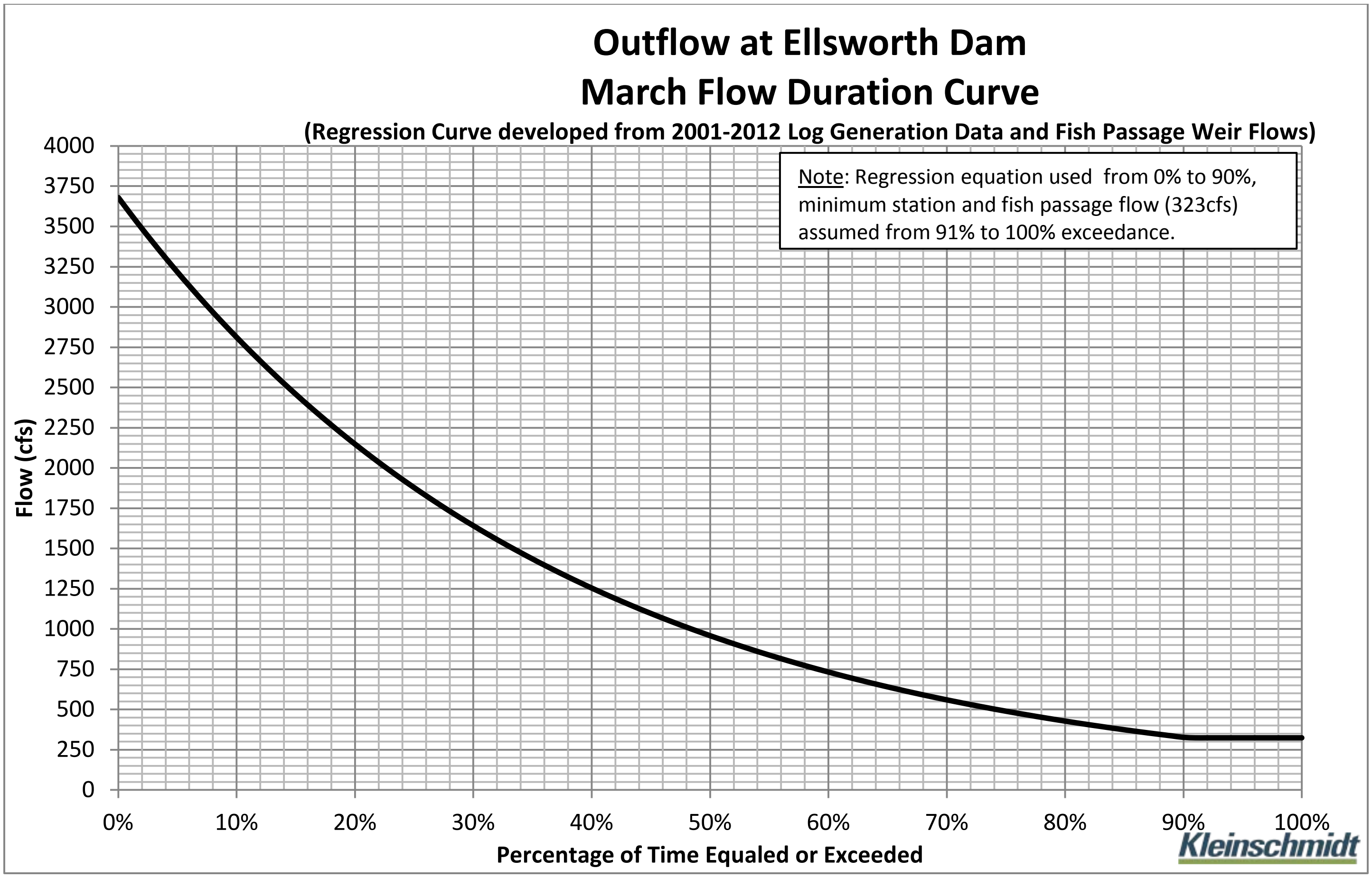


Outflow at Ellsworth Dam
January Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 90%, minimum station and fish passage flow (323cfs) assumed from 91% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage of Time Equaled or Exceeded
Kleinschmidt

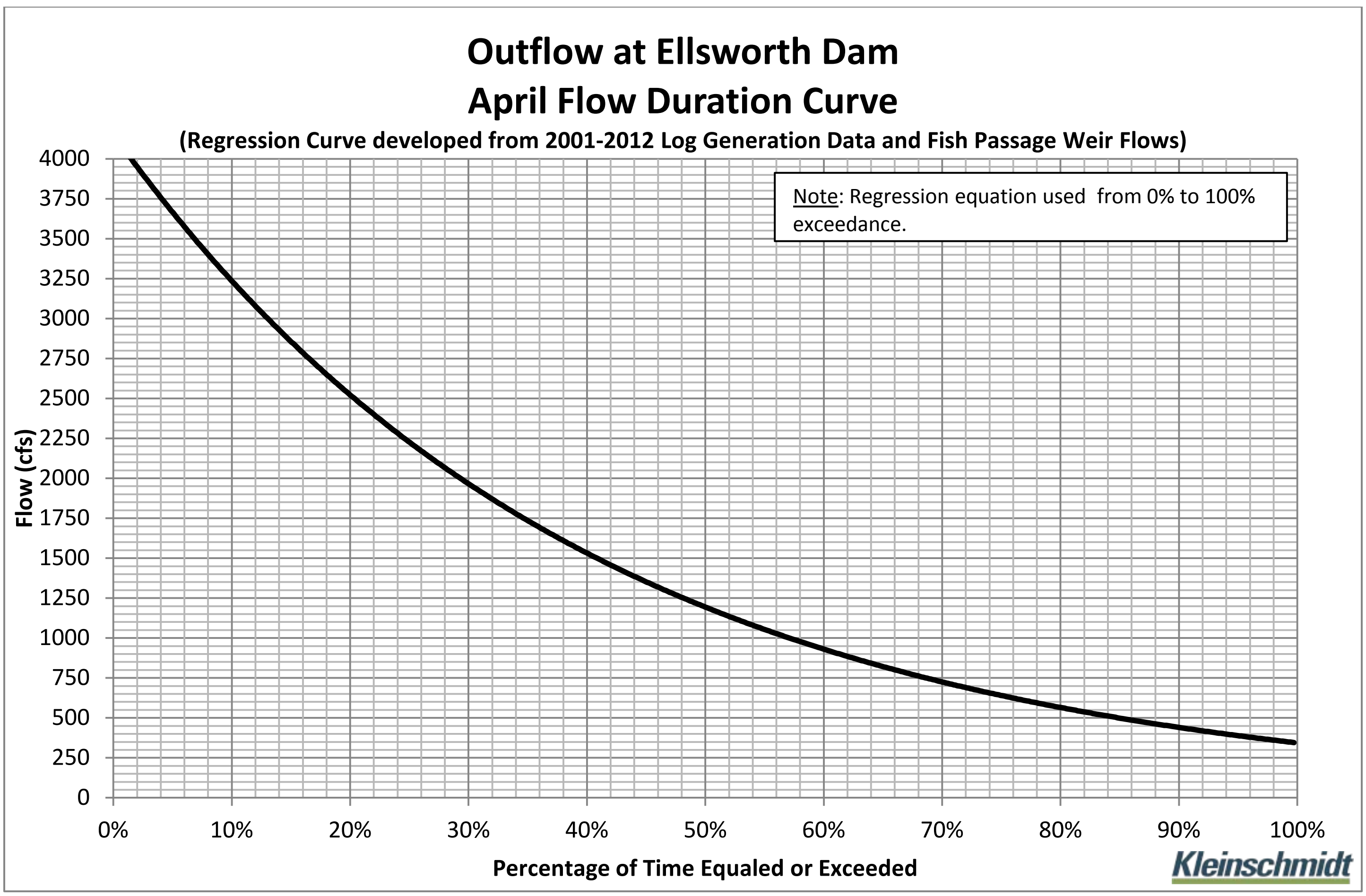


Outflow at Ellsworth Dam
February Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 71%, minimum station and fish passage flow (323cfs) assumed from 72% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage of Time Equaled or Exceeded
Kleinschmidt

EXHIBIT 9

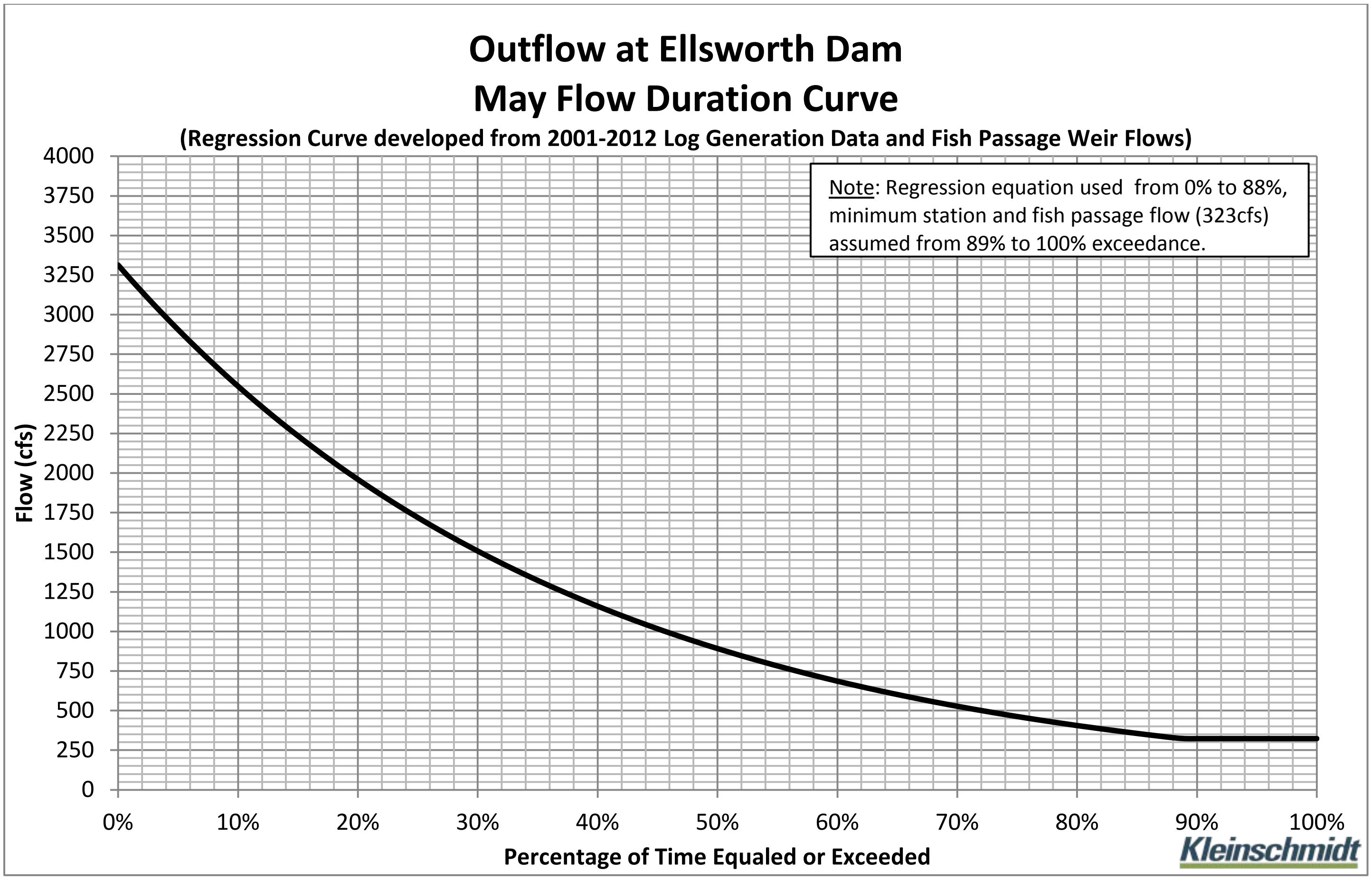


Outflow at Ellsworth Dam
March Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 90%, minimum station and fish passage flow (323cfs) assumed from 91% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage of Time Equaled or Exceeded
Kleinschmidt

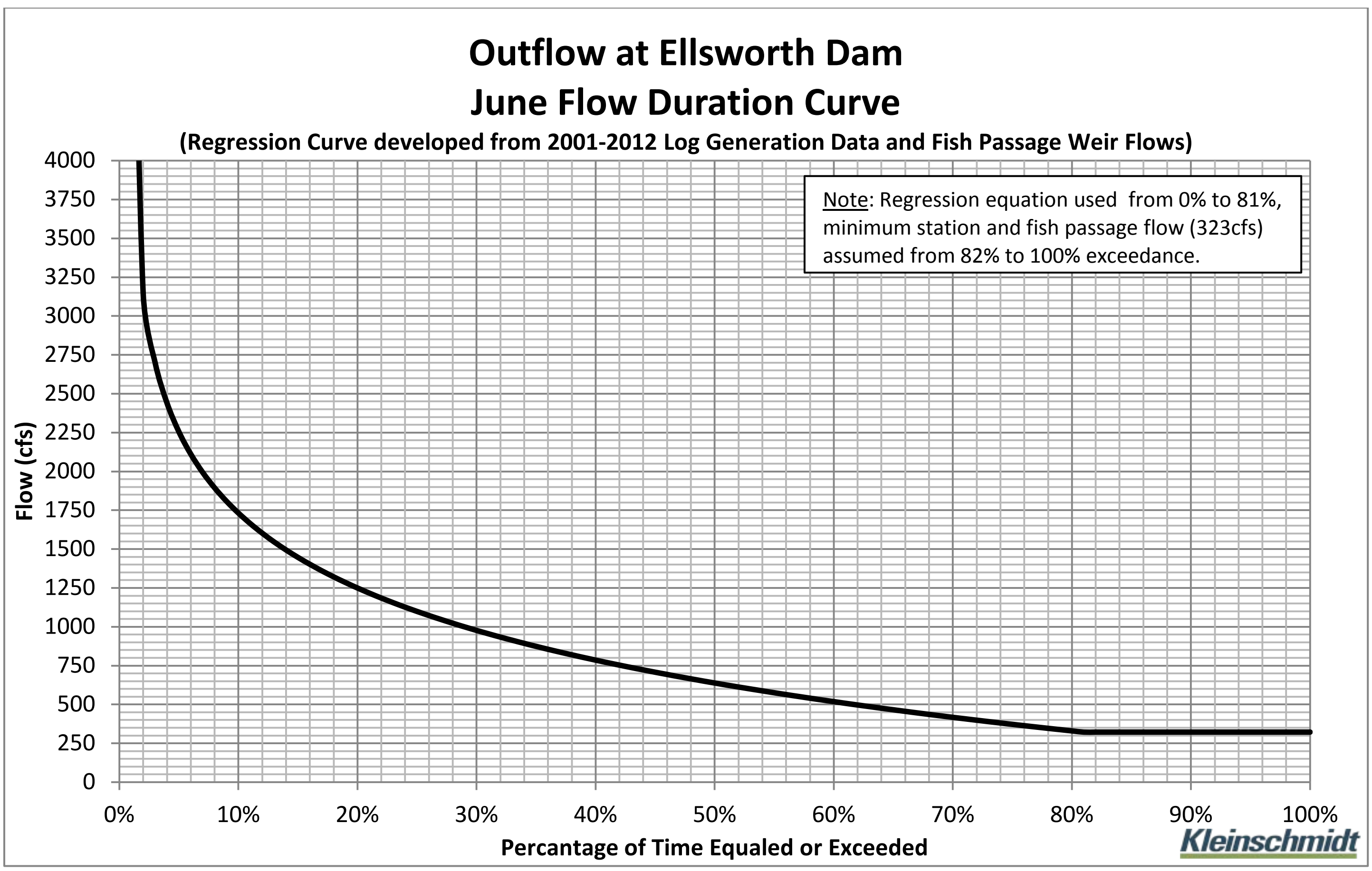


Outflow at Ellsworth Dam
April Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage of Time Equaled or Exceeded
Kleinschmidt

EXHIBIT 9

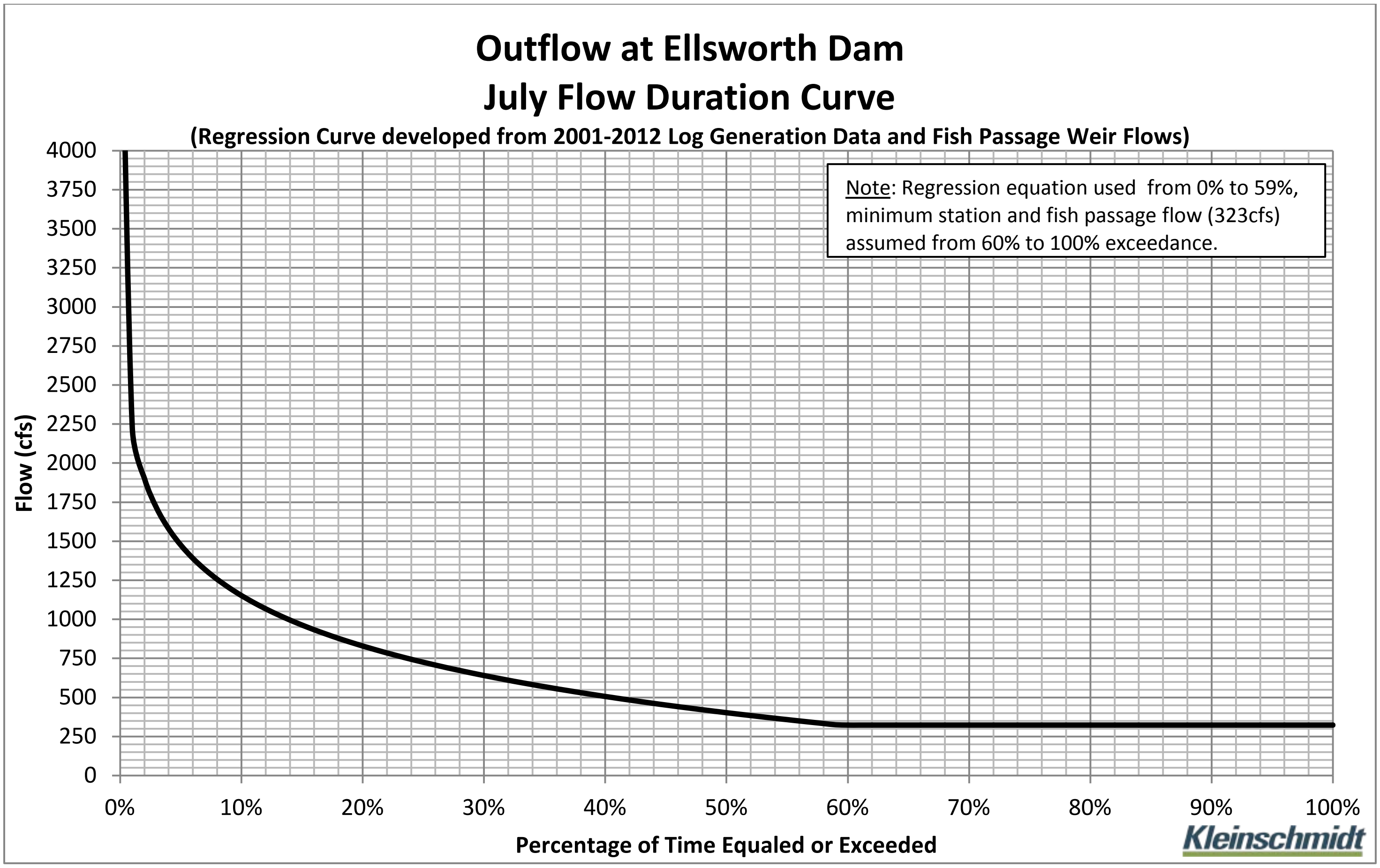


Outflow at Ellsworth Dam
May Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 88%, minimum station and fish passage flow (323cfs) assumed from 89% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage of Time Equaled or Exceeded
Kleinschmidt

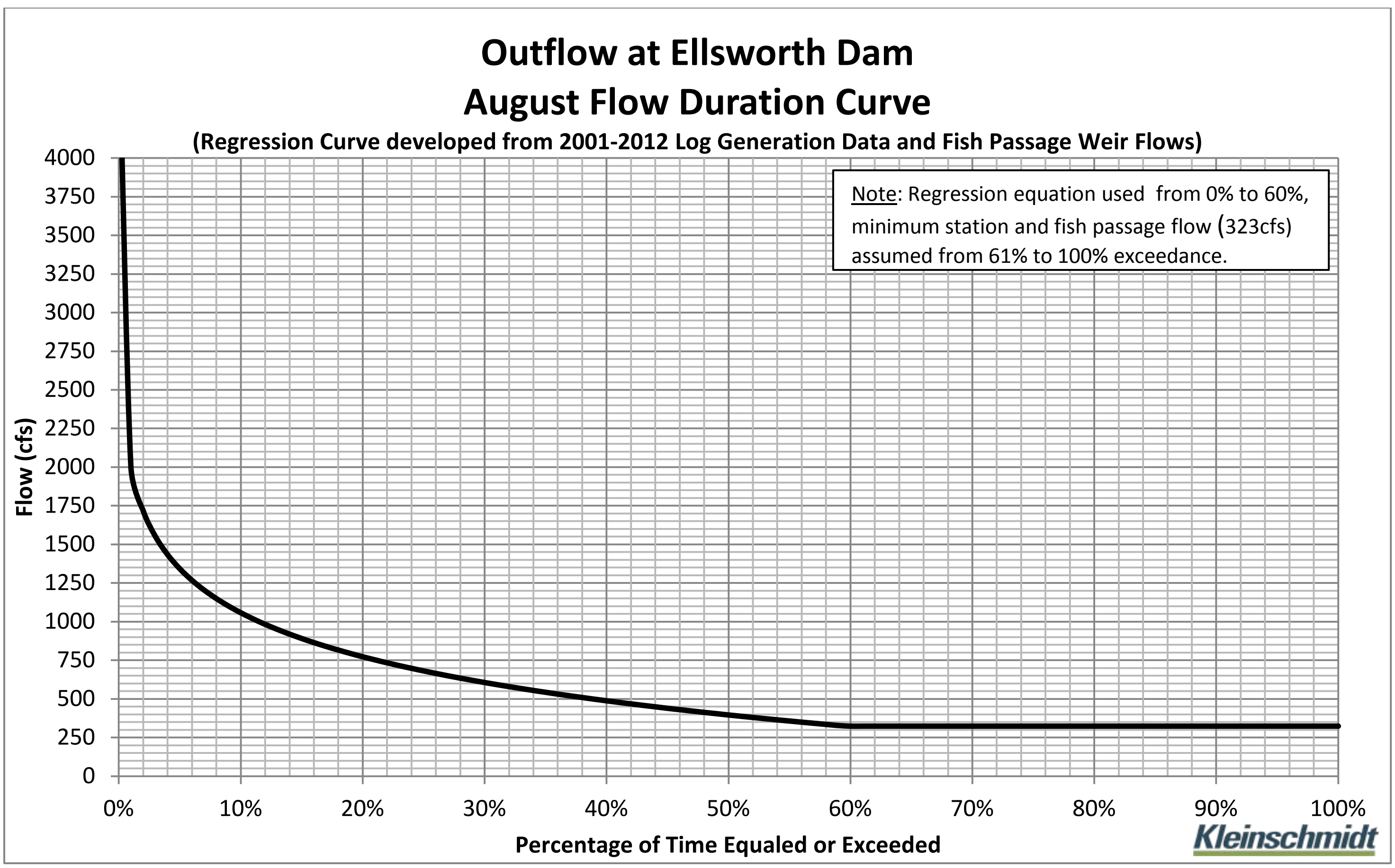


Outflow at Ellsworth Dam
June Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 81%, minimum station and fish passage flow (323cfs) assumed from 82% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percantage of Time Equaled or Exceeded
Kleinschmidt

EXHIBIT 9

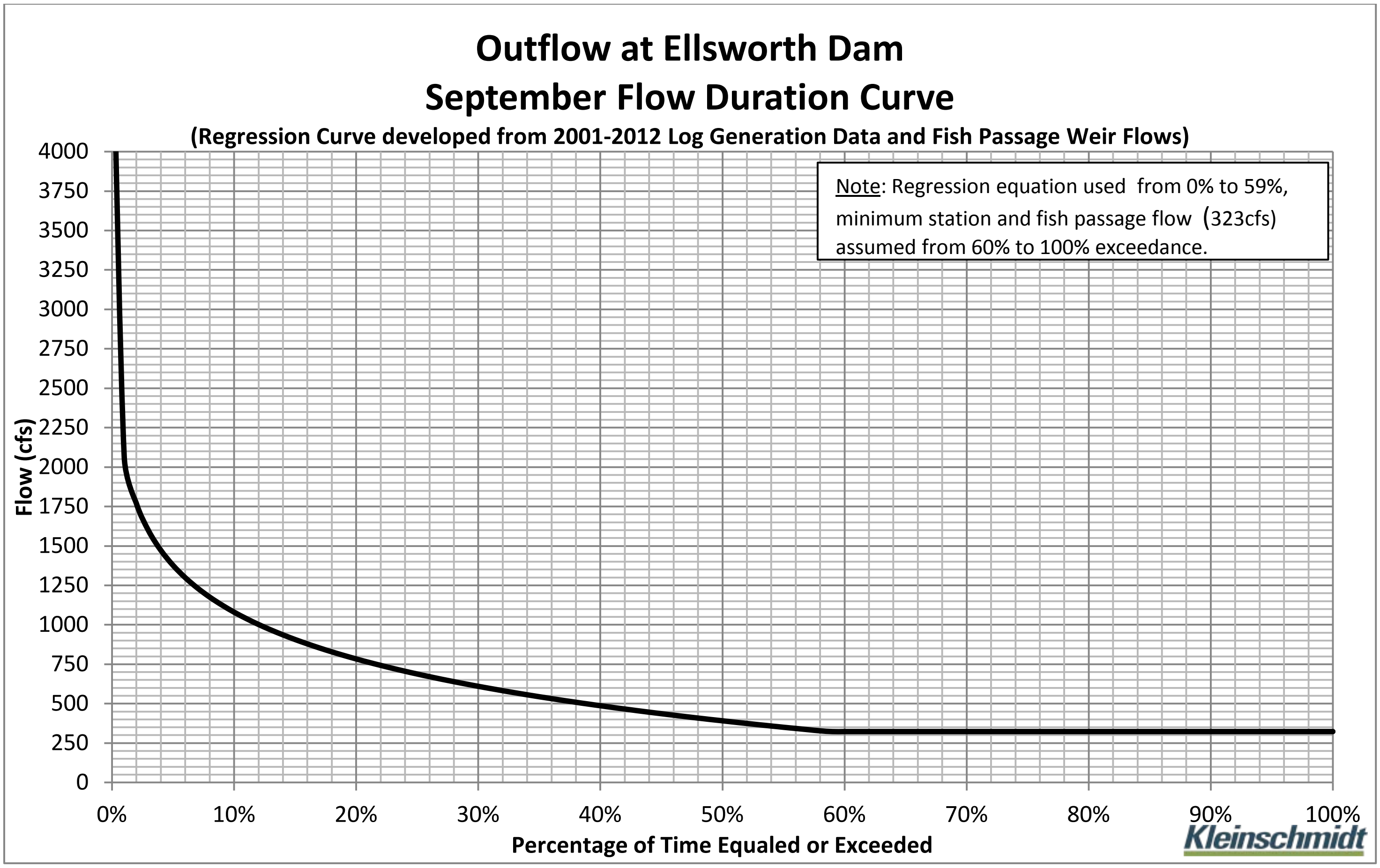


Outflow at Ellsworth Dam
July Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 59%, minimum station and fish passage flow (323cfs) assumed from 60% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage of Time Equaled or Exceeded
Kleinschmidt

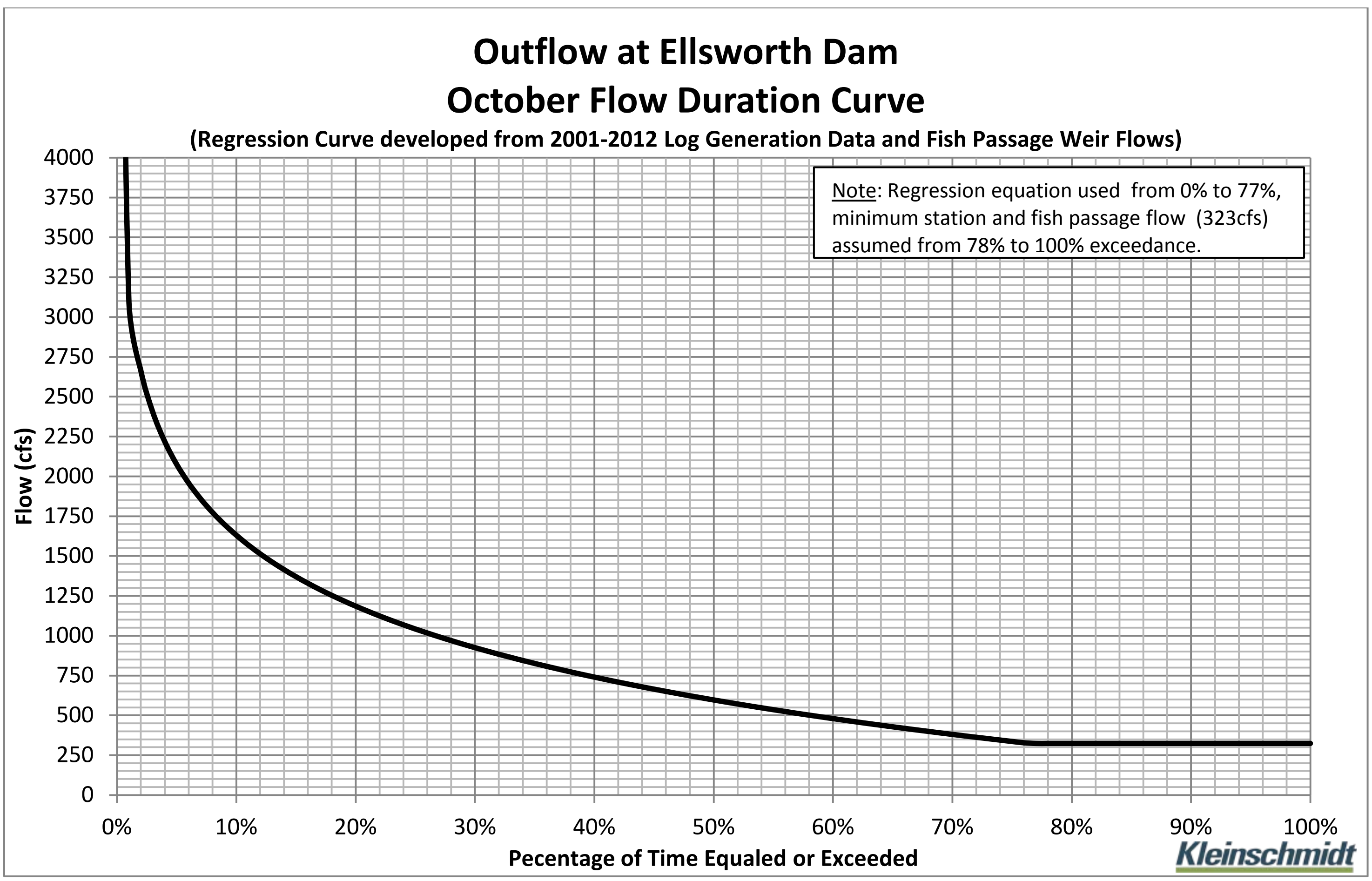


Outflow at Ellsworth Dam
August Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 60%, minimum station and fish passage flow (323cfs) assumed from 61% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage of Time Equaled or Exceeded
Kleinschmidt

EXHIBIT 9

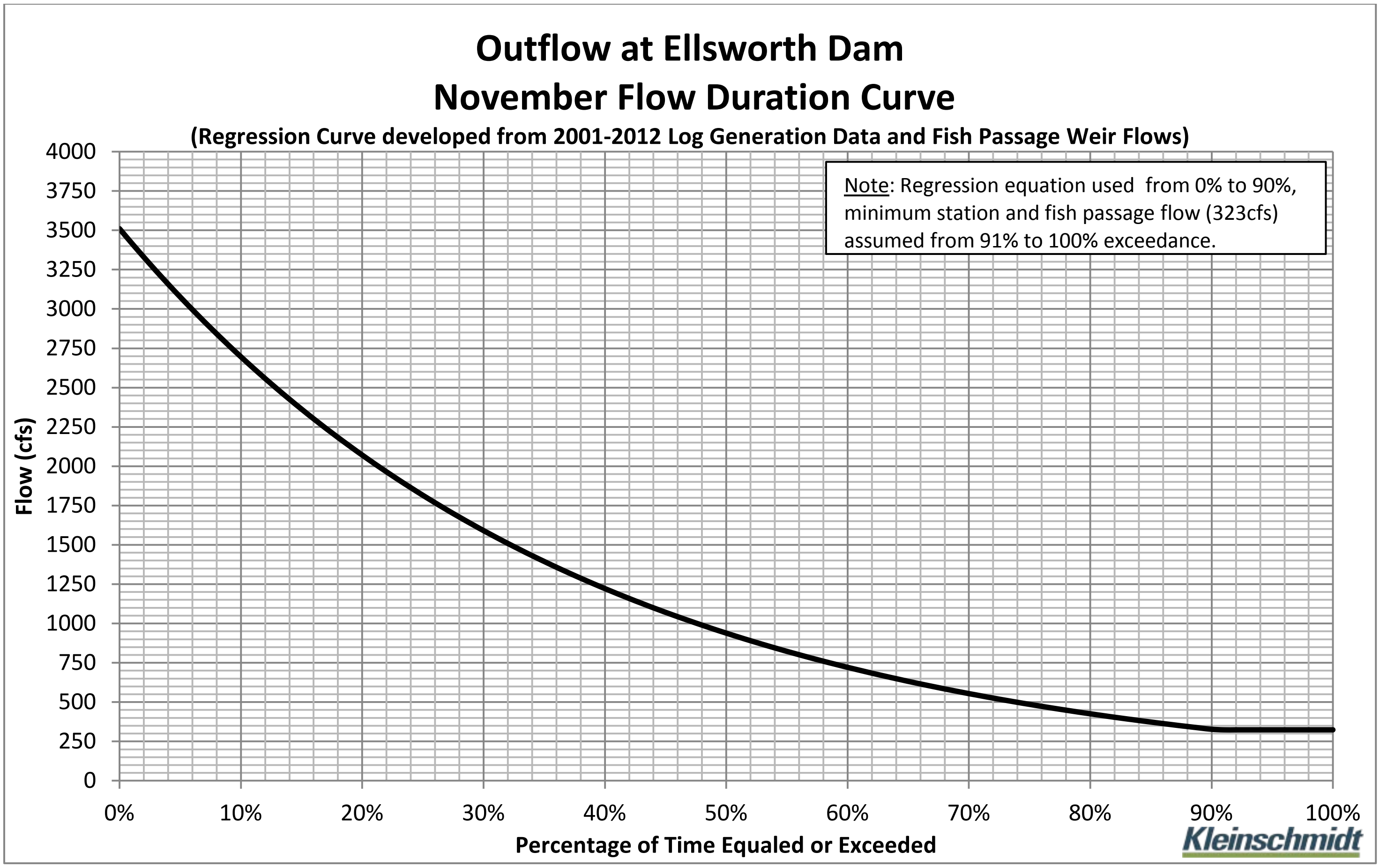


Outflow at Ellsworth Dam
September Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 59%, minimum station and fish passage flow (323cfs) assumed from 60% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage of Time Equaled or Exceeded
Kleinschmidt



Outflow at Ellsworth Dam
October Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 77%, minimum station and fish passage flow (323cfs) assumed from 78% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Pecentage of Time Equaled or Exceeded
Kleinschmidt

EXHIBIT 9


Outflow at Ellsworth Dam
November Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 90%, minimum station and fish passage flow (323cfs) assumed from 91% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage of Time Equaled or Exceeded
Kleinschmidt

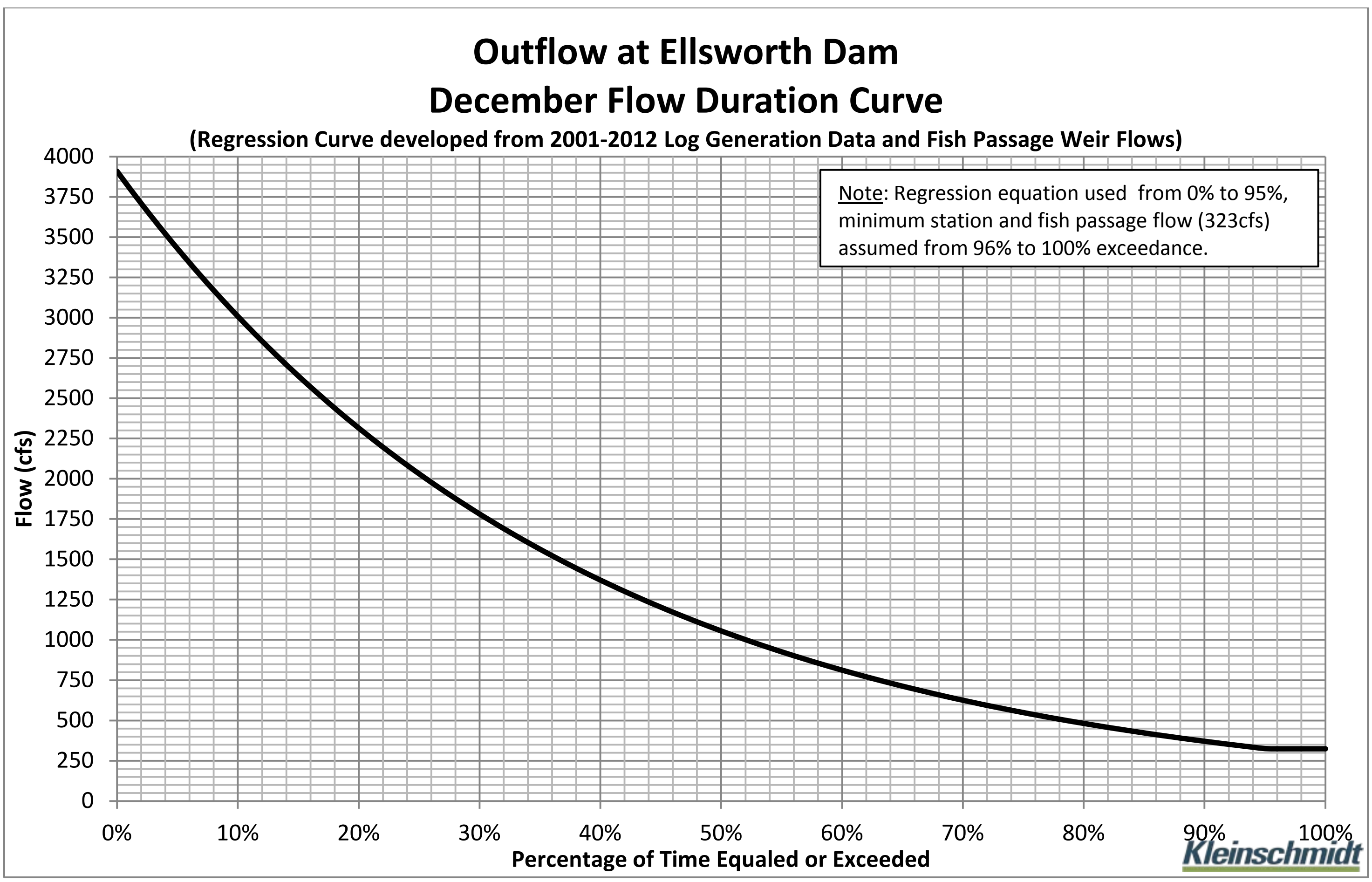

Outflow at Ellsworth Dam
December Flow Duration Curve
(Regression Curve developed from 2001-2012 Log Generation Data and Fish Passage Weir Flows)
Note: Regression equation used from 0% to 95%, minimum station and fish passage flow (323cfs) assumed from 96% to 100% exceedance.
Flow (cfs)
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage of Time Equaled or Exceeded
Kleinschmidt

EXHIBIT 9

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APPENDIX B-2

TAILWATER RATING CURVES

EXHIBIT 9

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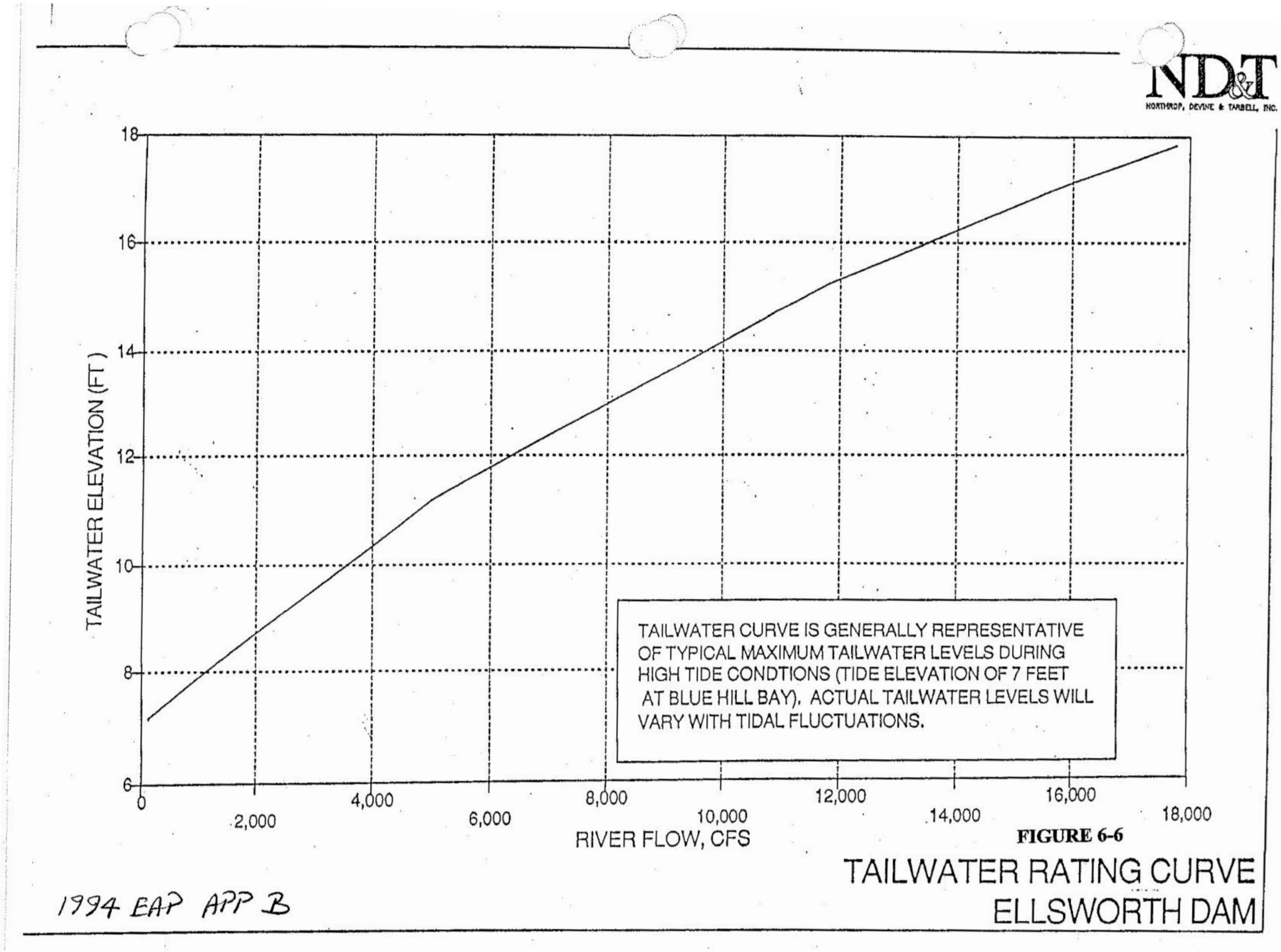

FIGURE 6-6

TAILWATER RATING CURVE
ELLSWORTH DAM

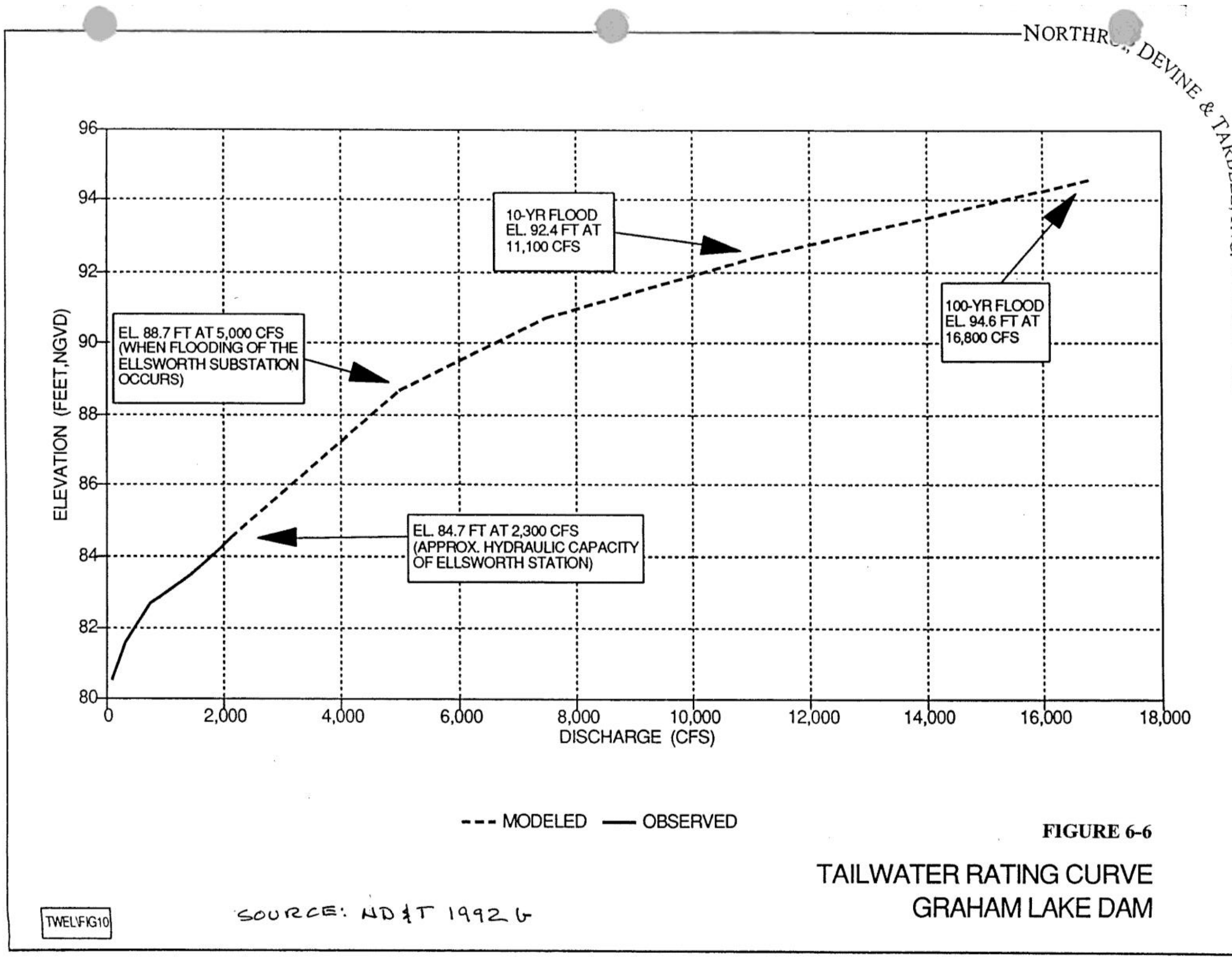

FIGURE 6-6

TAILWATER RATING CURVE
GRAHAM LAKE DAM

EXHIBIT 9

EXHIBIT C

CONSTRUCTION HISTORY AND PROPOSED CONSTRUCTION SCHEDULE

EXHIBIT 9

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ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT C
CONSTRUCTION HISTORY AND PROPOSED CONSTRUCTION SCHEDULE

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EXHIBIT 9

ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT C
CONSTRUCTION HISTORY AND PROPOSED CONSTRUCTION SCHEDULE

1.0 INTRODUCTION

Black Bear Hydro Partners, LLC (Black Bear) is filing an application with the Federal Energy Regulatory Commission (FERC) for a new license for the Ellsworth Hydroelectric Project (Project or Ellsworth Project) located on the Union River in Hancock County, Maine. The following provides construction history information for the Project required under 18 CFR § 4.51(d).

2.0 CONSTRUCTION HISTORY

Bar Harbor and Union River Power Company constructed the Ellsworth Dam in l907. The Graham Lake Dam, and the resulting Graham Lake reservoir were completed in 1924. Maintenance and repair activities at each of the developments has continued since their origination with major activities noted below.

The original facilities of the Ellsworth Dam consisted of two generation units (now termed Units No. 2 and 3). A third generation unit (now termed Unit No. 1) was added in 1919 and a fourth unit (Unit No. 4) was added in 1923 at the same time as construction of Graham Lake Dam. The horizontal turbines for Units No. 2 and 3 were replaced with vertical turbines in 1938, and the majority of the associated penstocks were also replaced at that time. In 1990 the open forebay was replaced with a new intake structure and longer penstocks.

Graham Lake Dam was constructed between 1922 and 1923. The original gate structure was found to have been constructed on soil and failed during a flood at the time of the initial filling of the reservoir. The gate structure was replaced with a structure founded on bedrock, and the dam was put into service in 1924. In response to the 1984 FERC Safety Inspection and subsequent studies, the site was dewatered from 1993-1994 and extensive remedial measures (including the construction of a downstream flood control structure) were implemented to address the high hazard potential and embankment stability of the structure.

Year	Ellsworth Dam	Graham Lake Dam
1907	Construction of dam and a two unit powerhouse completed and made operational	
1919	Third unit added	
1922		Dam construct initiated
1923	Fourth unit added	Dam failed during initial filling
1924		Dam rebuilt and put into service
1938	Units No. 2 and 3 replaced with vertical turbines and penstocks replaced	
1939	Crane trolley replaced with a motorized geared trolley	
1950	Spillway and non-overflow structures refaced with shotcrete	
1957	Rebuilt section of enclosure between buttresses four and six	
1982	All four turbines rebuilt and the generators rewound	
1985	Brake systems and cooling waters systems on Units No. 2 and 3 upgraded	
1986	Rip rap installed on downstream river bank to prevent erosion	
1986	Gatehouse replaced; fish passage facility installed	
1989		Temporary seepage control measures installed in one area of the downstream toe
1990	New intake structure constructed and penstock bays extended to the intake structure and buried	
1991	Headgate hoist installed	
1993	The buttress sections of the spillway and non-overflow structure partially filled with mass concrete and post-tensioned anchors installed	Site dewatered and site underwent extensive remedial repairs including construction of flood control structure, permanent cell, and southwest wingwall
1994		Major rehabilitation of radial gates.
1995	Repair of undermining of Unit No. 4 piers	
1995	Video cameras and high water alarms installed, the powerhouse automated	Video cameras and high water alarms installed

Year	Ellsworth Dam	Graham Lake Dam
2004	Sluice gate replaced with a stop log system used for downstream passage of migratory fish	
2005	Unit 4 rewound	
2006	Repairs completed on the downstream wall and tailrace flume piers of the powerhouse	
2007	No. 4 penstock replaced between the old forebay wall and powerhouse	

3.0 CONSTRUCTION SCHEDULE FOR NEW DEVELOPMENT

Black Bear is not proposing any new developments to the Ellsworth Project at this time.

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EXHIBIT 9

EXHIBIT D

STATEMENT OF COSTS AND FINANCING

EXHIBIT 9

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ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

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ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT D
STATEMENT OF COSTS AND FINANCING

1.0 ORIGINAL COST OF EXISTING UNLICENSED FACILITIES

This section is not applicable to the Ellsworth Hydroelectric Project (Project or Ellsworth Project) because Black Bear Hydro Partners, LLC (Black Bear) 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 FERC upon the expiration of the original license. FERC 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, Black Bear would have to be reimbursed for the net investment, not to exceed fair value, of the property taken, plus severance damages. To date, no agency or interested party has recommended a federal takeover of the Project pursuant to Section 14 of the Federal Power Act.

2.1 Fair Value

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

2.2 Net Investment

The net book investment for the Project is approximately [to be provided in the Final License Application] as of the end of 2015. Table D-1 shows original costs, accumulated depreciation, and net investment, under the Commission's Uniform System of Accounts.

Table D-1: Data Used to Determine the Net Book Investment of the Project

[To be provided in the Final License Application]

FERC	Production Plant	Original Cost ($)	Accumulated Depreciation	Net Investment
330	Land and Water Rights			
331	Structures and Improvements			
332	Reservoirs, Dams and Waterways			
333	Waterwheels, Turbines and Generators			
334	Accessory Electrical Equipment			
335	Misc. Power Plant Equipment			
336	Roads, Railroads and Bridges			
	Totals			
302	Relicensing Costs			

2.3 Severance Damages

Severance damages are determined either by the cost of replacing (retiring) equipment that is "dependent for its usefulness upon the continuance of the License" (Section 14, Federal Power Act), or the cost of obtaining an amount of power equivalent to that generated by the Project from the least expensive alternative source, plus the capital cost of constructing any facilities that would be needed to transmit the power to the grid, minus the cost savings that would be realized from not operating the Project. As discussed above, these values would need to 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

Black Bear is not proposing to expand land or water rights as a consequence of this license application.

3.2 Cost of New Facilities

Black Bear is not proposing any capacity-related developments at the Project.

4.0 ESTIMATED AVERAGE ANNUAL COST OF THE PROJECT

This section describes the annual costs of the Project as proposed. The estimated average cost of the total Project will be approximately [to be provided in Final License Application] per year, based on a 10-year period of analysis. This estimate includes costs associated with existing and projected project operations and maintenance[1], as well as local property and real estate taxes, but excludes income taxes, depreciation, and costs of financing.

4.1 Capital Costs

Black Bear uses a X.X% rate to approximate its average cost of capital [to be provided in the Final License Application]. 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 the 2015 fiscal year were approximately [to be provided in the Final License Application]. Income taxes for the Project are incorporated into costs of Black Bear'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 X.XX%. [to be provided the Final License Application]

4.4 Operation and Maintenance Expenses

The estimated annual operation and maintenance expense for 2015 at the Project are approximately [to be provided in the Final License Application] including corporate support costs.

4.5 Costs to Develop License Application

The approximate cost to date to prepare the application for a new license for the project is [to be provided in the Final License Application] (included in the above cost of net investment).

4.6 Costs of Proposed Environmental Measure

Black Bear is proposing the following environmental measures in this application:

- implement erosion controls at the Graham Lake boat launch facility
- develop a new portage trail at the west end of Graham Lake Dam
- improve a fisherman's downstream access trail on the east side of Graham Lake Dam

[1] Including major maintenance costs.

- develop and install in consultation with fisheries agencies, upstream eel passage at both the Ellsworth and Graham Lake Dams
- develop a Historic Properties Management Plan to provide for management of historic properties throughout the term of the license.
- develop a Recreation Management Plan to provide for the management of recreation facilities throughout the term of the license.

The costs to develop these measures is approximately [to be provided in the Final License Application]. Implementation of these measures will cost approximately [to be provided in the final application] annually.

5.0 ESTIMATED ANNUAL VALUE OF PROJECT POWER

Power generated by the project is sold through the New England ISO at prevailing market rates. Black Bear estimates gross annual energy production of about 30,333,000 megawatt-hour (MWH). The average market clearing price for energy can be estimated based on the ISO New England web site.

6.0 SOURCES AND EXTENT OF FINANCING

Black Bear's current financing needs are generated from internal funds. Financing of major enhancements will likely be made through earnings retention, equity contributions and/or loans made by the corporate parent. Black Bear anticipates that the Project will continue to operate as a market-based facility.

EXHIBIT 9

EXHIBIT E

ENVIRONMENTAL REPORT

EXHIBIT 9

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EXHIBIT 9

ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT E
ENVIRONMENTAL REPORT

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LIST OF ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
BA	Biological Assessment
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
CWA	Clean Water Act (Federal)
CZMA	Coastal Zone Management Act (Federal)
DLA	Draft License Application
DO	dissolved oxygen
DPS	Distinct Population Segment
DWA	Deer Wintering Area
EFH	Essential Fish Habitat
EPT	Ephemeroptera, Plecoptera, Trichoptera
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FT	Federal Threatened
GIS	Geographic Information System
GOM	Gulf of Maine
GPS	Global Positioning System
HPMP	Historic Properties Management Plan
ILP	Integrated Licensing Process
ISR	Initial Study Report
IWWH	Inland Waterfowl and Wading-bird Habitat
LAA	likely to adversely affect
LUPC	Land Use Planning Commission (Maine)
Maine DEP	Maine Department of Environmental Protection
Maine DIFW	Maine Department of Inland Fisheries and Wildlife
Maine DMR	Maine Department of Marine Resources
mg/l	Milligrams per liter
Maine HPC	Maine Historic Preservation Commission
Maine NAP	Maine Natural Areas Program
MOA	Memorandum of Agreement
msl	mean sea level
Maine SPO	Maine State Planning Office

MW	megawatt
MWh	megawatt hours
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NLAA	not likely to adversely affect
NMFS	United States National Marine Fisheries Service (Part of NOAA)
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
PAB	Palustrine Aquatic Bed
PAD	Pre-Application Document
PCE	primary constituent elements
PEM	Palustrine Emergent Wetland
PFO	Palustrine Forested Wetland
PLP	Preliminary Licensing Proposal
PME	protection, mitigation, and enhancement
PPM	parts per million
PSP	Proposed Study Plan
PSS	Palustrine Scrub-Shrub Wetland
PUB	Palustrine Unconsolidated Bottom
RPS	Renewable Portfolio Standards
RSP	Revised Study Plan
RTE	rare, threatened, or endangered
SD1	Scoping Document 1
SHPO	State Historic Preservation Officer
SPP	Species Protection Plan
ST	State Threatened
SVP	Significant Vernal Pool
µg/l	micrograms per liter
URFCC	Union River Fisheries Coordinating Committee
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USR	Updated Study Report

EXHIBIT 9

ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT E
ENVIRONMENTAL REPORT

1.0 INTRODUCTION

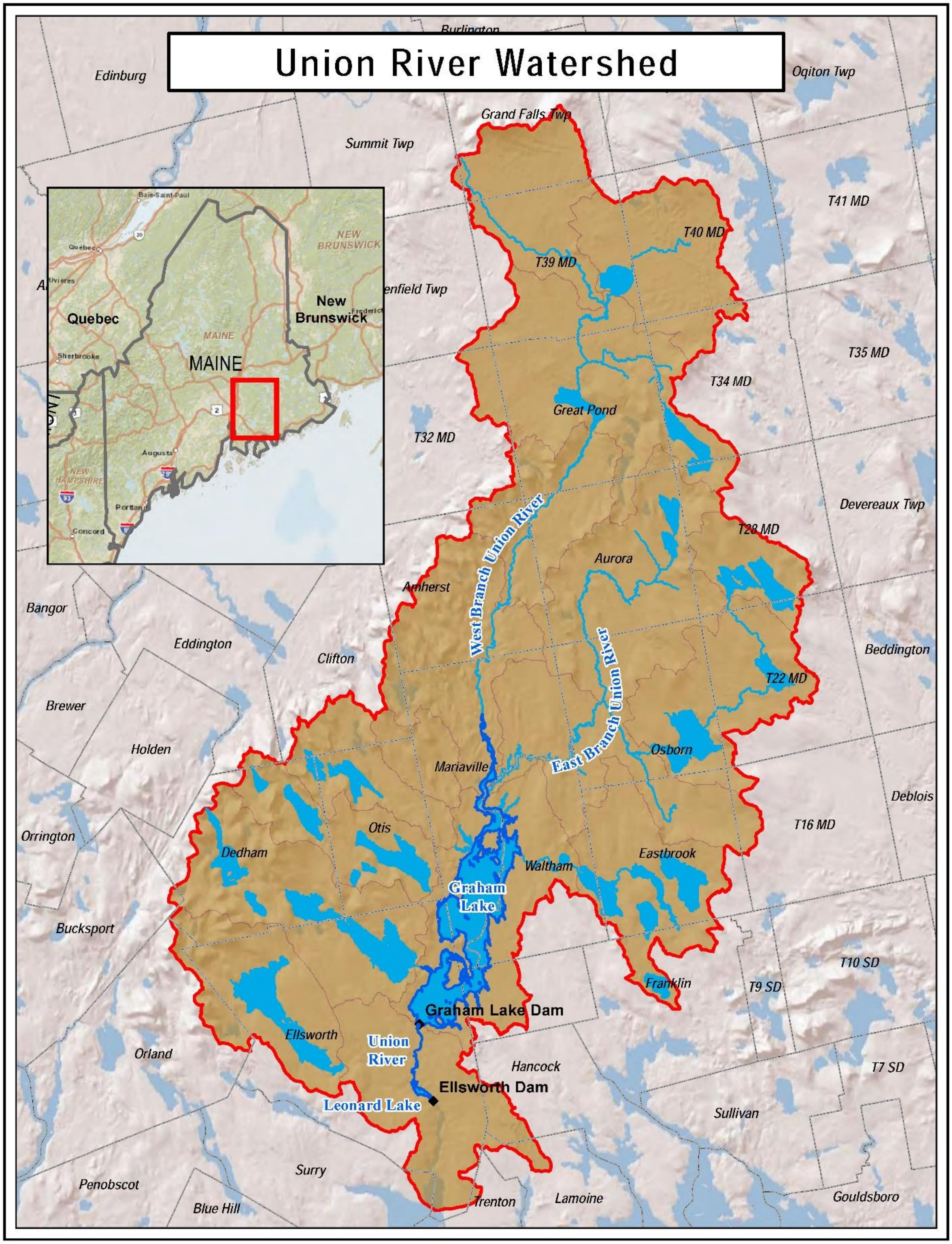
Black Bear Hydro Partners, LLC (Black Bear) is using the Federal Regulatory Commission's (FERC) Integrated Licensing Process (ILP) for the relicensing of the Ellsworth Hydroelectric Project (Project or Ellsworth Project). Pursuant to the process and schedule requirements of the ILP (CFR Part 5), Black Bear is filing a Draft License Application rather than a Preliminary Licensing Proposal for license renewal with FERC. The Draft License Application is being provided to participating agencies, tribes, non-governmental organizations (NGOs), local governments and the public.

Black Bear is the owner, operator, and licensee of the Project. The Project is located on the lower reach on the Union River in the City of Ellsworth, and the towns of Waltham and Mariaville in Hancock County, Maine (Figure E-1).

The Project consists of two developments, the Ellsworth Development and the Graham Lake Development. The Ellsworth Development consists of the Ellsworth Dam, which forms the 90-acre Lake Leonard, and the associated generating facilities. The Ellsworth Dam forms the upper limit of tidal influence of the Union River; below Ellsworth Dam the Union River flows into the Union River Bay approximately three miles downstream from the Project. The Graham Lake Development consists of a dam with an approximately 10,000-acre storage reservoir (Graham Lake). There are no generating facilities at the Graham Lake Development.

Construction of the Ellsworth Dam was completed in 1907 and the Graham Lake Dam was completed in 1924. The current license was issued by FERC in 1987. The license has been amended three times since then; in 1992, 1999, and 2002. In 1992, the project boundary was modified to include an additional 2 acres of land located downstream of the existing Graham Lake Dam. In 1999; the project description was corrected, Exhibit A was revised and the project boundary was changed to exclude land underlying a substation not a part of the project. In 2002, the approval of an upstream fish passage plan filed pursuant to Article 406 in 1994 was rescinded and the Comprehensive Fishery Management Plan for the Union River was filed in its stead. The license was transferred to Black Bear Hydro Partners, LLC by FERC Order Approving Transfer of License dated September 17, 2009 (128 FERC ¶ 62,212).

Figure E-1: Project Location



Graham Lake, the upper reservoir of the Project, has a normal maximum surface area of approximately 10,000 acres and a maximum length of approximately 10 miles. Graham Lake holds approximately 5.4 billion cubic feet of useable storage. Water levels in Graham Lake are typically managed between elevations of 93.4’ and 104.2’ mean sea level (msl). The lower impoundment, Lake Leonard impounded by the Ellsworth Dam, has a surface area of 90 acres at its normal maximum elevation of 66.7’ and a length of one mile.

Ellsworth Dam operates in a run of river mode automatically via pond level control and Graham Lake Dam provides storage and has no power facilities. The Union River has an average flow of 550 cubic feet per second (cfs). As part of the current license requirements the Licensee is required to release a continuous minimum flow of 105 cfs from the Ellsworth Dam and the Graham Lake Dam from July 1 through April 30 and 250 cfs from May 1 through June 30.

1.1 Purpose of Exhibit E

The purpose of Exhibit E, as defined in 18 CFR § 5.18, is to describe the following: 1) the existing and proposed project facilities, including project lands and waters; 2) the existing and proposed project operation and maintenance, to include measures for protection, mitigation and enhancement (PME), if appropriate, with respect to each resource affected by the Project proposal; and 3) the effects of issuing a new license for the continued operation and maintenance of the Project, including direct, indirect, and cumulative impacts based on information generated during relicensing studies.

The environmental analysis in this Exhibit E (Section 4.4) presents the assessment of effects associated with proposed Project operations and facilities and the expected benefits of proposed PME measures. This analysis is based in large part on the results of studies conducted by Black Bear under the FERC approved Study Plan. In consultation with participating agencies, Tribes and the public, Black Bear developed study plans, which were filed with and approved by FERC. A proposed study plan was filed with FERC April 8, 2013 that addressed written comments provided by stakeholders, as well as study scope changes resulting from comments and discussions that occurred at scoping meetings January 15/16, 2013. After FERC conducted the Proposed Study Plan meetings and Agency Meetings in the spring of 2013, a Revised Study Plan was filed with FERC on August 5, 2013. The Study Plan was approved with specific revisions by FERC in its Study Plan Determination issued on September 4, 2013. An Initial Study Report (ISR) was filed with FERC on September 4, 2014. A Modified Study Plan was approved with specific revisions by FERC in a Determination on Requests for Study Modifications and New Studies letter dated December 30, 2014. Black Bear plans to file updated study reports and addenda in the Updated Study Report (USR) in August 2015.

The results of the completed studies to date have been incorporated into the associated analysis of resources in this draft Exhibit E. The Draft License Application including Exhibit E is being provided to participating federal and state agencies, Tribes, NGOs, local governments, and the public for comment. Comments on the DLA are due by October 8, 2015. The resource analyses contained in the Final Exhibit E will provide the foundation for FERC's National Environmental Policy Act (NEPA) analysis.

1.2 Document Organization

In organizing this Draft Exhibit E, Black Bear relied on FERC's Revised Scoping Document for the Project, FERC's requirements for Exhibit E of the License Application (18 CFR § 5.18[b]), FERC's guidance document, Preparing Environmental Documents, Guideline for Applicants, Contractors, and Staff (FERC, 2008).

This Exhibit E is divided into four sections: 1) Introduction, 2) Consultation (a summary of consultation is provided in Appendix E-1), 3) Proposed Action and Alternatives and 4) Environmental Analysis. The Environmental Analysis compromises the bulk of Exhibit E. Following a general description of the basin, Section 4 describes each of the following for each resource area: Affected Environment (brief description of the existing environment based on information from the Pre-Application Document (PAD) and study reports included in the ISR), Environmental Analysis (description of the effects of the Project under proposed operations), Proposed PMEs (description of Black Bears proposed PME measures), Cumulative Effects (for those resources identified in the Scoping Document as ones that could be cumulatively affected, a description of whether the Proposed Action would contribute to such cumulative effects), and Unavoidable Adverse Impacts (description of any adverse impacts that will occur despite the implementation of proposed PMEs).

2.0 CONSULTATION

Black Bear initiated consultation with federal and state agencies, tribes, NGOs and other interested parties in October 2012, with the issuance of the Notice of Intent (NOI) and PAD. Stakeholders contacted as part of the ongoing consultation process are included in Table E-1.

Table E-1: List of Consulted Parties

Federal Agencies	
ACHP	Advisory Council on Historic Preservation
USACE	U.S. Army Corps of Engineers
FERC	Federal Energy Regulatory Commission
NMFS	U.S. National Marine Fisheries Service
NOAA	U.S. National Oceanic & Atmospheric Administration
NPS	U.S. Department of the Interior National Park Service
BIA	U.S. Department of the Interior Bureau of Indian Affairs
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
State Agencies	
Maine DMR	Maine Department of Marine Resources
Maine DIFW	Maine Department of Inland Fisheries & Wildlife
Maine DEP	Maine Department of Environmental Protection
Maine BPL	Maine Bureau of Parks and Lands
Maine HPC	Maine Historic Preservation Commission
Maine NAP	Maine Natural Areas Program
Maine DACF	Maine Department of Agriculture, Conservation, and Forestry
Non-Governmental Agencies	
ASF	Atlantic Salmon Federation
URWC	Union River Watershed Coalition
USA	Union Salmon Association
PERC	Penobscot East Resource Center
DSF	Downeast Salmon Federation
Tribes	
	Aroostook Band of Micmacs
	Houlton Band of Maliseet Indians
	Passamaquoddy Tribe
	Penobscot Indian Nation

Local Governments	
Ellsworth	City of Ellsworth
Mariaville	Town of Mariaville
Waltham	Town of Waltham
Individuals	
	Doug Watts

The NOI and PAD for the Ellsworth Project were issued to stakeholders and filed with FERC on October 24, 2012. FERC subsequently issued Scoping Document 1 (SD1) on December 20, 2012. Public scoping meetings were held January 15/16, 2013. After three study plan meetings, a Revised Study Plan was filed with FERC on August 5, 2013. The Study Plan was approved with specific revisions by FERC in its Study Plan Determination issued on September 4, 2013. Study results were filed with FERC on September 4, 2014 in an Initial Study Report and shared with stakeholders at an Initial Study Report Meeting held on September 18, 2014. Appendix E-1 provides a summary of consultation correspondence over the course of the relicensing process to date, including development and filing of draft and revised study plans and summaries of stakeholder meetings.

2.1 Comments on the Draft License Application

The DLA is being provided to participating federal and state agencies, tribes, NGOs, local governments, and the public. Comments on the DLA are due on October 8, 2015. Black Bear will address stakeholder's comments on the DLA during preparation of the final license application, which will be filed with the Commission by December 31, 2015..

2.2 REA Notice

Once FERC has determined that Black Bear's Final License Application meets all filing requirements, any deficiencies with the application have been resolved, and no additional information is required, FERC will issue the notice of acceptance and REA.

The acceptance/REA notice solicits comments, protests, and interventions- along with recommendations, preliminary terms and conditions, and preliminary fishway prescriptions- including all supporting documentation. Comments, protests, and interventions must be filed within 60 days of notice. Black Bear will then have 45 days to respond to submitted comments (105 days from the REA notice). When the application is accepted, FERC provides public notice in the Federal Register, local newspapers, and directly to resource agencies and Indian tribes. In its notice, FERC invites protests and interventions and requests the final fish and wildlife recommendations, prescriptions, mandatory conditions, and comments from the resource agencies and Indian Tribes.

3.0 PROPOSED ACTION AND ALTERNATIVES

3.1 No Action Alternative

No action means that the Project would continue to operate as authorized by the current license. Existing facilities would remain in place and existing PME measures would continue, but there would be no additional protection or enhancement of resources. If the Project were to operate as in the past, Black Bear would continue to produce energy in the present manner and the environmental effects of its operation would remain unchanged. Any ongoing effects of the Project would continue. The no action alternative represents the baseline Project energy production and environmental conditions for comparison with other alternatives.

3.1.1 Existing Project Facilities

The Project consists of two developments with associated dams and impoundments. The Ellsworth Development has a concrete dam 65 feet high and 377 feet long (with a 275-foot long section of spillway) and a powerhouse with four generation units. The overflow spillway has a flashboard crest elevation of 66.7'. Unit No. 1 is served by a 10-foot diameter vertical penstock contained in the non-overflow section of the dam. The non-overflow section is also connected to an intake structure containing three penstocks; two 8-foot diameter penstocks serving powerhouse units No. 2 and 3 and one 12-foot diameter penstock serving powerhouse unit No. 4. A fish passage facility is operated at the Ellsworth Dam providing for upstream fish passage and the commercial harvest of river herring by the City of Ellsworth under a cooperative management agreement with the Maine Department of Marine Resources (Maine DMR).

The Graham Lake Dam is a non-generating facility located about four miles upstream from the Ellsworth Dam. The structure is 30 feet high and consists of a 670-foot long earth dike and an 80 foot long concrete gate structure. The concrete gate structure contains three 20-foot wide radial gates and an eight-foot wide sluice that is used for downstream fish passage. There is a concrete flood control structure associated with the Graham Lake Dam. The flood control structure consists of an approximately 720-foot long flood wall, which is connected to the existing Graham Lake Dam outlet gates by a wing wall extension and a permanent cofferdam cell.

The Project is operated for water storage and power generation. Operationally, the Project is typically run as a peaking plant, with water being released from the Graham Lake reservoir and then used to generate electricity at the downstream Ellsworth powerhouse. The four units contained in the Ellsworth powerhouse have a total FERC-authorized capacity of 8.9 megawatts (MW) with an estimated total hydraulic capacity of approximately 2,460 cubic feet per second (cfs). The Project generated an average annual energy output of 30,333,000 kWh during the period 1994 – 2014.

The Union River has an average annual flow of 550 cubic feet per second (cfs). As part of the current license requirements of December 28, 1987, the licensee is required to release a continuous minimum flow of 105 cfs from the Ellsworth Dam and the Graham Lake Dam from July 1 through April 30 and 250 cfs from May 1 through June 30, for the protection of fishery resources (FERC 1987).

The Ellsworth Project has a drainage area of approximately 547 square miles. The reservoir impounded by the Ellsworth Dam, Lake Leonard, has a surface area of 90 acres at its normal maximum elevation of 66.7' and a reservoir length of one mile. The upper reservoir, Graham Lake, has a normal maximum surface area of approximately 10,000 acres and a maximum length of approximately 10 miles. Water levels in Lake Leonard vary between 65.7' and 66.7' over the course of the year. Water levels in Graham Lake are typically managed between elevations 93.4' and 104.2'. Drawdown of Graham Lake in the fall and more extensively at the beginning of the year provides significant downstream flood control benefits. The ability to store large flows when the lake is drawn down is a particularly valuable asset given the location of downtown Ellsworth just below the Ellsworth Dam. Drawdown of Graham Lake also provides important flow augmentation during dry periods so that minimum flows can be maintained in the Union River below Graham Lake Dam.

Table E-2: Ellsworth Project Specifications

GENERAL INFORMATION
Owner and Operator: Black Bear Hydro Partners, LLC
FERC Project Number: 2727
Current License Term: January 1, 1998 to December 27, 2017
County: Hancock County
Nearest Town: Ellsworth, Maine
Watershed: Union River
River: Union River
Drainage Area: 547 square miles

Ellsworth Development	**Graham Lake Development**
Normal Maximum Water Surface Elevation (msl)	
Lake Leonard	**Graham Lake**
66.7' (includes 1.7 foot flashboards)	104.2'
Normal Tailwater Elevation	
Varies with tidal fluctuations	80.5'
Reservoir Length	
1 mile	10 miles
Shoreline Length	
4.4 miles	80 miles (not including islands)
Surface Area at Maximum Water Surface	
Lake Leonard	**Graham Lake**
90 acres	Approximately 10,000 acres
Gross Storage Lake Leonard 0.107 billion cubic feet	Useable Storage Graham Lake – 5.4 billion cubic feet between elevations 104.2' and 93.4'
Structures	
Ellsworth Dam	**Graham Lake Dam**
Concrete buttress dam	Earth fill dam with concrete core walls
Total Length 377 feet	Total Length 750 feet
Penstock: 10-foot diameter vertical penstock serving Unit 1; two 8-foot diameter penstocks serving powerhouse Units No. 2 and 3, and a 12-foot diameter penstock serving Unit No. 4	N/A
Dam height 65 feet	Dam height 30 feet
Powerhouse: reinforced concrete and concrete block masonry structure 52.5 feet x 68 feet with an attached 15 feet x 30 feet switch house annex	N/A
Turbine Rated Capacity:* Unit 1 – 3,800 hp (2,850 kW) (vertical shaft propeller) Unit 2 – 2,900 hp (2,175 kW) (Kaplan) Unit 3 – 2,900 hp (2,175 kW) (Kaplan) Unit 4 – 3,800 hp (2,850 kW) (vertical shaft propeller)	N/A
Generator Rated Capacity:** Unit 1 – 3,125 kVA @ power factor 0.8; 2,500 kW Unit 2 – 2,500 kVA @ power factor 0.8; 2,000 kW Unit 3 – 2,500 kVA @ power factor 0.8; 2,000 kW Unit 4 – 3,000 kVA @ power factor 0.8; 2,400 kW	N/A

*The total combined maximum hydraulic capacity of the turbines is estimated to be 2,460 cfs.
**The total FERC authorized capacity of the facility, based on the limiting unit components, is 8.9MW.

3.1.2 Existing Project Boundary

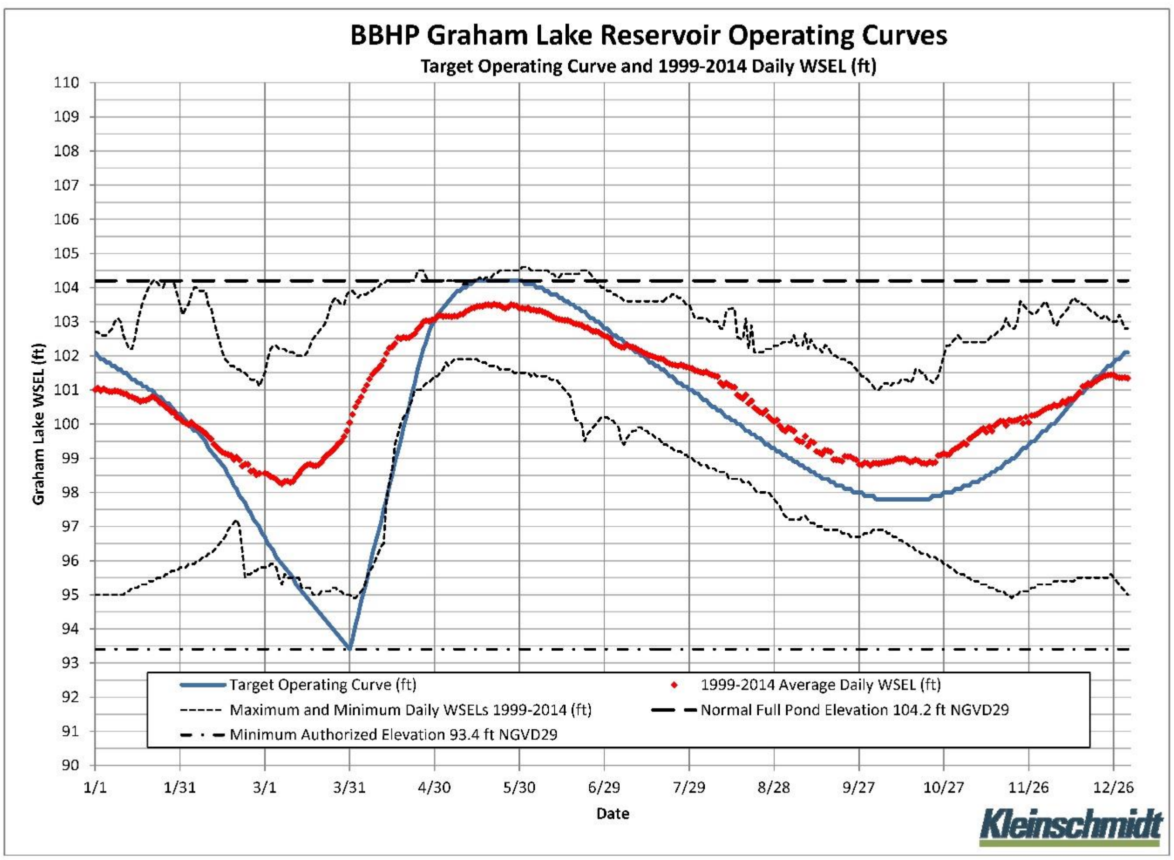
The Project boundary generally follows elevation 66.7’ (USGS) on Lake Leonard and elevation 107’ (USGS) on Graham Lake. There are no federal lands within the Project boundary.

3.1.3 Existing Project Operations

The Ellsworth Project operates as both a water storage facility and as a peaking generation facility. Black Bear is not currently proposing any changes to operations.

Timed releases at Graham Lake are used at Ellsworth Dam for power production. The releases may result in minor (approximately 1 foot) surface elevation changes in Lake Leonard. Graham Lake generally follows an operating curve that has historically resulted in fluctuations approaching 11 feet over the course of a year (Figure E-2).

Figure E-2: Graham Lake Reservoir Operating Curves



As per Articles 401 and 402 of the 1987 Order Issuing New License, minimum flows and water levels are maintained. Article 401 specifies a continuous minimum flow release of 105 cfs from the Ellsworth Dam and Graham Dam from July 1 through April 30 and a continuous minimum flow release of 250 cfs from May 1 through June 30 for the protection of fishery resources. The flows can be temporarily modified if required by operating emergencies beyond the control of Licensee, and for short periods upon on agreement among Licensee, USFWS and Maine DEP.

Article 402 requires Licensee to operate the Project so that water levels in Lake Leonard are maintained between the elevations of 65.7’ msl and 66.7’ msl, and water levels in Graham Lake are maintained between 104.2’ msl and 93.4’ msl. The requirements can also be temporarily modified if required by operating emergencies beyond the control of Licensee, and for short periods upon agreement among Licensee, USFWS and Maine DEP.

3.2 Alternatives Considered but Eliminated from Detailed Study

3.2.1 Federal Government Takeover of the Project

No party has suggested that federal takeover of the Project would be appropriate and no federal agency has expressed an interest in operating the Project. The federal takeover of the Project would require congressional approval. Moreover, there is no evidence that indicates a federal takeover should be recommended to Congress. Thus, the federal takeover of the Project is not a reasonable alternative.

3.2.2 Issuance of Non-Power License

No party has sought a non-power license and there is no basis for concluding that the Project should no longer be used to produce power. Thus, a non-power license is not a reasonable alternative to a new license with PME measures.

3.2.3 Project Decommissioning

Decommissioning of the Project could be accomplished with or without dam removal. Either alternative would require denying the License Application and surrender or termination of the existing license with appropriate conditions. No party has suggested Project decommissioning would be appropriate and there is no basis for recommending it. The Project provides a viable, safe, and clean renewable source of power to the region; therefore, replacement power would need to be identified. The Project contributes to flood control and seasonal water storage in the Union River basin and provides the public with recreational access. If the Project were decommissioned, its contribution to flood control and seasonal water storage in the Union River basin would end and the public would no longer have access to the Project’s recreation facilities.

Subsequently, Project decommissioning is not a reasonable alternative to relicensing the Project with appropriate PME measures.

3.3 Proposed Action

3.3.1 Proposed Project Facilities

Black Bear is proposing no modifications of the existing Ellsworth Project facilities. The existing dams, powerhouse, spill gates, and appurtenant features are all well maintained and in good working order. No changes of these facilities that are outside normal maintenance practices or the Commission's safety requirements are required or proposed.

3.3.2 Proposed Project Operation

Black Bear is proposing no changes in the way the Ellsworth Project is currently operated. Section 4.0 discusses the effects of the proposed relicensing on the issues that the stakeholders and the Commission identified during the scoping.

3.3.3 Proposed Environmental Measures

Black Bear is proposing the following PME measures for the protection of resources:

- Implement erosion controls at the existing Graham Lake boat launch facility;
- Develop a new portage trail at the west end of Graham Lake Dam;
- Improve a fisherman's downstream access trail on the east side of Graham Lake Dam;
- Develop, in consultation with fisheries agencies, plans for upstream eel passage at Ellsworth and Graham Lake Dams;
- Develop a Recreation Facilities Management Plan to provide for appropriate management of recreation facilities throughout the term of the license;
- Develop a Historic Properties Management Plan to provide for management of historic resources throughout the term of the license.

4.0 ENVIRONMENTAL ANALYSIS

4.1 General Description of the River Basin

The Union River Watershed—located in Hancock and Penobscot Counties, in eastern Maine—has a drainage area of approximately 547 square miles above the Ellsworth Dam. The Union River is composed of three main tributaries: the East, West, and Middle Branches. The total length of these branches includes 484 miles of streams and 81 miles of lakes and ponds (URSG 2000).

The river forms at the north end of Graham Lake at the confluence of the river's East and West branches, on the border of the towns of Mariaville and Waltham. It runs south 10 miles through Graham Lake to the dam at the lake's outlet, then continues south through Ellsworth, flowing through Leonard Lake and passing over its outlet dam just above the downtown. The Ellsworth Dam, built in 1907, spans the Union River and forms Lake Leonard. It houses a powerhouse with four generating units that combined produce 30,333,000 megawatt hours per year, enough to power about 3,000 households. At downtown Ellsworth, the river reaches tidewater, and flows south as an estuary (Union River Bay) for 5 miles (8 km) to the Atlantic Ocean.

4.1.1 Hydrology

The calculated mean annual flow for the Project at the Ellsworth Dam is 550 cfs. Annual and monthly flow duration curves are provided in Appendix A of Exhibit B. These curves were calculated based on daily generation records at the Project.

4.1.2 Topography

The Union River basin is characterized by numerous flat or gently rolling plains, a few high bedrock ridges and monadnocks, and a variety of lakes, ponds, and streams. The basin topography has been shaped primarily by glaciation and marine invasion. Elevations throughout the basin range from sea level to a maximum of 1,300 feet.

The bedrock of the basin consists of highly altered metamorphic rock in the northern portion, and a wide zone of schist and gneiss intruded by great masses of granite along the southern section near the coast. The overburden throughout the basin consists of glacial till aqueo-glacial outwash, and marine sediments. While the glacial till covers most of the bedrock in the region, extensive areas of till have, in turn, been buried by subsequent glacial outwash and marine materials. These materials, consisting of sand and gravel, form numerous and extensive outwash plains, deltas, kames, and eskers. Many of the flat, swampy areas in the basin are largely the result from graded material washed out by the retreating glacier (Bangor Hydro-Electric Company 1984).

4.1.3 Climate

The Ellsworth Project is located in Maine's coastal climatological division, which extends for about twenty miles inland along the length of the coast. The coastal division is tempered by the ocean, resulting in lower summer and higher winter temperatures than are typical of interior zones. In the Ellsworth Project area, the average daily temperature maximum in July is 78° F (26°C) and the average daily minimum is 58° F (14°C). In January the average daily maximum is 30° F (-1°C) and the average daily minimum is 11° F (-12°C). The average annual precipitation in the Project area is 46.8 inches which is typically distributed evenly throughout the year (3-4 inches/month), although some flooding may occur in late winter/early spring due to rain/snowmelt events. Annual snowfall averages approximately 63 inches in the Project area.

4.1.4 Land Uses and Economic Activity

The Ellsworth Project is located in Hancock County, the seventh largest county in terms of land area. Hancock County is rural and sparsely populated, ranking eighth out of 16 in population. Hancock County's population is density is 34.3 persons per square mile, which is lower than the state of Maine average of 43.1 persons per square mile (U.S. Census Bureau, 2015h).

Approximately 90.2 percent of Hancock County is comprised of forested land (USDA, 2005). The City of Ellsworth, Towns of Mariaville and Waltham, and Fletchers Landing Township are in the Northeast Maine nonmetropolitan area (BLS, 2013). While lands within the Project vicinity are predominately undeveloped forest lands and wetlands, the city of Ellsworth is an area of relatively dense population (7,741 in 2010) within the County. Forestry is a common land use in the area, while agricultural uses include apple orchards and blueberry barrens (Ellsworth Comprehensive Planning Committee, 2004, Mariaville Comprehensive Planning Committee, 2006).

There were an estimated 24,355 households in Hancock County, which was approximately 4.4 percent of the state's households based upon the Census 2009-2013 American Community Survey Estimate values. The median household income in Hancock County was $47,460. Approximately 14.0 percent of the population of Hancock County was below the poverty level, while the percent of the state's population living below poverty level was lower at 13.6 percent (US Census Bureau, 2015h). Hancock County had a higher unemployment rate (7.8 percent) as compared to the overall state (5.5 percent) in December 2014 based upon the data derived from the Local Area Unemployment Statistics (LAUS) program (Maine CRWI, 2015).

In Hancock County, as well as the entire state of Maine, the top two sources of employment are in education and health services (7,336 people employed) and in the retail trade industry (3,286 people employed) (US Census, 2015b and 2015c). The largest employer in Hancock County is Jackson Laboratory, which employed over 1,000 people in 2014 (MDOL, 2014).

4.1.5 Dams and Diversions

Other than the Ellsworth and Graham Lake Dams, there are no other dams or diversions on the main stem Union River[1]. The Ellsworth Dam is at the head-of-tide of the Union River which empties into Union River Bay in the Atlantic Ocean approximately three miles downstream from the Project.

4.2 Cumulative Effects

4.2.1 Resources that could be Cumulatively Affected

In SD1, the Commission identified migratory fish (i.e., alewife, American eel, American shad, Atlantic salmon, Atlantic sturgeon, blueback herring, and striped bass) and water quality as resources that could be cumulatively affected by the proposed continued operation and maintenance of the Ellsworth Project in combination with other hydroelectric projects and other activities in the Union River Basin. The effects analyses for the resources identifies as having the potential to be cumulatively affected appear in the applicable resource area sections.

4.2.2 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 proposed action's effect on the resources, and (2) contributing effects from other hydropower and non-hydropower activities within the Union River Basin. In SD1 the Commission identified the geographic scope for migratory fish species to include the Union River Basin from Union River Bay upstream to Great Pond on the West Branch Union River, to Alligator Lake on the Middle Branch Union River, and to Rocky Pond on the East Branch Union River. The Commission chose this geographic scope because operation and maintenance of the Ellsworth Project, in combination with other hydroelectric projects and activities in the Union River Basin, may directly affect migratory fish species or affect access to and quantity of migratory fish habitat.

4.2.3 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 water quality. Based on the potential term of the new license for the Ellsworth Project, the temporal scope will look 30 to 50 years into the future, concentrating on the effect on resources of reasonably foreseeable actions. The historical discussion will, by necessity, be limited to the amount of available information for each resource.

[1] The Green Lake Project, FERC No. 7189 is located on Reeds Brook, a tributary of Graham Lake.

4.3 Applicable Laws

4.3.1 Section 401 of the Clean Water Act

Pursuant to Section 401 of the 1972 Amendments to the Federal Water Pollution Act, Public Law 92-500 as amended, Black Bear is required to apply for Section 401 Certification.

As part of the ILP, Black Bear consulted with the Maine Department of Environmental Protection (Maine DEP) throughout the relicensing process. Black Bear will file an Application for Water Quality Certification with Maine DEP. A copy of the 401 Water Quality Certification Application to Maine DEP will be provided in Appendix E-4.

4.3.2 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 National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service. The USFWS maintains a nationwide list of endangered species. The law requires federal agencies, in consultation with the USFWS or NOAA to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. Section 9 of the ESA prohibits taking endangered species of fish and wildlife. The regulations implementing ESA define "take" as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct.

As part of the ILP, Black Bear consulted with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) throughout the relicensing process to assess potential Project effects on federally listed threatened and endangered species in the Project area. Rare, threatened and endangered species at the Project are listed in Section 4.4.6 of this Exhibit E and described in detail in relevant sections of this Exhibit E.

4.3.3 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Steven Fishery Conservation and Management Reauthorization Act of 2006 mandated that habitats essential to federally managed commercial fish species be identified, and that measures be taken to conserve and enhance habitat. In the amended Act, Congress defined essential fish habitat (EFH) for federally managed fish species as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity". The designation and conservation of EFH seeks to minimize adverse effects on habitat caused by fishing and non-fishing activities.

Before a Federal agency proceeds with an activity that may adversely affect a designated EFH (e.g., relicensing of a hydro project), the agency must: 1) consult with NOAA Fisheries and, if requested, the appropriate Council for the recommended measures to conserve EFH and 2) reply within thirty days of receiving EFH recommendations. The agency response must include proposed measures to avoid or minimize adverse impacts on the habitat, or alternatively an explanation if the agency cannot adhere to the recommendation from NOAA Fisheries.

Essential fish habitat for Atlantic salmon is described as all waters currently or historically accessible to Atlantic salmon within the streams, rivers, lakes, ponds, wetlands, and other water bodies of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut (NEFMC 1998). The EFH designated habitat for all life stages of Atlantic salmon (eggs, larvae, juveniles, and adults) in Maine includes the Union River and Union River Bay, including the Project area.

Black Bear provides its EFH assessment in Section 4.5

4.3.4 Coastal Zone Management Act

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

The Ellsworth Project is located in the City of Ellsworth at the head of tide of the Union River. Black Bear will submit a certificate of consistency to the Maine Coastal Program in the Maine Department of Agriculture, Conservation and Forestry for their concurrence.

4.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires FERC to take into account the effect of its undertakings on historic properties. In this case the undertaking includes the issuance of a federal license for the continued operation of the Ellsworth Project. Section 106 of the NHPA is implemented through the Advisory Council on Historic Preservation (Council regulations "Protection of Historic Properties" (36 CFR Part 800). For hydropower licensing actions, FERC typically completes Section 106 by entering into a Programmatic Agreement or Memorandum of Agreement (MOA) with the licensee, the Advisory Council on Historic Preservation (ACHP), and the state and tribal historic preservation office. FERC typically requires the licensee to develop and implement a Historic Properties Management Plan (HPMP) as a license condition. Through an approved HPMP, FERC can require consideration and management of effects on historic properties for the license term; thus, meeting the requirements of Section 106 for its undertakings.

As part of the ILP, Black Bear consulted with the State Historic Preservation Officer (SHPO) and the Tribes that may have an interest in the Project, as appropriate, throughout the relicensing process on the Phase I archaeological survey, Phase II archaeological testing and the historic architectural survey of the Project area. Black Bear will be submitting a draft HPMP with the FLA, prepared in consultation with the SHPO, which contains specific steps to be taken by Black Bear to protect and preserve the historic properties identified at the Project over the term of the new license. With the implementation of an approved HPMP, the continued operation of the Project as proposed by Black Bear will have no adverse impacts on cultural resources at the Project.

4.3.6 Wild and Scenic Rivers and Wilderness Acts

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 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 wild, scenic, or recreational.

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.

There are no nationally designated wild and scenic rivers or wilderness areas within the Project boundary or in the vicinity of the Project.

4.4 Proposed Action

4.4.1 Geology and Soils

4.4.1.1 Affected Environment

The Ellsworth Project is located within the eastern coast of Hancock County in an area of the State that was modified heavily by glacial activity. The majority of the landscape in the vicinity of the Project is gently sloping valleys draining into the coastal lowlands of the southern portion of the county. Elevations throughout the basin range from sea level to a maximum of 1300 feet.

Existing Geological Features

The Project area is contained within three biophysical regions in the State of Maine: Central Interior, the Eastern Lowlands, and Penobscot Bay regions (Figure E-3). The Central Interior biophysical region is characterized by sedimentary and metamorphic bedrock overlain by deep, well to moderately drained, coarse sandy loam soils. The Penobscot Bay Region is distinguished by granitic plutons and granite. The Eastern Lowlands Biophysical Region is comprised of mineral soils that are generally wet and dense with glaciolacustrine deposits and glaciomarine clays. Depressions within this region are commonly filled with organic soils, mucks, clays, and silts (Maine DIF&W, 2005).

The underlying bedrock within the region is complex with alternating bands of metasedimentary and metavolcanic rocks (MDIF&W, 2005). Geologic formations dating from the Ordovician and Cambrian periods consist of stratified rocks including Penobscot formation of schist and pelitic slate and unnamed volcanic rocks and the Ellsworth Schist, a type of quartz-feldspar-muscovite-chlorite schist (MGS, 2008).

Soils

Soils within the Union River Basin consist mainly of marine clays in the low-lying areas, and glacial tills above. The tills are of a coarse sandy or stony nature, are well to excessively drained, and contain hardpan about two to three feet below the surface. The soils in the Project area fall into four dominate soil association units: Lamoine-Lyman-Dixfield; Hermon-Dixfield-Lyman; Colton-Sheepscot-Adams; and Dixfield-Marlow-Brayton. Table E-3 lists the soil series known to occur in the Project area.

The majority of the Project lies within the Lamoine-Lyman-Dixfield unit, which is comprised of loamy and clayey soils deposited over bedrock (Ferwerda, 1997). Drainage ranges from the somewhat excessively drained Lyman soil to the somewhat poorly drained Lamoine soil (NRCS, 1988).

The second general soil group within the Project area is the Hermon-Dixfield-Lyman unit, located on the west side of Graham Lake. These soils are characterized by sandy loams that are very stony to extremely bouldery on upland till ridges surrounding lakes, ponds, and valleys. Drainage classes within the general unit range from somewhat excessively drained to moderately well drained Dixfield soil (NRCS, 1988).

The third general soil group is the Colton-Sheepscot-Adams unit, located on the west side of Graham Lake. Soils here are very deep and range from steep slope to relatively flat with moderately well drained to excessively drained soils formed in glaciofluvial sand and gravel. These soils are poorly to very poorly drained.

Figure E-3: Biophysical Regions

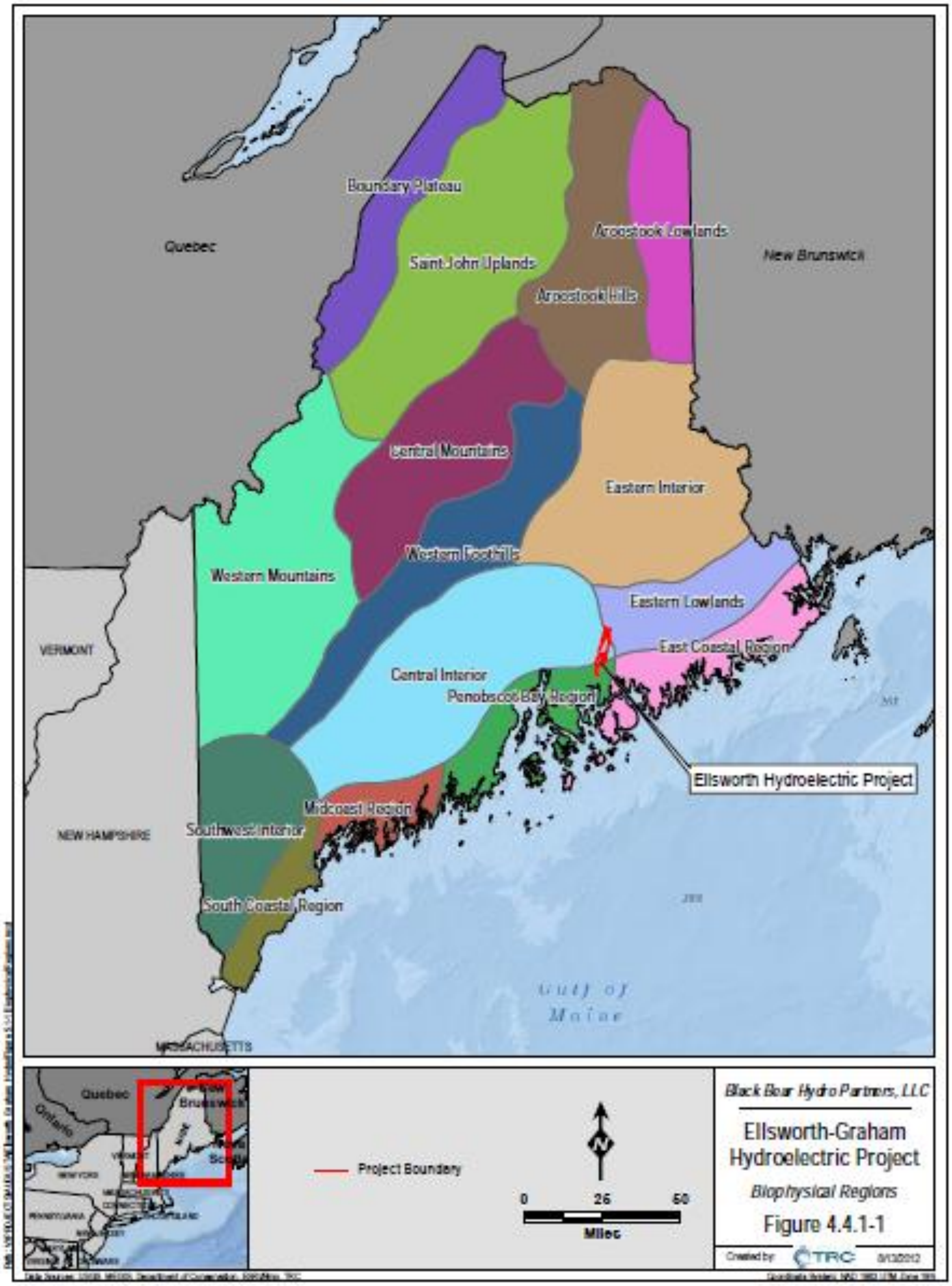


Figure E-4: Hancock County General Soil Map

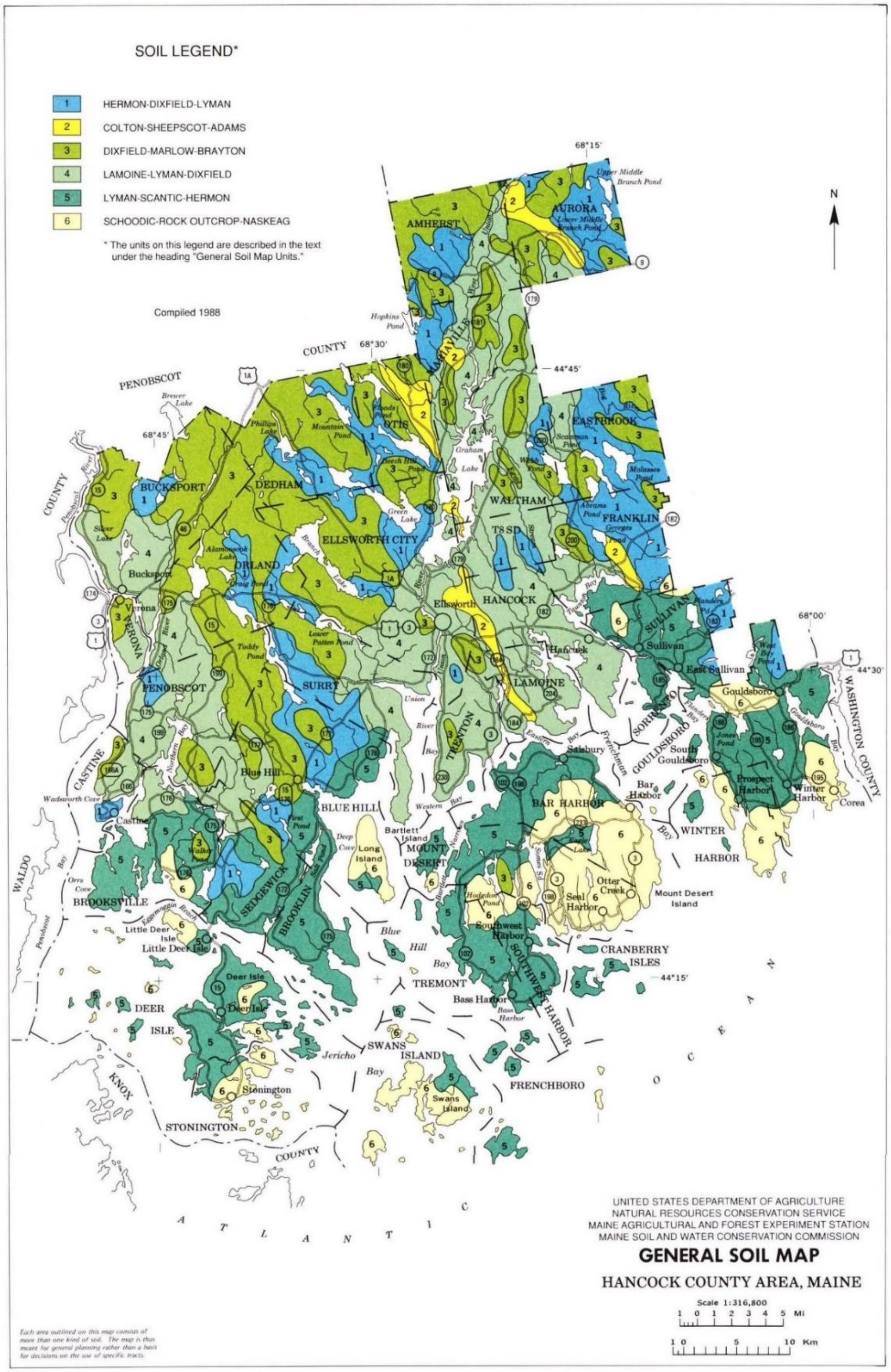


Figure E-5: Project Area Soils

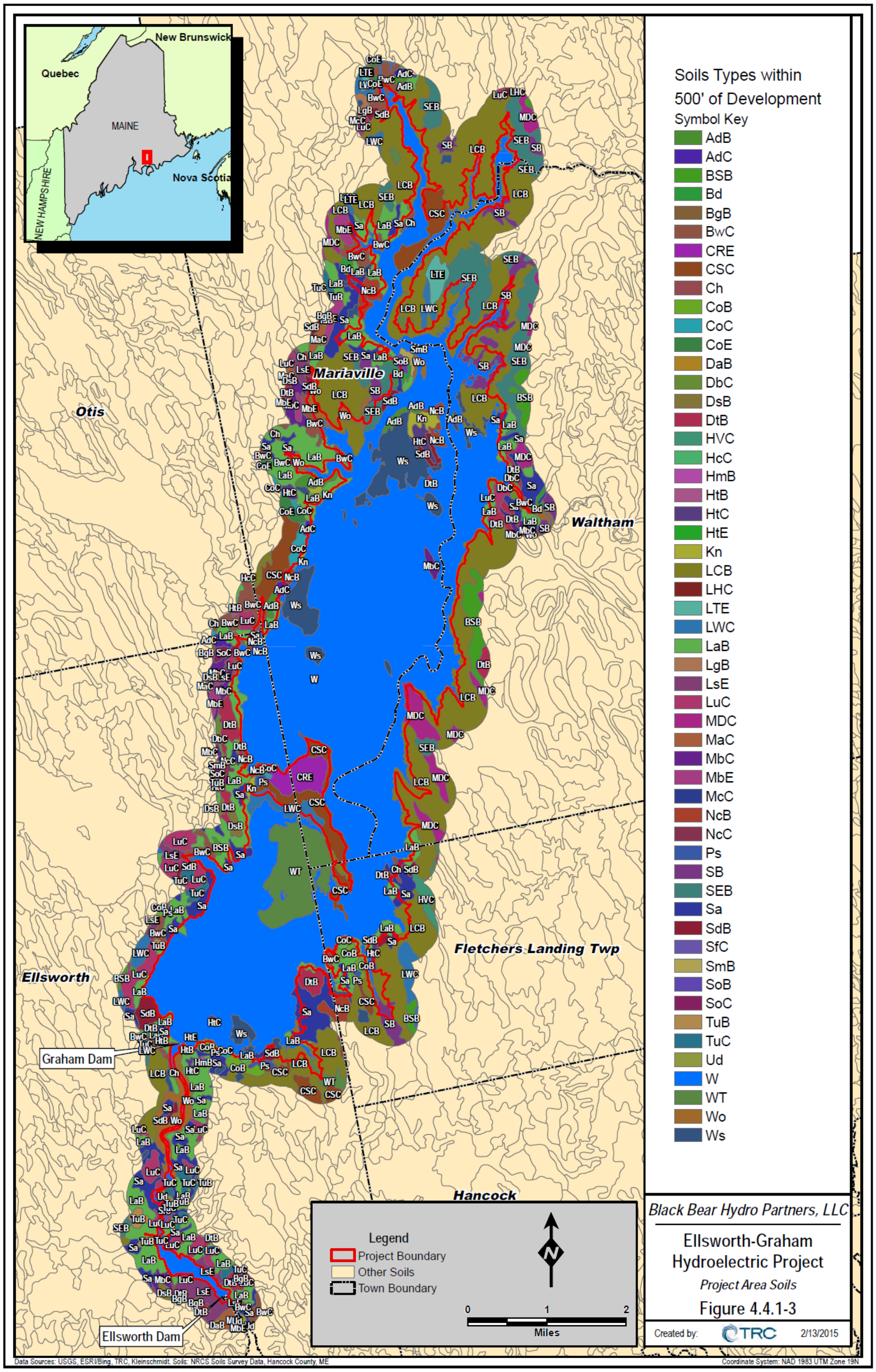


Table E-3: Soils Series Occurring within the Ellsworth Project Area

Soils Unit Symbol	Soils Unit Name
AdB	Adams loamy sand, 0 to 8 percent slopes
AdC	Adams loamy sand, 8 to 15 percent slopes
Bd	Biddeford mucky peat, 0 to 3 percent slopes
BgB	Brayton fine sandy loam, 0 to 8 percent slopes, very stony
BSB	Brayton-Colonel association, gently sloping, very stony
BwC	Buxton silt loam, 8 to 15 percent slopes
Ch	Charles silt loam, 0 to 2 percent slopes, occasionally flooded
CoB	Colton gravelly sandy loam, 0 to 8 percent slopes
CoC	Colton gravelly sandy loam, 8 to 15 percent slopes
CoE	Colton gravelly sandy loam, 15 to 45 percent slopes
CRE	Colton-Adams association, steep
CSC	Colton-Adams-Sheepscot association, strongly sloping
DaB	Dixfield fine sandy loam, 3 to 8 percent slopes
DbC	Dixfield fine sandy loam, 8 to 15 percent slopes, very stony
DsB	Dixfield-Colonel complex, 3 to 8 percent slopes
DtB	Dixfield-Colonel complex, 3 to 8 percent slopes, very stony
HcC	Hermon-Colton-Rock outcrop complex, 3 to 15 percent slopes, very stony
HmB	Hermon-Monadnock complex, 3 to 8 percent slopes
HtB	Hermon-Monadnock complex, 3 to 8 percent slopes, very stony
HtC	Hermon-Monadnock complex, 8 to 15 percent slopes, very stony
HtE	Hermon-Monadnock complex, 15 to 45 percent slopes, very stony
HVC	Hermon-Monadnock-Dixfield complex, strongly sloping, very stony
Kn	Kinsman loamy sand
LaB	Lamoine silt loam, 3 to 8 percent slopes
LCB	Lamoine-Scantic-Buxton association, gently sloping
LgB	Lyman-Brayton complex, 3 to 15 percent slopes, very stony
LHC	Lyman-Brayton-Schoodic complex, 3 to 15 percent slopes , rocky
LsE	Lyman-Schoodic complex, 15 to 35 percent slopes, rocky
LTE	Lyman-Schoodic-Rock outcrop complex, 15 to 35 percent slopes, very stony
LuC	Lyman-Tunbridge complex, 0 to 15 percent slopes, very stony
LWC	Lyman-Tunbridge-Schoodic complex, 8 to 15 percent slopes, very stony
MaC	Marlow fine sandy loam, 8 to 15 percent slopes
MbC	Marlow fine sandy loam, 8 to 15 percent slopes, very stony

Soils Unit Symbol	Soils Unit Name
MbE	Marlow fine sandy loam, 15 to 45 percent slopes, very stony
McC	Marlow fine sandy loam, 3 to 15 percent slopes, extremely bouldery
MDC	Marlow-Dixfield association, strongly sloping, very stony
NcB	Nicholville very fine sandy loam, 3 to 8 percent slopes
NcC	Nicholville very fine sandy loam, 8 to 15 percent slopes
Ps	Pits, gravel and sand
Sa	Scantic silt loam, 0 to 3 percent slopes
SB	Scantic-Biddeford complex, 0 to 3 percent slopes
SdB	Scantic-Lamoine complex, 0 to 8 percent slopes, very stony
SEB	Scantic-Lamoine-Dixfield complex, gently sloping, very stony
SfC	Schoodic-Rock outcrop complex, 0 to 15 percent slopes
SmB	Sheepscot sandy loam, 0 to 8 percent slopes
SoB	Sheepscot sandy loam, 3 to 8 percent slopes, very stony
SoC	Sheepscot sandy loam, 8 to 15 percent slopes, very stony
TuB	Tunbridge-Lyman complex, 3 to 8 percent slopes, rocky
TuC	Tunbridge-Lyman complex, 8 to 15 percent slopes, rocky
Ud	Udorthents-Urban land complex
W	Water bodies
Wo	Wonsqueak muck, flooded
Ws	Wonsqueak and Bucksport mucks
WT	Wonsqueak, Bucksport, and Sebago soils

Source: NRCS 2015

The final general soil group is the Dixfield-Marlow-Brayton unit, located west of Lake Leonard. These soils consist of very deep compact upland glacial till that is poorly to well drained with steep to nearly flat topography.

Exposed boulder/ledge substrate is limited in, and around, Graham Lake. Boulder/cobble substrate mixed with sand and gravel is the most common substrate along the east shore of Graham Lake and the islands. The western shore of Graham Lake is made up of varying ratios of clay and finer sands as well as medium to coarse sands and some fine gravel. Some small areas (predominantly in the southwest area of Graham Lake) have boulder and cobble areas. A combination of clay, sand, gravel, and organic substrates are present where the Union River enters the northern portion of Graham Lake (Northrop, Devine & Tarbell, Inc., 1990).

Portions of the shoreline along Graham Lake are comprised of highly erodible soils, including sand and gravel. The combination of wave and ice action on exposed, erodible soils contribute to shoreline erosion along Graham Lake. Erosion was observed in select areas along the shoreline of Graham Lake, including bank slumps located primarily along the western shore of the impoundment. The shoreline of Lake Leonard is composed of ledge and stony glacial soils with gentle to moderate slopes. The Ellsworth Dam is located in a gorge of solid bedrock.

4.4.1.2 Environmental Effects

Potential Project effects to geology and soil resources are limited to the possibility that water level fluctuations may impact soils and geologic resources through shoreline erosion. Shoreline erosion is present along portions of Graham Lake. The combination of wave and ice action, erodible soils, and water level fluctuations may contribute to this erosion within Graham Lake (FERC, 1987). Much of the shoreline is heavily vegetated with forest and wetland habitats, which reduce the potential for erosion along the shoreline.

Shoreline erosion was problematic around Graham Lake in the past when water surface elevation was greater than 104' mean sea level (msl) (FERC, 1987). FERC provided the following comment on shoreline erosion in its 1987 Environmental Assessment: "DEP states that this limit on the surface elevation appears adequate for managing shoreline erosion, and recommends that the applicant maintain the Graham Lake surface elevation within 104.2 feet msl and 92.4 feet msl according to the applicant's proposed operational curve. To minimize shoreline erosion and turbidity in Lake Leonard, DEP recommends that the applicant maintain the lake level of Lake Leonard within 1 foot of the crest of the Ellsworth Dam flashboards; that is, 65.7 feet msl and 66.7 feet msl." FERC concluded in its Environmental Assessment that an unavoidable adverse impact of the Project, "…would be some increase in suspended sediment from wave and ice action on shoreline areas." To address landowner concerns about shoreline erosion at that time, the Licensee evaluated surface water elevation and developed a new rule curve, limiting maximum surface elevation to 104.2' msl. This rule curve has been in effect since 1980.

The Licensee developed a study plan in 1990 to determine the effectiveness of the water elevation management plan in controlling shoreline erosion, protecting water quality, and providing for enhancement of fish and wildlife resources in response to Article 403 of the 1987 FERC license. This study, conducted by Northrup, Devine and Tarbell, Inc. 1990, concluded that, "The observations made as part of the study of the effectiveness of the present water elevation management plan confirmed that a majority of the shoreline at Graham Lake has been subject to erosion forces since the establishment of the original impoundment. The majority of the soils that exist at the Graham Lake site are silt, sand, and clay and tills which are all susceptible to erosion forces. Observations confirm that the present operating rule curve has reduced the erosion conditions and reduced the risk of erosion damage to camp owners bordering the lake. Minor erosion continues to take place along some sections of the shoreline. These shoreline areas are predominantly effected by wave action under the maximum water levels that occur in the spring." This report also stated that "The present operating rule curve (one foot below the original curve) has succeeded in reducing shoreline erosion."

Stakeholders did not express concerns, provide comments, or submit study plan requests to address soil erosion or suspended sediments during the scoping phase of this current relicensing process.

Black Bear is proposing no changes of operations; therefore, Black Bear anticipates that continued operation of the Ellsworth Project will not significantly affect geological and soil resources.

4.4.1.3 Proposed Environmental Measures

Black Bear is proposing to continue operating the Project under the current operating regime.

4.4.1.5 Unavoidable Adverse Effects

Some small amounts of erosion and sedimentation may occur within the Project boundary as a result of continued Project operation. However, Black Bear has demonstrated that operation of the Ellsworth Project has a limited effect on geological resources and soil; therefore, PME measures are not warranted.

4.4.2 Water Resources

4.4.2.1 Affected Environment

Water Resources Overview

The Project area is located within the Union River watershed and encompasses portions of the Union River, Lake Leonard, and Graham Lake. The Union River watershed encompasses approximately 547 square miles in Hancock and Penobscot Counties in Maine (Maine DEP, MDIF&W, and MEGIS, 2010) and includes 484 miles of streams and 81 miles of lakes and ponds) (College of the Atlantic, 2004). The Union River watershed is bordered by coastal rivers and by the Gulf of Maine to the south, the Penobscot River basin to the west and north, and the Narraguagus River basin to the east (FERC, 1987a).

The Project creates two impoundments on the Union River, Lake Leonard which is a small impoundment, and Graham Lake which is a larger storage reservoir. Ellsworth Dam, the lower dam, is located at the upper limit of tidal influence of the Union River, impounds Lake Leonard, and is the site of power generation. Lake Leonard has a surface area of approximately 90 acres at its normal maximum elevation of 66.7' msl, a width of up to 0.3 miles and a maximum length of approximately 1.0 mile. Lake Leonard has a volume of 751 acre-feet (Mohler, 2012a).

Graham Lake is the storage reservoir formed by the Graham Lake Dam. The Graham Lake Dam is located approximately four miles upstream of the Ellsworth Dam. Graham Lake has a surface area of approximately 10,000 acres at a normal full pond surface elevation of 104.2' msl; a maximum width of 2.75 miles; and a maximum length of approximately 10 miles. Graham Lake has a volume of approximately 124,000 acre-feet.

Drainage Area

The Union River at the Ellsworth Dam has an average annual flow of approximately 550 cfs from a drainage area of approximately 547 square miles (Maine DEP, 1987 and Maine DEP, MDIF&W, and MEGIS, 2010). The total drainage area at Graham Dam is approximately 499 square miles (Maine DEP, MDIF&W, and MEGIS, 2010).

The Union River originates from the following sources: Great Pond (West Branch) in Great Pond Township approximately 18 miles north of Graham Lake; Upper Middle Branch Pond (Alligator Lake) (Middle Branch) approximately 14 miles northeast of Graham Lake; and Rocky Pond (East Branch) approximately 24 miles northeast of Graham Lake. The Union River is approximately 65 miles long. Topographically, the watershed is hilly, but also has numerous flat or gently rolling plains, a few high bedrock ridges and monadnocks, and a variety of lakes, ponds, and streams with associated marshes, bogs and forested wetlands (FERC 1987b, College of the Atlantic 2004). The Union River flows into Union River Bay in the Atlantic Ocean, approximately three miles downstream from the Project (FERC, 1987a).

In addition to the East and West Branches of the Union River, Graham Lake receives flow from the outlets of Beech Hill Pond, Webb Pond (Webb Brook), and Green Lake (Reed's Brook) (USFWS, 2005). Other tributaries to Graham Lake include Little Meadow Brook, Rocky Brook, Jordan Brook, Dumb Brook, Tannery Brook, Rankin Brook, Day Brook, Hapworth Brook, Archer Brook, Cyreno Brook, and several unnamed tributaries.

Lake Leonard receives flow from the outlet of Branch Lake (Branch Lake Stream) and two unnamed tributaries. Furthermore, Grey, Shackford, Moore and Gilpatrick Brooks and some unnamed tributaries, flow into the Union River downstream of Graham Lake and upstream of Lake Leonard.

Streamflow, Gage Data and Flow Statistics

Black Bear uses the waters of the Union River for power generation at the Ellsworth Dam and for water storage at the Graham Lake Dam. Operationally the Project is typically run as a peaking project, with water being released from the Graham Lake reservoir and then used to generate electricity at the downstream Ellsworth powerhouse. Water levels in Lake Leonard vary very little over the course of the year. Water levels in Graham Lake are typically managed between elevations 93'msl (end of March in order to provide storage capacity for spring rains and snow melt runoff) and 104.2'msl (typically in late May after Spring runoff). This provides significant downstream flood control benefits. Water levels then gradually decline over the summer months down to approximately 98'msl in mid-October after which the lake is partially refilled at the first of the year.

Black Bear operates the Project as a peaking facility, depending on available inflows, and uses all available river flows 99 percent of the time (FERC, 1987a). Under Article 401 of the FERC license, Licensee is required to release a continuous minimum flow of 105 cubic feet per second (cfs) from the Ellsworth Dam and the Graham Lake Dam from July 1 through April 30, and a continuous minimum flow of 250 cfs from May 1 through June 30, for the protection of fishery resources (FERC 1987b). Timed releases from Graham Lake are used at the Ellsworth Dam for power production. These releases result in minor (approximately 1 foot) surface elevation changes in Lake Leonard and greater changes (approximately 10 feet over the course of the year) in Graham Lake. Figure E-6 depicts the Graham Lake Reservoir Operating Curves.

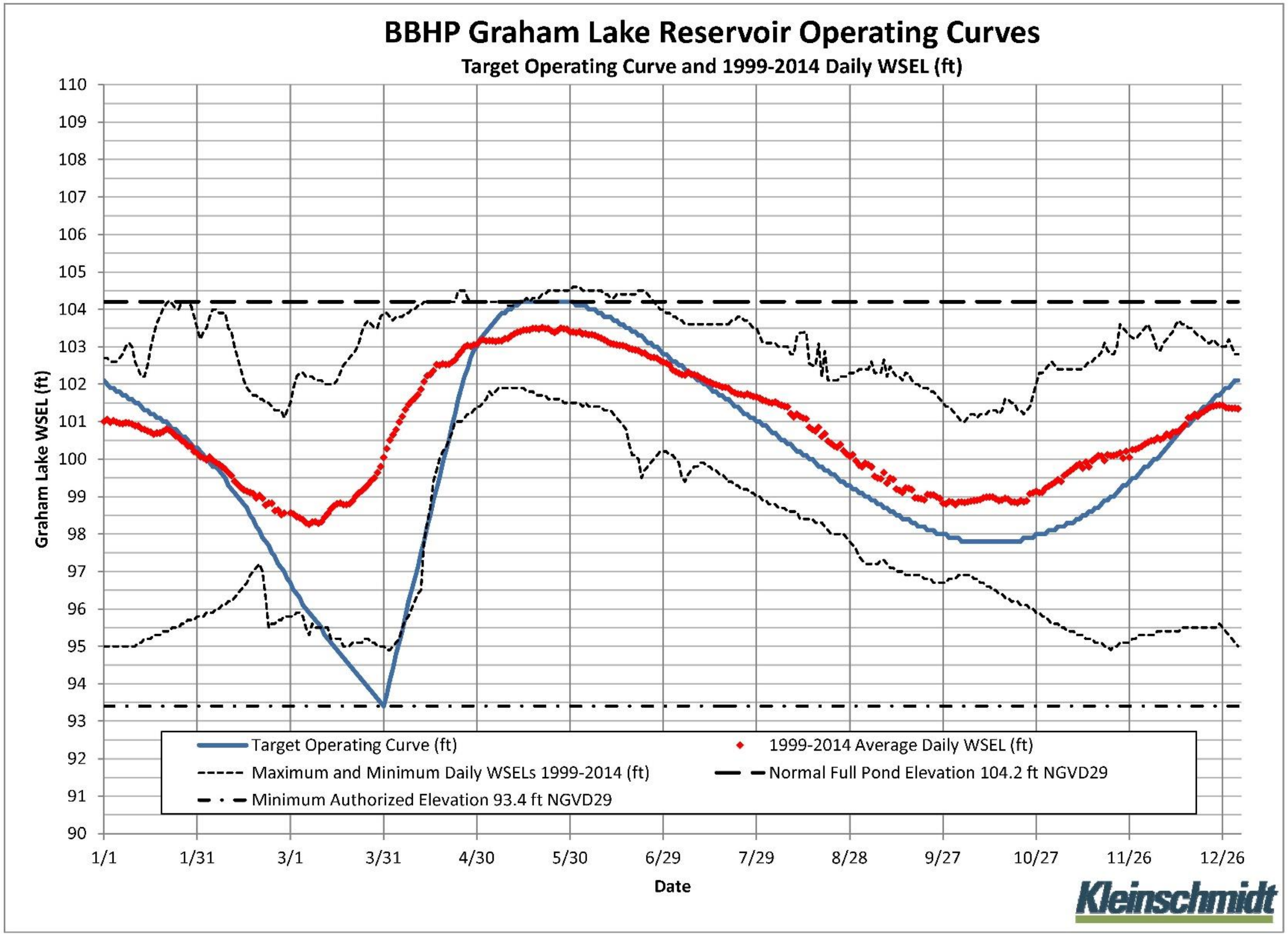
Existing and Proposed Uses of Water

Water within the Project area is not used for major consumption, irrigation, municipal water supply, or industrial purposes, although some seasonal residential use does occur. There are no known major withdrawals of water from the Project impoundments.

Potential sources of non-point source discharge into the Union River watershed include agricultural run-off, road salt, and sediment inputs due to land use activities. Permitted point source discharges to the Project impoundment include effluent from the U.S. Fish and Wildlife Service's Green Lake National Fish Hatchery, which discharges to Reed's Brook, the outlet stream of Green Lake and a tributary to Graham Lake (USFWS, 2005).

Black Bear currently proposes to continue the operational pattern of the Project and does not propose to modify the existing uses of water at the Project.

Figure E-6: Graham Lake Historic Operating Curves 1998 – 2012



Existing Instream Flow Uses

The primary developmental uses of inflows to the Project are water storage and hydroelectric generation, and to a limited extent recreation. Recreational uses include boating and fishing.

Upstream from the Project, there are five retired, unlicensed hydroelectric projects and one operating, licensed project (the Green Lake Dam). Branch Lake, which is an impoundment of Branch Lake Stream, a tributary of Lake Leonard, provides water to the Ellsworth Water Company for domestic use (Bangor Hydro-Electric Company, 1984).

The City of Ellsworth's municipal waste water treatment plant discharges into the Union River estuary approximately 0.5 miles downstream from the Ellsworth Dam (Maine DEP, 1987).

Existing Water Rights

Currently, no major withdrawals are made from Graham Lake, Lake Leonard, or the Union River within the Project boundary. Black Bear has all the ownership or flowage easements necessary to operate the Project. There is no commercial development and there are no residences within the Project boundary along Lake Leonard or the Union River. There is existing residential development within the Project boundary on Graham Lake, most of which are seasonal dwellings.

Impoundment Bathymetry

Graham Lake is oriented in a north-south direction and flow is from north to south. The lake is divided into two large basins (a north and a south basin) by a peninsula that originates from the western shore (USFWS, 2005). The lake is irregular in shape with numerous coves and inlets. The mean depth of Graham Lake is 17 feet, and the maximum depth is 47 feet. Figure E-7 depicts the bathymetry of Graham Lake. This figure was developed from ortho-photo based shape files of the Graham Lake shoreline at known dates (August 22, 2007, and May 19, 2004) and lake elevations (99.0’ and 103.9’ respectively). A third elevation, 102.5’ was interpolated between the 99.0’ and 103.9 elevations. Figure E-8 is a sounding map of Graham Lake developed by the Maine Department of Inland Fisheries and Wildlife (revised 1980). Lake Leonard runs northwest to southeast with flow in the same direction, has a mean depth of 25 feet and a maximum depth of 55 feet. Figure E-9 is a sounding map of Lake Leonard developed by the Maine Department of Inland Fisheries and Wildlife (1960). Morphometric information for Lake Leonard and Graham Lake is presented in Table E-4 below.

Figure E-7: Graham Lake Bathymetry Map

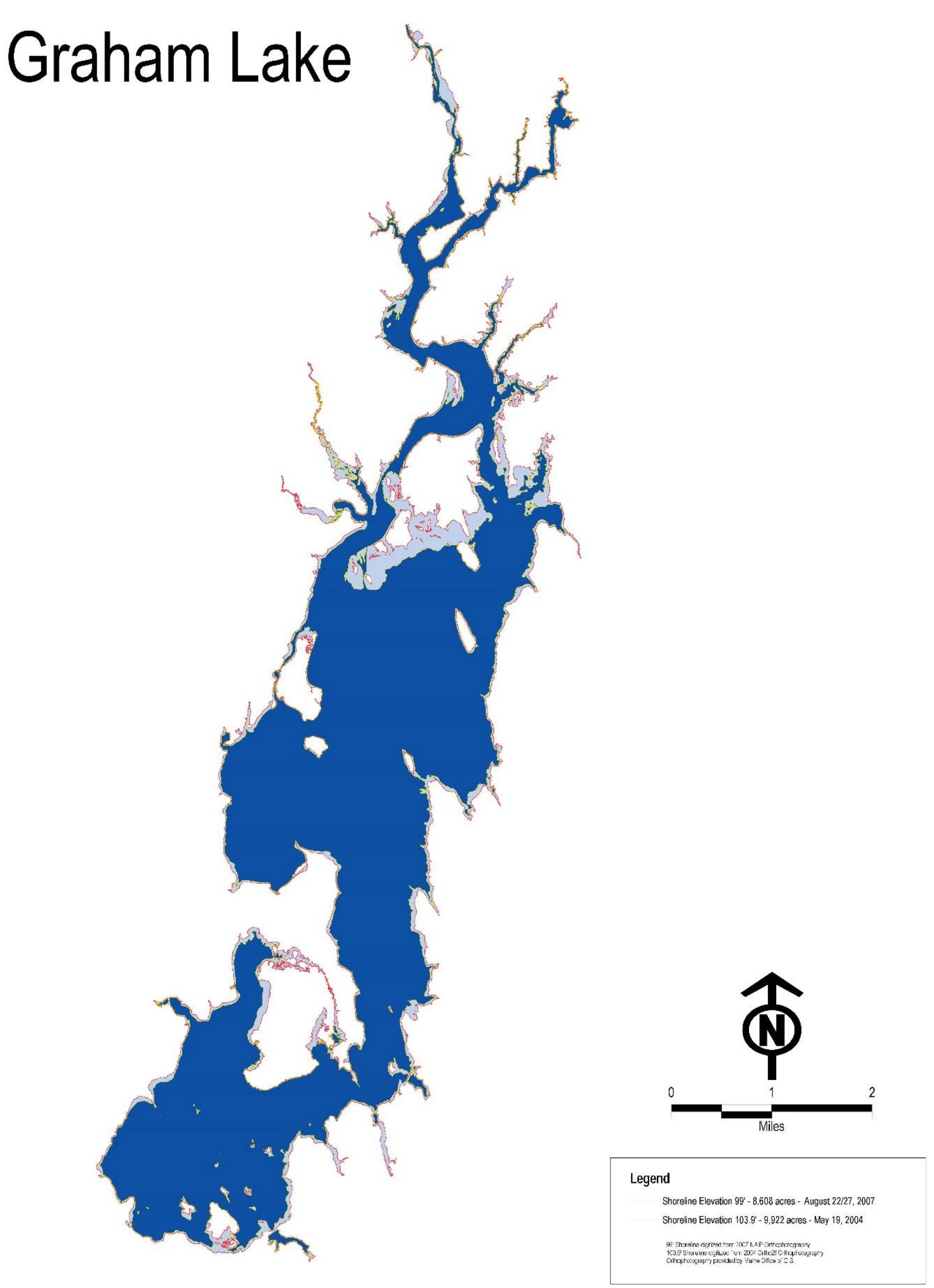


Figure E-8: Graham Lake Maine DIFW Bathymetry Map

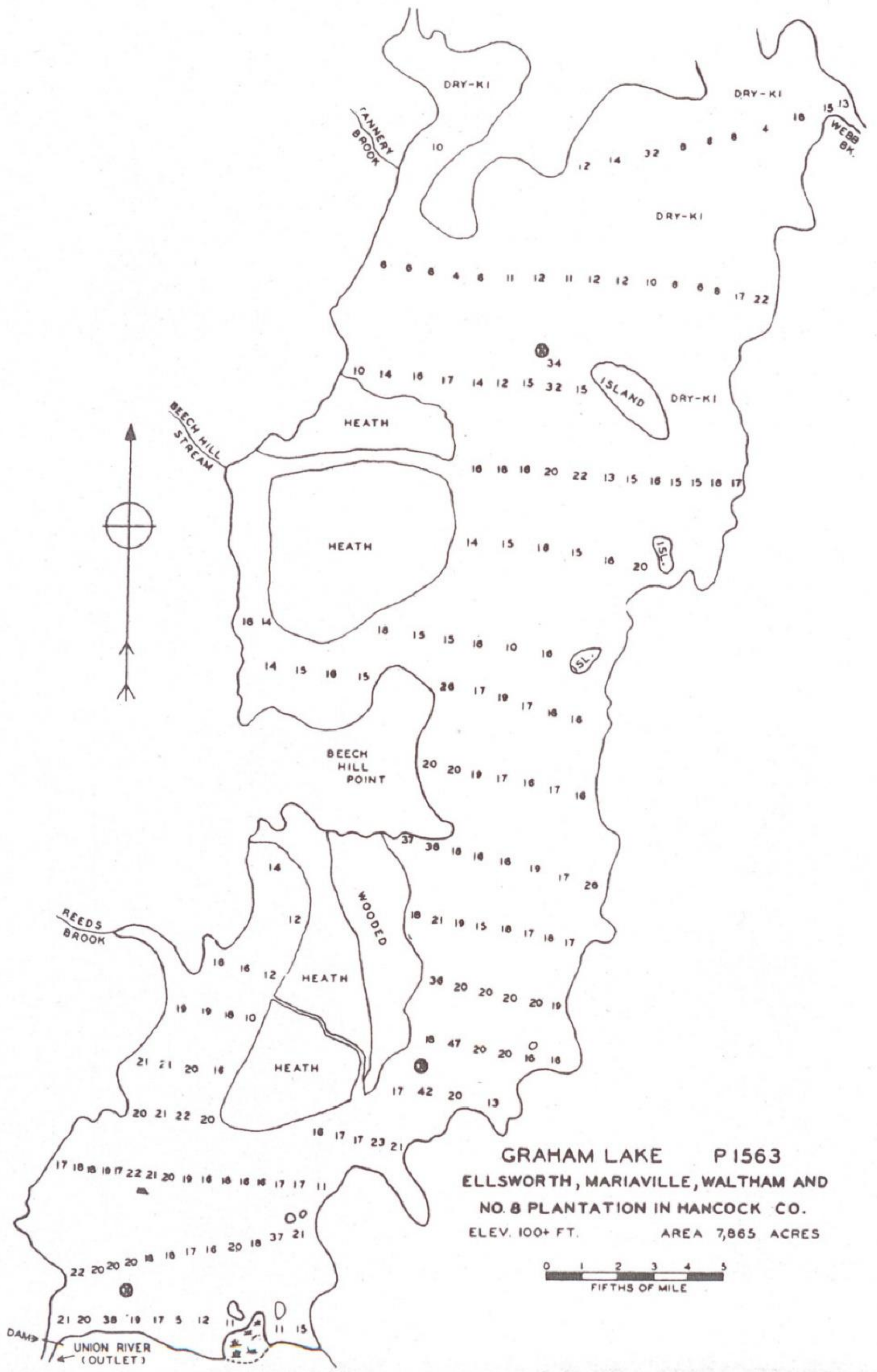


Figure E-9: Leonard Lake Bathymetry Map

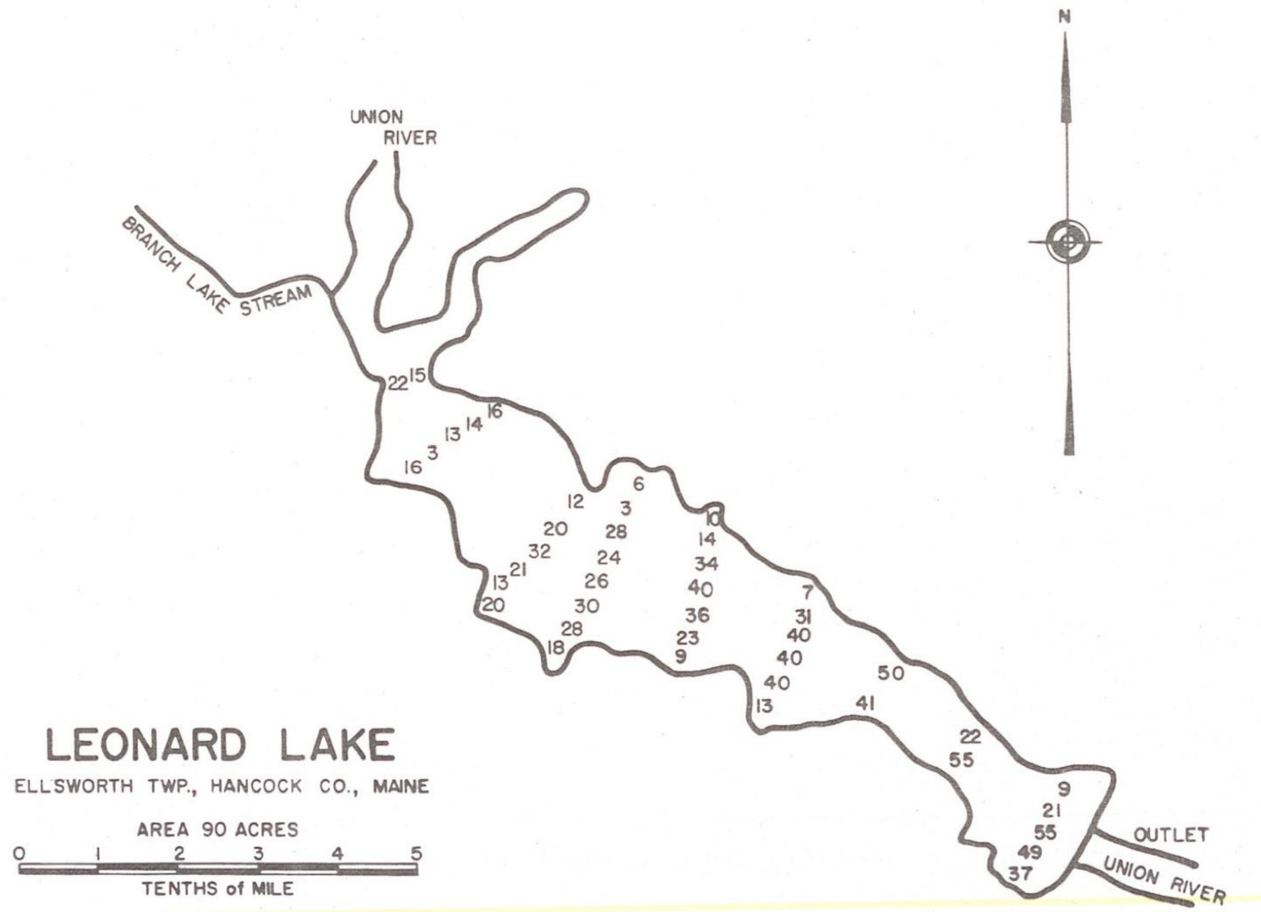


Table E-4: Morphometric Information for the Lake Leonard and Graham Lake Impoundments

	Lake Leonard	Graham Lake
Area (ac)	90	10,000
Perimeter (miles)	4.4	80
Mean Depth (ft)	25	17
Maximum Depth (ft)	55	47
Flushing Rate (flushes per year)	288	4.06
Total Volume (ac-ft)	751	124,000
Direct Drainage Area (sq. mi)	12	48.56
Total Drainage Area (sq. mi)	547	499
Elevation at full pond (ft msl)	66.7	104.2

Gradient of Downstream Reaches

The Project is located in the southern portion of the Union River watershed; the Union River flows into the Union River Bay approximately three miles downstream from the Project. The Ellsworth Dam is located at the upper limit of tidal influence of the Union River.

Water Quality Standards

Water quality certification for the initial licensing of the Ellsworth Project was issued by the Maine Department of Environmental Protection on March 11, 1987. The Maine DEP determined in its issuance of the Water Quality Certificate that the Project would meet applicable water quality standards pursuant to the Clean Water Act (CWA).

Maine statute 38 MRSA (§464-470) establishes the basis for the State's classification system of surface waters. The State has one water quality standard for lakes and great ponds (GPA) which includes inland bodies of water artificially formed or increased that have a surface area greater than 30 acres. Graham Lake is included in this classification The Maine DEP currently interprets the water quality statutes to classify Lake Leonard as a GPA water (K. Howatt, Maine DEP personal communication, June 16, 2015). There are four standards for the classification of fresh surface waters which are not classified as great ponds: Class AA, A, B, and C waters. The Union River from the outlet of Graham Lake to tidewater is classified as Class B (Maine Revised Statute, 2012a).

Designated uses for Class GPA water include: drinking water supply after disinfection; recreation in and on the water; fishing; agriculture, industrial process and cooling water supply; hydroelectric power generation; navigation; and habitat for fish and aquatic life. The habitat must be characterized as natural (Maine Revised Statute, 2012c). Designated uses for Class B waters are the same as those for Class GPA waters and are described above, except in outstanding river segments (as defined under Title 12, section 403) where hydroelectric power generation is prohibited. The Union River is not designated as an outstanding river segment. The habitat in Class B waters must be characterized as unimpaired (Maine Revised Statute, 2012b).

The water quality standard for Class B waters (Table E-5) requires that dissolved oxygen (DO) concentrations be maintained at not less than 7 parts per million (ppm) or 75 percent saturation whichever is higher.

Table E-5: Maine Water Quality Standards for Select Parameters for Class B and GPA Waters

Parameter	Standard Class B	Standard GPA
DO (mg/L)	7 ppm or 75% of saturation, whichever is higher, except from Oct. 1st to May 14th, the 7-day mean DO concentration may not be less than 9.5 ppm and the 1-day minimum DO concentration may not be less than 8.0 ppm in identified fish spawning areas	No Numeric Standard
pH (su)	6.0 to 8.5	6.0 to 8.5
E. coli	Between May 15th and Sept, 30th, not to exceed a geometric mean of 64 per 100 milliliters or an instantaneous level of 236 per 100 milliliters	Not to exceed a geometric mean of 29 per 100 mL or an instantaneous level of 194 per 100 mL
Aquatic Life Habitat	Unimpaired	Natural

Sources: Maine Revised Statute, 2012b and 2012c

The State of Maine Department of Environmental Protection 2012 Integrated Water Quality Monitoring and Assessment Report, approved by the US Environmental Protection Agency, classified Graham Lake as Category 4c: aquatic life drawdown (impairment not caused by a pollutant, but impaired by habitat modification). The Union River main stem in Ellsworth is classified as having insufficient data or information to determine if designated uses are attained; one or more uses may be impaired (Maine DEP, 2012). In communications with the Maine DEP, staff stated that historically the main stem of the Union River, outside of the Project area had some transient isolated pockets of marginal dissolved oxygen non-attainment associated with discharge from the Ellsworth municipal wastewater treatment plant more than a mile below the Ellsworth Dam. New construction at the plant, including a new discharge location more than a mile below the previous discharge point, has recently been implemented. Maine DEP feels that these changes satisfactorily resolve the dissolved oxygen issue (R. Mohler, personal communication February 2015).

Existing Water Quality

Impoundment Sampling

Impoundment water quality sampling was conducted in accordance with Maine DEP's Lake Trophic State Sampling Protocol for Hydropower Studies on a bi-weekly basis in Graham Lake from April 23 through October 24, 2013, and in Lake Leonard from June 13 through October 24, 2013.

<u>Graham Lake</u>

Graham Lake is a large (approximately 10,000 acres), shallow lake (average depth 17 feet; maximum depth 47 feet). Sampling on Graham Lake was conducted at the three historic sampling locations (north, central, and south). In general there was little variation in sampling results between the three locations. Water in the lake is turbid (average 3.3 NTU) and colored (average 75.2 PCU) resulting in low visibility. The average Secchi disk transparency is less than two meters (average 1.7 meters). Algal production, as indicated by chlorophyll *a* levels, (average 2.3 µg/l) is low.

Graham Lake weakly stratifies during the summer months, but due to the shallowness of the lake and long fetch from multiple directions, the stratification often breaks down during windy periods that prevail on the lake. Thermal stratification was first documented on June 27 and occurred at all three of the sampling stations in Graham Lake. This was the only date on which thermal stratification was documented at Station 1 (central). Thermal stratification was documented one other time (July 18) at sampling Station 3 (north) when the top of the thermocline was at 3 meters. At sampling Station 2 (south), thermal stratification was also documented on July 2, July 18, August 1, and August 28. The top of the thermocline on June 27 and July 18 was at 3 and 4 meters respectively. The top of the thermocline on July 2 and for two dates in August was at 10 to 11 meters

The results of the 2013 sampling for Graham Lake are consistent with previous sampling efforts dating back to the 1970's.

Lake Leonard

Lake Leonard is a small (approximately 90 acres), though moderately deep lake (average depth 25 feet; maximum depth 55 feet) for its size. Sampling on Lake Leonard was conducted at the deep hole, a mid-channel location, slightly north of the buoy barriers at the Ellsworth Dam. Water quality in Lake Leonard is similar to Graham Lake, though slightly less turbid (average 2.59 NTU) and less colored (average 67.8 PCU). These differences are reflected in a slightly higher Secchi disk transparency (average 2.1 meters) in Lake Leonard. The improvements in Lake Leonard water quality over Graham lake water quality is likely in part due to intervening tributary inputs between the two developments, especially from Branch Lake Stream which enters toward the upper end of Lake Leonard. Algal production, as indicated by chlorophyll *a* levels, (average 2.4 µg/l) is low.

Riverine Sampling

River water quality sampling was conducted in the Union River in the tailwater area of Graham Lake Dam in accordance with Maine DEP's River Sampling Protocol on a weekly basis from July 2 through September 12, 2013 in both the early morning (before 7:00 AM) and afternoon (after 1:00 PM) on each sampling day. Sampling was not conducted in the Ellsworth Dam tailwater as the Union River is subject to tidal fluctuations at that point.

The Union River sampling was conducted mid-channel, approximately 450 feet downstream of the Graham Lake Dam. Water depth was 3-4+ meters on each sampling day. Sampling results showed only minor variation in vertical profile, and between the morning and afternoon periods on individual sampling days. Over the course of the 11 week sampling period, temperatures ranged from 19.1 – 26.6°C and DO levels ranged from 8.3 and 10.4 mg/l (96 – 114% saturation).

Secchi disk transparency and chlorophyll *a* levels averaged 2.1 meters and 3.3µg/l respectively. These values are similar to the sampling results for both Graham Lake and Lake Leonard.

As per the Maine DEP study request, benthic macroinvertebrate sampling was conducted at one location in the Union River approximately 450 feet downstream of Graham Lake Dam. Moody Mountain Environmental conducted the field sampling and laboratory procedures in accordance with the Maine Department of Environmental Protection's Methods for Biological Sampling and Analysis of Maine's Inland Waters (Davies and Tsomides 2002). The samplers were placed in the Union River on July 24, 2014 and were retrieved on August 22, 2014.

The macroinvertebrate community sampled below the Graham Lake Dam was abundant and rich in taxa (Leeper 2014). The community was populated with 29 different taxa with a Mean Total Abundance of 640. The community was dominated by filter-feeding caddisflies which represented more than 79% of Total Abundance. The Diversity value for the community was correspondingly low at 1.75.

Indices measuring the tolerance to poor water quality conditions revealed that sensitive caddisflies dominated the community. The EPT richness index showed that sensitive mayfly and caddisfly taxa represented 41% of the taxa identified. No stoneflies were collected. Of those 3 orders, the stoneflies and mayflies are generally more sensitive to environmental stressors. Two (2) mayfly taxa were found representing 7% of the taxa richness. In terms of numbers (Tot. Abundance), mayflies made up 1% of the community. Hilsenhoff's Biotic Index value, 4.91, indicated good water quality (Hilsenhoff 1987).

The community structure and function found in the tailwater section of the Graham Lake Dam on the Union River shows evidence of organic enrichment and filter-feeder dominance which is a common phenomenon below lake outlets and impoundments (Hynes 1970, Spence and Hynes 1970, Parker and Voshell 1983). Following consultation with Maine DEP, additional macroinvertebrate sampling will take place in the summer of 2015. Results of the additional sampling will be included in the FLA.

Impoundment Aquatic Habitat

Graham Lake, the upper reservoir of the Project, has a normal maximum surface area of approximately 10,000 acres and a maximum length of approximately 10 miles. In concurrence with Article 402 of the current FERC license, water levels in Graham Lake are managed between elevations of 93.4’ and 104.2’ mean sea level (msl). Generally Graham Lake is filled in the spring reaching full pond in mid-April following spring snow melt and runoff. The lake is gradually drawn down over the summer into the early fall as reservoir storage is used to augment downstream river flows. There is a partial refill during the late fall followed by a winter drawdown under the ice, typically reaching its lowest levels in late winter. Refill then re-occurs during the spring. Figure E-6 shows the historic operating curve for Graham Lake.

The lower impoundment, Lake Leonard is impounded by the Ellsworth Dam, has a surface area of 90 acres and a length of one mile. Water levels in Lake Leonard are normally maintained between the elevations of 65.7’ and 66.7’ msl as per the current FERC license.

A bathymetric map (Figure E-7) for Graham Lake was developed from ortho-photo based shape files of the Graham Lake shoreline at known dates and lake elevations. Ortho-photos were available for eight dates between May 2004 and August 2013. Lake level elevations for these dates ranged from 99.0’ to 103.9’ msl. The 103.9’ elevation is very close to the 104.2’ full pond elevation and the 99’ elevation is within a foot of the typical fall low point. Ice cover precluded shoreline determinations during the winter months when water level elevations are typically the lowest. At elevations of 103.9’ and 99.0’ the surface area of Graham Lake was calculated to be 9,922 and 8,608 acres respectively.

Exposed boulder/ledge substrate is limited in, and around, Graham Lake. Boulder/cobble substrate mixed with sand and gravel is the most common substrate along the east shore and the islands lake. In general, these substrate types are present from the shoreline to at least 4 to 5 feet depths. The western shore of Graham Lake is made up of varying ratios of clay and finer sands as well as medium to coarse sands and some fine gravel. Some localized areas have boulder and cobble mixed in with the sand/gravel. The north end of the lake, where the Union River enters the lake also has clay/sand/gravel substrates with some organic substrate. This area tends to have somewhat coarser material than the lower west shore. Substrate surrounding the heath areas within Graham Lake are dominated by clay and fine sand (Northrop, Devine & Tarbell, Inc., 1990).

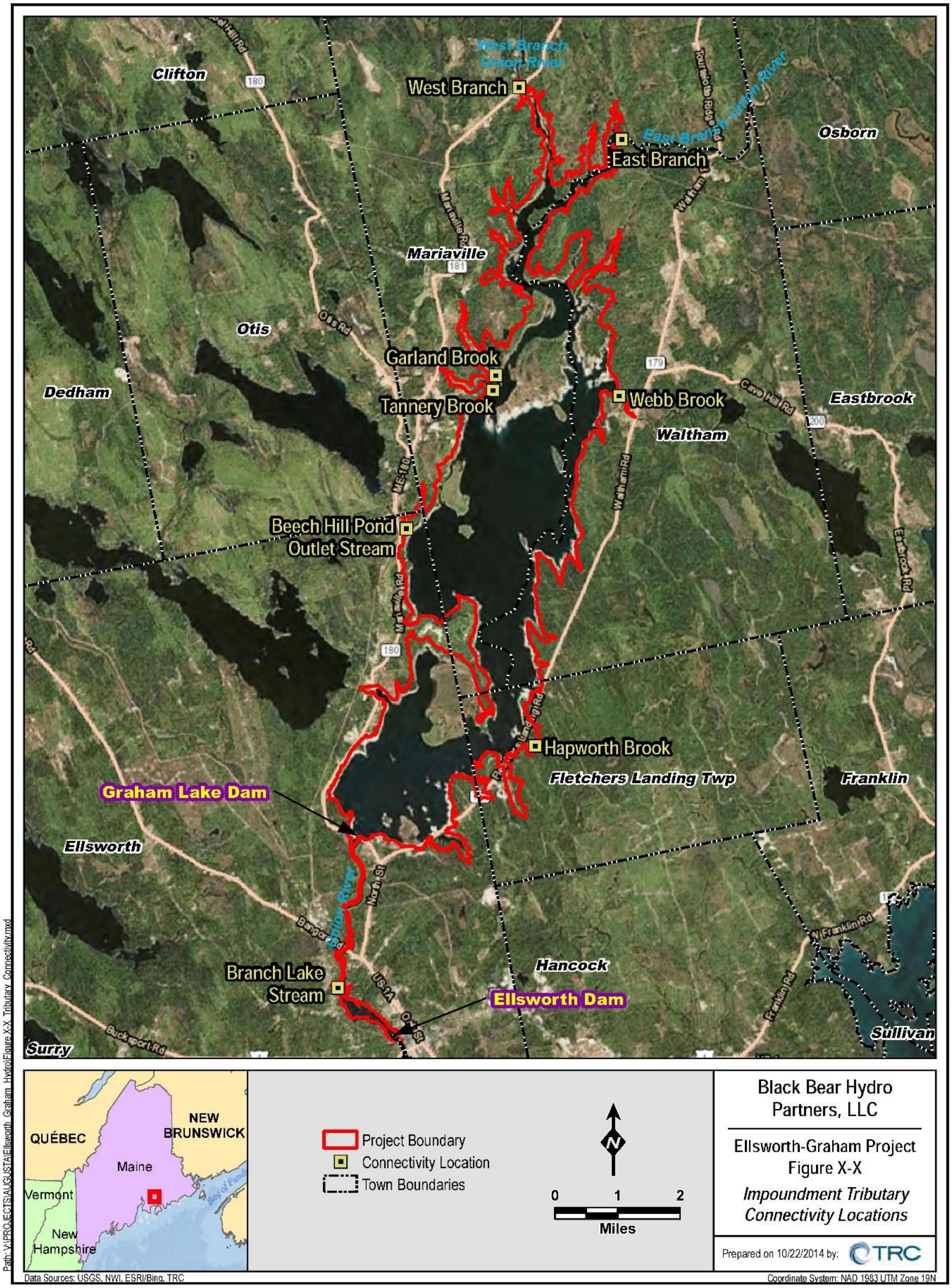
Impoundment Tributary Connectivity

An assessment of impoundment tributary connectivity for the single Lake Leonard and seven Graham Lake tributaries (Figure E-10) designated in FERC’s Study Plan Determination was based on field observations and photo documentation during low water conditions on October 5 and 6, 2014 when Graham Lake water level elevations were at 97.9’, and on October 6, 2014 when Lake Leonard was between elevations 65.7’ and 66.7’.

At the Graham Lake water levels investigated, the surface area of the lake was reduced from a full pond area of approximately 10,000 acres to approximately 8,340 acres. This change in lake surface area resulted in areas of dewatered shoreline around the lake. These areas were investigated to determine the effect of drawdown on lake access to the seven designated tributaries.

Hapworth Brook flows into Graham Lake via two culverts under Route 179, which are located adjacent to the lake’s eastern shore. One of the culverts was completely dry, but the second culvert was fully submerged with a water depth in excess of 5 feet connecting Hapworth Brook and the lake. Webb Brook entered Graham Lake via a 20-50 foot wide quick-flowing stream. Slightly upstream of the lake two beaver dams created runs and pools in the stream. Water depths ranged from a few inches to a few feet in the quick-flowing sections and up to several feet deep behind the beaver dams. The East Branch of the Union River is a large, quick-flowing boulder strewn stream that ranged in depth from a few inches to a few feet deep across its 50-100 foot width where it enters the lake. The West Branch of the Union River entering Graham Lake is a broad (100+ feet) run that is several feet deep at its center. Garland Brook enters Graham Lake via a long (0.7 miles), broad inlet with a well-defined channel. The gradient is very flat and the brook flows in wide meanders. The brook channel is 30-75 feet wide through most of its

Figure E-10: Impoundment Tributary Connectivity Locations



length, is quick-flowing, and is as much as 5+ feet deep. Tannery Brook is somewhat smaller, but otherwise very similar to Garland Brook, and the two brooks are located in close proximity to one another. The brook channel is 25-50 feet wide through most of its length, is quick-flowing and is 0.5 to 2+ feet deep. Beech Hill Stream enters Graham Lake by an approximately 1600-foot long, broad, flat inlet. Just upstream of the inlet area is a small beaver dam and approximately 200 feet upstream of the beaver dam is a cascade with a vertical drop of about 8 feet. The stream is quick-flowing in the inlet area and is 0.5 to 2+ feet deep. At the water levels observed, tributary connectivity exists through the dewatered shoreline areas of Graham Lake for all of the tributaries investigated.

Only one tributary to Lake Leonard, Branch Lake Stream was investigated. Branch Lake Stream is dammed by a small concrete dam at its confluence with Lake Leonard. The dam has two approximately 4-foot wide stop log sections. It was difficult to determine if there were any engaged stop logs, though the openings were clogged with logs, sticks, and debris.

Riverine Aquatic Habitat

The outlet stream (Union River) downstream of the Graham Lake Dam was evaluated regarding the adequacy of of habitat for aquatic organisms under current instream flow releases.

Article 401 of the current FERC license requires a continuous minimum flow release of 105 cfs from the Graham Lake Dam from July 1 through April 30 and 250 cfs from May 1 through June 30, for the protection of fishery resources. Measurements were obtained of the wetted width and bankfull width under the 150 cfs minimum flow conditions on the Union River approximately 1,000 feet downstream of Graham Lake Dam.

The Union River at the point of measurement is the beginning of a long run stretch of river. The bankfull width of the river is 242 feet at this point. At 150 cfs the wetted width was 203 feet or 83% of the bankfull width. The water depth at this transect was 12+ feet.

4.4.2.2 Environmental Analysis

Impoundment Water Quality

As described above, impoundment water quality sampling was conducted in accordance with Maine DEP's Lake Trophic State Sampling Protocol for Hydropower Studies on a bi-weekly basis in Graham Lake from April 23 through October 24, 2013, and in Lake Leonard from June 13 through October 24, 2013. Results of the sampling indicate that Graham Lake meets the applicable Class GPA trophic state standards and is free of culturally induced algal blooms which might impair its use or enjoyment. Lake Leonard, to which Maine DEP has indicated the GPA standards apply, also meets the standards applicable to that classification. The water quality parameters typically sampled for Class B waters (riverine) were included in the Lake Leonard trophic state sampling conducted in 2013 as requested by the Maine DEP. Maine DEP has requested no additional sampling of Lake Leonard.

Impoundment Aquatic Habitat

Maine DEP considers aquatic life and habitat standards in determining whether a water body is meeting water quality standards. It is Maine DEP's position that there must be both sufficient quality and quantity of habitat for aquatic organisms to meet aquatic life and habitat standards. The Maine DEP has a hydropower policy which states that, generally, water levels providing wetted conditions for ¾ of the littoral zone of a lake or pond, as measure from full pond conditions, are sufficient to meet aquatic life and habitat standards. As discussed above, Black Bear developed an ortho-photo based bathymetric map for Graham Lake with elevations ranging between 103.9' and 99.0'. These elevations were within 0.3' and 1.0' of normal full pond (104.2') and the typical fall drawdown low point. At elevations 103.9' and 99.0' the surface area of Graham Lake was calculated to be 9,922 and 8,608 acres respectively.

Using a depth of twice the mean 2013 summer sampling Secchi disk transparency (1.77 meters or 5.8 feet) as a measure of the bottom of the littoral zone, the littoral zone depth at Graham Lake was approximately 11.6 feet during the sampling period. This calculates to an elevation of 92.6'. Extrapolating, at its deepest the littoral zone of Graham Lake at elevation 92.6' has an area of approximately 7,232 acres. Similarly extrapolating from known bathymetric data, Graham Lake at full pond elevation of 104.2 has a surface area of 10,042 acres. Thus the approximate area of the littoral zone is: 10,042 acres – 7,232 acres =2,810 acres.

Lake Leonard is operated as a run-of-river facility with a maximum normal pond fluctuation of one foot. As such Lake Leonard essentially maintains a fully wetted littoral zone.

Riverine Water Quality

Tailwater water quality sampling downstream of Graham Lake Dam was conducted in accordance with Maine DEP's River Sampling Protocol on weekly basis from July 2 through September 12, 2013 in both the early morning (before 7:00 AM) and afternoon (after 1:00 PM) on each sampling day. Tailrace sampling was not conducted in the Ellsworth Dam tailrace as the Union River is subject to tidal fluctuations at that point. Results of the sampling indicate that Class B physical and chemical water quality standards were met in the tailwater downstream of Graham Lake Dam.

Riverine Aquatic Habitat

Macroinvertebrate sampling in 2014 showed a hyperdominance of net spinning caddisflies in the Graham Lake tailwater, a phenomenon commonly seen in rivers below lakes and reservoirs. Following consultation with Maine DEP, additional macroinvertebrate sampling will take place in the summer of 2015. Results of the sampling will be included in the FLA. Regardless of how the Project is operated, this effect would be expected to continue to occur in the Graham Lake tailwater.

The wetted width, coupled with the depth at the flow release at Graham Lake Dam of 150 cfs, provided adequate wetted habitat for aquatic organisms in the Union River. Given that 105 cfs flow is the minimum flow out of Graham Lake (July 1- April 30) and 250 cfs at others times, and that Black Bear is not proposing any operational changes, the wetted zone of passage and habitat for aquatic organisms will remain adequate in the future.

4.4.2.3 Proposed Environmental Measures

Black Bear proposes to continue to operate and maintain the Project generally under the existing licensed regime. Under the propose operation of the Project, there will be no significant changes to the magnitude or timing of seasonal minimum flow releases, or of Graham Lake or Leonard Lake water levels, from what currently occurs. As a result, the operation of the Project will have no impacts on existing water quality in Graham Lake, the Union River or Lake Leonard.

4.4.2.4 Cumulative Effects

In Scoping Document 1, the effects of continued Project operation on dissolved oxygen and water temperature in Lake Leonard, Graham Lake, and the Union River downstream of the Project were identified as an issue to be analyzed for both cumulative and site specific effects. Black Bear is proposing to continue to operate the Project with the same flow and water level restrictions that are in the current license. As there are no proposed changes to the Ellsworth Project flow regime, or to the fundamental operation of the Project, as both a generating and storage Project, there will be no cumulative impacts to water quality in Graham Lake, Lake Leonard, or the Union River.

4.4.2.5 Unavoidable Adverse Impacts

The continued operation of the Ellsworth Project as proposed will result in no new impacts to Project water quality. The annual drawdown of Graham Lake for the purposes of enhanced generation at the Ellsworth Dam is managed within the licensed impoundment elevations of 104.2’ and 93.4’ while at the same time maintaining the seasonal minimum flow license conditions of 105 cfs (July 1 through April 30) and 250 cfs (May 1 through June 30). The drawdown results in portions of the littoral zone being dewatered. The greatest extent of the drawdown occurs early in the year under ice cover conditions.

4.4.3 Fish and Aquatic Resources

4.4.3.1 Affected Environment

The Union River watershed is inhabited by a diversity of coldwater and warmwater fish species (Baum 1982). Approximately 36 species of fish are known to occur in the Project area (Table E-6).

Long-term fishery management goals have been identified for reaches of the Union River in the *Comprehensive Fishery Management Plan for the Union River Drainage* (CFMP [URFCC 2015]). The mainstem between Ellsworth Dam and Graham Lake Dam is managed for sustained production of brook trout and as a migratory pathway for Atlantic salmon, American shad, river herring and American eels. Graham Lake is managed for existing resident species including smallmouth bass, white perch and pickerel, as well as alewives and eels (URFCC 2015).

American shad, river herring and American eels, along with striped bass, are managed in accordance with the Atlantic States Marine Fisheries Commission's Interstate Fisheries Management Plans from the mouth of the Union River to Ellsworth Dam. This reach of the river is also managed for sustained production of resident and diadromous species.

Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon are species listed under the Endangered Species Act (ESA) as discussed in the following sections.

Resident Species

Warmwater species such as smallmouth bass, chain pickerel, and white perch are resident species in Graham Lake and Lake Leonard (Black Bear 2012). Largemouth bass were introduced illegally into Graham Lake about five years ago, and are expanding rapidly (Greg Burr, Maine DIFW, personal communication July 3, 2014). Data collected at a bass tournament in Graham Lake showed the largest bass caught (species was not specified) weighed 5.2 pounds, and the average weight of the bass caught by each team ranged from 1.7 to 3.9 pounds, Table E-7 (USA Bassin 2014).

Table E-6: Fish Species Known to Occur in the Union River Watershed

Scientific Name	Common Name
Acipenseridae	
Acipenser oxyrinchus	Atlantic sturgeon
Acipenser brevirostrum	Shortnose sturgeon
Anguillidae	
Anguilla rostrata	American eel
Catostomidae	
Catostomus commersoni	White sucker
Clupeidae	
Alosa aestivalis	Blueback herring
Alosa pseudoharengus	Alewife
Alosa sapidissima	American shad
Centrachidae	
Lepomis gibbosus	Pumpkinseed
Lepomis auritus	Redbreast sunfish
Micropterus dolomieu	Smallmouth bass
Micropterus salmoides	Largemouth bass
Cyprinidae	
Luxilus cornutus	Common shiner
Notemigonus crysoleucas	Golden shiner
Notropis heterolepis	Blacknose shiner
Phoxinus eos	Northern redbelly dace
Semotilus atromaculatus	Creek chub
Semotilus corporalis	Fallfish
Cyprinodontiformes	
Fundulus diaphanus	Banded killifish
Fundulus heteroclitus	Mummichog
Esocidae	
Esox niger	Chain pickerel
Gadidae	
Microgadus tomcod	Tomcod
Gasterosteidae	
Gasterosteus oculeatus	Threespine stickleback
Pungitius pungitius	Ninespine stickleback
Ictaluridae	
Ameiurus nebulosus	Brown bullhead (hornpout)
Osmeridae	
Oxmerus mordax	Rainbow smelt
Percichthyidae	
Morone americana	White perch
Morone saxatilis	Striped bass

Scientific Name	Common Name
Percidae	
Perca flavescens	Yellow perch
Petromyzontidae	
Petromyzon marinus	Sea lamprey
Salmonidae	
Salvelinus alpinus	Landlocked arctic char
Salvelinus fontinalis	Brook trout
Savelinus namaycush	Lake trout (togue)
Salvelinus namaycush x S. fontinalis	Splake
Salmo salar	Atlantic salmon
Salmo salar sebago	Landlocked salmon
Salmo trutta	Brown trout

Source: Black Bear 2012; Maine DIFW 2013a and 2013b; Baum 1982

Table E-7: Bass Tournament Results, Graham Lake, May 18, 2014

Group	No. of Bass	Total Weight (lbs)	Avg. Weight (lbs)*	Largest Fish Weight (lbs)
1	5	19.3	3.9	5.2
2	5	18.5	3.7	5.1
3	5	13.9	2.8	4.3
4	5	13.1	2.6	3.4
5	5	12.7	2.5	3.5
6	5	11.1	2.2	2.3
7	3	5.2	1.7	0
8	2	4.2	2.1	0

*Calculated. Source: USA Bassin 2014.

Good white perch fishing exists at Graham Lake, which also has a productive pickerel (URFCC 2015) and brown bullhead fishery (Dick Fennelly, personal communication July 23, 2014). Given the connections and proximity between other adjacent lakes and ponds to Graham Lake and Lake Leonard, species likely drop down to the Project area; for example, in the spring, lake trout, brook trout, brown trout, and landlocked salmon are caught below Graham Lake Dam, but not in great numbers (Burr, G. Maine DIFW, personal communication, July 23, 2014).

Stocking of brown trout still occurs at some lakes and ponds in the drainage, and wild brown trout still occur in the Union River (Greg Burr, Maine DIFW, personal communication July 23, 2014). Maine DIFW stocked brook trout in the riverine reach of the Union River between Graham Lake Dam and the Ellsworth Dam from approximately 2004 to 2007 (Burr, G. Maine DIFW, personal communication, March 7, 2013 and July 18, 2013), however, stockings were not successful and the efforts were cancelled (Burr, G. Maine DIFW, personal communication, July 3, 2014).

Fish that occur in Graham Lake and the Union River upstream of Lake Leonard would be expected to occur in Lake Leonard as well.

Diadromous Fish

River Herring (Alewives and Blueback Herring)

Alewives are common in the Union River in May and June (Baum 1982). Alewives spawn about two or three weeks earlier in the spring than blueback herring. They migrate upstream entering rivers from the ocean in April and May, spawning in quiet areas with slow current or in still pools (Jenkins and Burkhead 1993). Similar to other herring species, they are fractional broadcast spawners, randomly releasing their small adhesive eggs over cobble, gravel, or other bottom material on their way upstream. After spawning, alewives return to the river mouth and may live in the shallow estuary until fall before heading out to sea for the winter (Jenkins and Burkhead 1993). Juveniles remain in primary nursery areas until October and then begin migrating to shallow, high salinity estuaries for over-wintering (Jenkins and Burkhead 1993).

A small remnant stock of blueback herring is believed to exist in the Union River below the Ellsworth Dam. Blueback herring closely resemble alewives, but spawn in free-flowing rivers and streams rather than in lakes and ponds. The peak spawning period for blueback herring is also slightly later than that of alewives. The existence of blueback herring in the Union River is based on the river herring trapping data at Ellsworth Dam (URFCC 2015).

Alewives and blueback herring, collectively referred to as river herring, are managed by the Maine Department of Marine Resources (Maine DMR) in cooperation with the City of Ellsworth. The City of Ellsworth holds the commercial fishing rights for river herring on the Union River, and historically assumed responsibility for stocking adult fish in upstream spawning habitat under a cooperative agreement with the Maine DMR. The annual commercial harvest, which occurs at the trapping facility at the Ellsworth Dam, has ranged from 5,000 to 1,066,297 fish since 1974 (URFCC 2010, 2015), with the catch being sold as bait in the lobster fishery.

Black Bear operates the upstream passage facility at Ellsworth Dam, where river herring are trapped and transported to Lake Leonard and Graham Lake. Lake Leonard and Graham Lake are the primary stocking locations for river herring in the Union River drainage, and contain the majority of potential spawning habitat. Based on the upstream fishway operations data, the alewife migration and trap and transport activity typically runs from early May to early/mid-June. For 2014, the upstream trap and transport started capturing alewives on May 8 and extended to June 11, with one additional trap and transport to Lake Leonard on June 14. According to the fishway operator, the presence of river herring in the river near the fishway is typically sporadic after early June as the migration slows to an end. Table E-8 shows returns of river herring to the fishway since 1986.

Table E-8: River Herring Fishway Counts, Union River at Ellsworth Dam

Year	Number	Year	Number
1986	1,038,920	2001	446,850
1987	473,840	2002	666,967
1988	526,911	2003	326,497
1989	559,676	2004	193,523
1990	368,400	2005	195,277
1991	192,720	2006	693,360
1992	390,210	2007	227,070
1993	111,139	2008	515,160
1994	117,158	2009	452,250
1995	183,634	2010	450,090
1996	301,253	2011	415,125
1997	279,145	2012	1,219,927
1998	441,923	2013	709,097
1999	277,425	2014	769,635
2000	389,610		

Source: URFCC 2015.

Efforts to restore river hearing populations to the Union River drainage began in 1972 (UFCC 2015). Initially, brood stock were trapped in a nearby river and released in Graham Lake (UFCC 2015). Once the fish trapping facility at the Ellsworth dam was completed in 1974, fish were collected in the Union River trap and transported upstream of the dam (UFCC 2015). Annual trap and transport of adult spawners ranged from 600 to 63,585 fish from 1972 through 1999 (no fish were transported upstream in 1978 - 1980). Licensee had transported over 100,000 river herring (11.6 fish/acre) upstream annually since 2000, until increasing the spawning escapement to 125,000 in 2010 and 150,000 (18 fish/acre) in 2011. In addition, 1,600 river herring are transported to Lake Leonard after June 10 if available. This late season stocking is to enhance and expand the small population of blueback herring thought to consist primarily of the late run (URFCC 2015). The overall goal is to reach an annual alewife run size that would allow for harvest of two million fish plus the spawning escapement numbers (URFCC 2015). Starting in 2015, the planned river herring stocking number has been raised from 150,000 to 315,000.

Another change included in the updated CFMP consists of stocking river herring in five additional lakes/ponds in the Union River drainage. Based on the target 35 fish/acre and a harvest of 2 million river herring, the calculated spawning escapement for all seven lakes is 357,151 alewives. Thus, Black Bear has transported a sufficient number of river herring in 2015 to meet 88 percent of the calculated spawning escapement for the watershed.

Black Bear operates downstream passage facilities at both the Ellsworth and Graham Lake Dams. The downstream fishways are operated from April 1 to December 31 annually, as river conditions allow. Fish passage facilities were designed and are operated in consultation with the agencies through the CFMP (URFCC 2015).

Atlantic Salmon

The Gulf of Maine (GOM) Distinct Population Segment (DPS) of Atlantic salmon was first listed as endangered under the ESA by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) (the Services) on November 17, 2000 (USFWS and NMFS 2000). The GOM DPS designation in 2000 included all naturally reproducing Atlantic salmon populations occurring in an area from the Kennebec River downstream of the former Edwards Dam site extending north to the international border between Canada and the United States at the mouth of the St. Croix River. This range includes the Union River. The GOM DPS also included river-specific hatchery fish that were being propagated for release at the Craig Brook Hatchery.

The Ellsworth Project falls within the designated critical habitat of the Downeast Coastal Salmon Habitat Recovery Unit for Atlantic salmon (NMFS 2009; Sean McDermott, NMFS, personal communication July 2, 2014).

Anadromous Atlantic salmon have a complex life history that includes spawning and rearing in freshwater rivers and streams, as well as extensive feeding migrations and sexual maturation in the marine environment (Fay et al. 2006). The freshwater juvenile stage of the life cycle can last from one to three years, after which juveniles undergo a physiological transformation (called smoltification) and migrate downstream from late April to early June to spend one to three years at sea, before returning to freshwater to spawn in their natal rivers. Although spawning by Atlantic salmon does not occur until late October or November, most adult Atlantic salmon ascend rivers beginning in the spring. In the GOM rivers, the peak upstream migration occurs in June, but may persist until the fall (Fay et al. 2006). Unlike Pacific salmon, Atlantic salmon do not die after spawning, and can return to sea to repeat the migratory cycle.

Historically, hatchery raised salmonids have been stocked in most of the lakes and ponds of the Union River (Baum 1982). Annual releases of hatchery-reared Atlantic salmon smolts (one- and two-year old fish) began in the Union River in 1971, and were continued until 1991, when stocking was suspended due to funding reductions and a redirected focus on wild salmon rivers and the Penobscot River (USASAC 1992). Since 1993, there has been sporadic stocking of salmon parr, and annual stocking of fry since 2001, in the Union River (Table E-9).

Table E-9: Union River Atlantic Salmon Stocking History 1970-2014

Year	Fry	0 Parr	1 Parr	2 Parr	1 Smolt	2 Smolt	Adult
1971-2001	425,000	371,400	0	0	379,700	251,000	0
2002	5,000	0	0	0	0	0	0
2003	3,000	0	0	0	0	0	0
2004	3,000	0	0	0	0	0	0
2005	2,000	0	0	0	0	0	0
2006	2,000	0	0	0	0	0	0
2007	22,000	0	0	0	0	0	0
2008	23,000	0	0	0	0	0	0
2009	28,000	0	0	0	0	0	0
2010	19,000	0	0	0	0	0	0
2011	19,000	0	0	0	0	0	282
2012	Natural recruitment from 282 adult spawners stocked in September, 2011 – no fry stocking						
2013	Natural recruitment from 282 adult spawners stocked in September, 2011 – no fry stocking						
2014	23,000	0	0	0	0	0	0

Source: URFCC 2015.

In 2011, 282 excess captive-reared brood stock (pre-spawn) salmon were released into the West Branch, Union River. Maine DMR biologists documented over 200 completed redds several miles upstream of the Project produced by these salmon during a subsequent survey. Maine DMR expects smolts produced from these captive-reared excess brood stock would migrate to sea in 2014-2015 (Maine DMR letter to FERC, dated July 1, 2013).

Since 1999, the resource agencies have examined scale samples from each adult salmon returning to the Union River to determine origin. The assessments of salmon origin show that returns to the Union River since 1993 (i.e., following cessation of the broodstock program) indicate that annual returns consist of a few hatchery origin strays and a few wild or fry stocked salmon. The former are most likely strays from the Penobscot River. The latter include salmon that originated from fry stocking, natural reproduction or wild/fry stocked strays from other rivers. Having a few strays into the Union River that originated from the Penobscot River, or from the other eastern Maine rivers, is consistent with the homing and straying behavior of Atlantic salmon and the typical rate of straying described in the Status Review (i.e.,., 2% [Fay et al. 2006]). Between 2006 and 2011, no salmon returned to the Union River. Since then, three aquaculture escapees returned in 2012, one salmon (wild) returned in 2013, and two (one wild and one hatchery) in 2014 (Table E-10) (URFCC 2015). The 2014 salmon was a suspected hatchery stray and was released downstream of the Project. Maine DMR noted in a letter to FERC dated July 1, 2013 that the lack of returning Atlantic salmon to the Union River is not unexpected given the recent stocking history and lack of spawning escapement.

Table E-10: Union River Salmon Returns by Origin

Year	Aquaculture	Hatchery	Wild	Total
1973 - 1986	0	1892	4	1896
1984	undetermined	40	0	40
1985	undetermined	82	0	82
1986	undetermined	67	0	67
1987	undetermined	63	0	63
1988	undetermined	45	2	47
1989	undetermined	30	0	30
1990	undetermined	21	0	21
1991	undetermined	2	6	8
1992	undetermined	4	0	4
1993	undetermined	0	0	0
1994	undetermined	0	0	0
1995	undetermined	0	0	0
1996	undetermined	68	1	69
1997	undetermined	8	0	8
1998	undetermined	13	0	13
1999	63	6	3	72
2000	3	2	0	5
2001	2	0	0	2
2002	6	5	0	11
2003	0	1	0	1
2004	0	1	1	2
2005	4	0	0	4
2006	0	0	0	0
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	3	0	0	3
2013	0	0	1	1
2014	0	1	1	2

Source: URFCC 2015

NMFS and the University of Maine maintain an array of acoustic telemetry receivers along the coast of Maine. This array is used to detect passing fish that have been tagged with acoustic tags. Species tagged include Atlantic salmon, as well as shortnose and Atlantic sturgeon (Gayle Zydlewski, University of Maine, personal communication July 22, 2013). Acoustic receivers have been deployed in the Union River in 2008 and annually since (G. Zydlewski, University of Maine, personal communication July 9, 2014). One receiver is deployed about 0.7 km downstream of the boat launch in Ellsworth and the second, about 1.7 km downstream of the boat launch, close to Blue Hill Bay. The receivers are typically deployed from mid- or late-May and retrieved in late October or early November. No fish from the Union River have been captured and tagged for monitoring. Additionally, no acoustic tags have been detected in the Union River from fish tagged in other Maine rivers (G. Zydlewski, University of Maine, personal communication July 9, 2014).

Essential Fish Habitat - The Magnuson-Steven Fishery Conservation and Management Reauthorization Act of 2006 mandated that habitats essential to federally managed commercial fish species be identified, and that measures be taken to conserve and enhance habitat. In the amended Act, Congress defined essential fish habitat (EFH) for federally managed fish species as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity”. Essential fish habitat for Atlantic salmon is described as all waters currently or historically accessible to Atlantic salmon within the streams, rivers, lakes, ponds, wetlands, and other water bodies of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut (NEFMC 1998). The EFH designated habitat for all life stages of Atlantic salmon (eggs, larvae, juveniles, and adults) in Maine includes the Union River and Union River Bay, including the Project area.

The Project protects EFH for Atlantic salmon by providing upstream and downstream fish passage and migratory pathways to habitat, and ensuring suitable habitat downstream of each development through minimum flows.

Atlantic Sturgeon and Shortnose Sturgeon

On February 6, 2012, NOAA published notice in the Federal Register listing the Atlantic sturgeon as endangered in the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs, and as threatened in the Gulf of Maine DPS (77 FR 5880 and 77 FR 5914). The Atlantic sturgeon is a long-lived, late maturing, estuarine dependent, anadromous species. Information in the following subsections is taken from the 2007 Atlantic sturgeon status review (Atlantic Sturgeon Status Review Team 2007), unless otherwise noted. The species’ historic range included major estuarine and riverine systems that spanned from Hamilton Inlet on the coast of Labrador to the Saint Johns River in Florida. Atlantic sturgeon spawn in freshwater, but spend most of their adult life in the marine environment. Spawning adults generally migrate upriver in the spring/early summer. Critical habitat has not been designated for the Atlantic sturgeon.

Shortnose sturgeon were listed as endangered on March 11, 1967 (32 FR 4001), and the species remained on the endangered species list with the enactment of the ESA in 1973. Although shortnose sturgeon are listed as endangered range-wide, in the final recovery plan NMFS recognized 19 separate populations occurring throughout the range of the species. These populations are in New Brunswick Canada; Maine; Massachusetts; Connecticut; New York; New Jersey/Delaware; Maryland and Virginia; North Carolina; South Carolina; Georgia; and Florida.

The shortnose sturgeon is an endangered fish species that occurs in large coastal rivers of eastern North America. In the northern part of its range, the species is considered to be "freshwater amphidromous," and it spawns in freshwater, but regularly enters seawater during various stages of its life (NMFS 1998). Shortnose sturgeon are occasionally found near the mouths of rivers, and coastal migrations between the lower Penobscot River and the Androscoggin/Kennebec estuary (i.e., Merrymeeting Bay) have been documented (Zydlewski 2011, Fernandes et al. 2010). Juveniles typically move upstream in rivers in spring and summer, and downstream in fall and winter, but inhabit reaches above the freshwater - saltwater interface. Adults may move into higher salinity areas on a more regular basis (NMFS 1998). Critical habitat has not been designated for the shortnose sturgeon.

According to state fishery personnel, Atlantic sturgeon have been observed in the Union River below Ellsworth Dam (URFCC 2015). The status of the population of Atlantic sturgeon and shortnose sturgeon, which may also occur in the river, is unknown at this time (URFCC 2015). In the Status Review of Atlantic sturgeon, it was noted that "The geomorphology of most small coastal rivers in Maine is not sufficient to support Atlantic sturgeon spawning populations, except for the Penobscot and the estuarial complex of the Kennebec, Androscoggin, and Sheepscot Rivers" though subadults may use the estuaries of smaller coastal drainages during the summer months (Atlantic Sturgeon Status Review Team 2007). Zydlewski et al. (2011) found that shortnose sturgeon use small coastal rivers as they migrate between the Kennebec and Penobscot Rivers. However, as noted above, shortnose and Atlantic sturgeon tagged at other locations have not been detected by the acoustic receivers deployed in the lower Union River. There was no information found regarding the use of the Union River by these species (G. Zydlewski, University of Maine, personal communication July 9, 2014). From review of the limited bathymetry data of the original river channel that has been inundated by Lake Leonard there may be steep gradient reaches that would have historically kept Atlantic and shortnose sturgeon from accessing the Union River in the Project vicinity.

American eel

American eel are present in the Union River estuary, and some are known to occur in inland waters above the Ellsworth Project dams. The USFWS is currently reviewing a petition to list the American eel as a protected species under the ESA. The review is scheduled to be completed by September 2015 (URFCC 2015). The American eel is a widely spread, catadromous fish that spends most of its life in fresh or estuarine water before migrating to the Sargasso Sea to spawn. Juvenile eel (elvers) enter river systems in the spring, migrating upstream. They are habitat generalists and may stay in the lower coastal river habitat or continue moving upstream to distant inland waters. American eel have multiple lifestages, including a larval stage (leptocephalus) that typically occurs offshore; young juvenile forms (glass eel and elver) that enter rivers; and older juveniles (yellow eel), and adult (silver eel). They may take from as few as 8 to more than 20 years to mature, before migrating back out to sea to spawn. Spawning likely occurs from February through April, although spawning has never been observed (Boschung and Mayden 2004).

Maine manages three different eel fisheries, glass eel/elver fishery, yellow eel fishery, and mature adult silver eel fishery. There is an active elver fishery downstream of Ellsworth Dam. Maine DMR regulates the elver fishing industry in Maine, with dip net and fyke net permits issued for elver fishing. Records of elver fishing from 2007 to 2013 in the Union River and the percent of the landing in comparison to total elver statewide landings is shown in Table E-11. During this period, landings of elvers in the Union River ranged from 173 to 1,501 pounds, and represented 6 to 10 percent of the state's total elver catch (G. Wippelhauser, Maine DMR, personal communication July 15, 2014).

Table E-11: 2007 to 2013, Union River Elver Landings

Year	Union River Elver Landing (Total Pounds)	Percent of Statewide Elver Landing
2007	306	10
2008	494	8
2009	424	9
2010	173	7
2011	436	6
2012	1,183	8
2013	1,501	10
2014*	570	6

*Preliminary and subject to change.

During the 2014 upstream eel migration season, Black Bear conducted nighttime eel surveys at Ellsworth Dam and Graham Lake Dam (Black Bear 2014). Eel observation surveys were conducted once per week from June to August. Each site was surveyed for approximately 1 hour between 21:00 hours and midnight. At the Ellsworth Dam, the number of eel observed during each night's survey ranged from approximately 10 to more than 700 (Table E-12). At Graham Lake Dam, the total number of eels observed per survey ranged from approximately 40 to more than 600. The highest eel densities were observed during the July 8th survey. Eel ranged from 2 to 5 inches in length at the Ellsworth Dam. At Graham Lake Dam, the length of eel generally ranged from approximately 3 to 6 inches long, but there were a few longer eel that ranged up to approximately 8 to 10 inches in length. The study, based on visual observations coupled with the known presence of the species in the Union River above Graham Lake, concluded that eel are able to migrate upstream throughout Project waters under existing conditions.

Table E-12: Summary of 2014 Nighttime Juvenile Eel Survey Results at Ellsworth Dam and Graham Lake Dam

Date	Ellsworth Dam		Graham Lake Dam	
	Number of Eel	Size Class (inches)	Number of Eel	Size Class (inches)
06/10/2014	0	-	40 to 50	3 to 6
06/18/2014	0	-	200+	3 to 6
06/25/2014	10	-	70+	3 to 6
07/01/2014	100+	2 to 4	100+	3 to 6
07/08/2014	700+	2 to 4	20+	3 to 6
			600+	<3 to 10
07/22/2014	400+	2 to 5	150+	3 to 8
08/05/2014	200 to 300	3 to 4	50	3 to 6

Black Bear 2014

Other Diadromous Fish

Based on past incidental occurrence in the commercial river herring harvest, occasional catch by anglers, and historic reports by agency personnel that used to tend the fishway and trap, a residual population of American shad together with strays from other river systems is believed to exist in the Union River estuary below Ellsworth Dam. Due to the lack of an available source of brood stock, there currently are no plans for active restoration of shad to the Union River. The Maine DMR plans to focus its shad restoration efforts on rivers other than the Union River from 2015 to 2017 as identified in the CFMP (URFCC 2015).

Striped bass use the Union River estuary for feeding during the spring, summer and fall, and are attracted into the river by the presence of migrating river herring, American shad and eel. They are not known to spawn in the Union River, but originate from other coastal migratory populations at major spawning rivers outside of the Gulf of Maine, including the Hudson and Delaware Rivers, and the tributaries to Chesapeake Bay. Striped bass are a popular sportfish in the Union River and are currently protected through the use of regulated minimum sizes and creel limits (URFCC 2015).

Rainbow smelt occur in the Union River estuary downstream of Ellsworth Dam and continue to be managed in the Union River in accordance with statewide regulations governing recreational and commercial harvest (URFCC 2015). They support a small recreational fishery at the head of tide, which is limited to harvest by hook and line or dip net from March 15 to June 15 (URFCC 2015, Baum 1982). Anadromous rainbow smelt typically migrate a short distance into rivers and streams during their annual spawning migrations and cannot negotiate rapids or other significant natural barriers. It is unknown how far smelt migrated upstream in the Union River prior to the existence of the Ellsworth Dam (URFCC 2015), but it is unlikely that they ascended the ledges at the Ellsworth Dam location.

Freshwater Mussels

Per the study request of the Maine DIFW, Black Bear performed a survey for the Brook Floater (*Alasmidonta varicosa*) freshwater mussel in the Union River downstream of the Graham Lake Dam in 2014 to provide more detailed information on the occurrences in Project waters. The Brook Floater freshwater mussel is listed as Threatened under Maine's Endangered Species Act. Black Bear performed surveys on July 24, August 22, and September 22, 2014, using a combination of widely used methodologies for determining presence/absence of freshwater mussels. The primary reference for the methodologies used was "A Guide to Sampling Freshwater Mussel Populations" (Strayer and Smith 2003).

Black Bear used aerial photography, coupled with the surveyors' investigation of the Project's riverine areas and shoreline, to identify distinct river reaches in which to locate survey transects. The first field component of the survey effort consisted of a reconnaissance review around the perimeter of the river. This was conducted by boat using view tubes and on foot for shoreline investigations. Nineteen survey transect locations were selected based on observations made during the perimeter reconnaissance. Divers then swam bank-to-bank transects in each of the identified reaches of the river. In the lower part of the investigation area river rapids made it unsafe for SCUBA or snorkel investigations. In this reach investigators used view tubes and face masks and investigated wadeable portions of the reach.

In addition to in-water searches, Black Bear surveyed the shoreline for shell middens by boat and on foot. All surveys were performed in summer months, during low water levels and warm water conditions. The water temperature was between 22ºC and 24ºC during the surveys. These parameters favor times when mussels are more likely to be visible at the substrate surface.

No Brook Floater mussels were observed in either the upper or lower survey reaches. Shell middens observed on the shore revealed no Brook Floater shells.

Fish Passage

Ellsworth Dam is equipped with a vertical slot upstream fishway and trap, which is operated in consultation with the agencies through the management plan. The upstream fishway and fish trapping facility were constructed at the Ellsworth Dam (Lake Leonard) in 1974, originally to provide a supplemental source of Atlantic salmon broodstock for use in the restoration of populations to the Penobscot and other rivers (Baum 1982). Atlantic salmon broodstock collection was discontinued and the upstream fishway has been used primarily during the river herring migration, but also to collect any salmon that might use the facility for potential upriver transport (depending on origin of fish) in the Union River. Maine DMR has annually directed Black Bear whether to transport any returning adult Atlantic salmon upstream of the Project. The trapping facility is also used for the commercial harvest of river herring by the City of Ellsworth under a cooperative management agreement with the Maine DMR. In 2014, the upstream fishway was operated for alewife stocking and harvesting beginning in early May through mid-June. Black Bear then continued to operate the fishway through November 4 for Atlantic salmon (URFCC 2015). In 2015, the upstream fishway will be operated from May 1 through October 31 as part of an upstream salmon passage effectiveness study.

Black Bear operates downstream passage facilities at both the Ellsworth and Graham Lake Dams. Downstream measures at the Ellsworth Dam consist of two stop-log controlled surface weirs above Units 2 through 4 and a transport pipe leading to a plunge pool immediately downstream of the dam, as well as a third surface weir adjacent to the Unit 1 intake that discharges directly to the same plunge pool.

Black Bear operates a surface weir (an abandoned log sluice gate) to provide downstream passage of out-migrating Atlantic salmon and river herring on the west end of the Graham Lake Dam gate structure. The development of this passage route was completed in 2003, coinciding with increased upstream stocking of alewives. The weir is very similar to the downstream passage system at the Ellsworth Dam in that it is a surface weir that contains stoplogs, which enable Black Bear to adjust the opening to match the changes in water elevation of Graham

Lake. The opening empties into a downstream plunge pool and provides migrants with another route of passage in addition to the existing Tainter gates, which are operated to pass minimum flows and for flows used for generation purposes at the Ellsworth Dam. The downstream fishways are operated from April 1 to December 31 annually, as river conditions allow.

The Project's upstream and downstream fish passage facilities were designed, and are operated in consultation with the agencies through the CFMP (URFCC 2015). To improve the upstream fishway operation, Black Bear developed a Fish Passage O&M Plan in 2015. The plan, which is specific to the fishways at this Project and is consistent with the original design criteria, includes a daily checklist that will be employed throughout 2015 and future seasons to ensure that the upstream and downstream fishways are operating properly. The O&M Plan includes both a list of spare parts critical to fishway operation and a checklist of proper fishway operating characteristics. In 2015, Black Bear hired dedicated staff to implement the O&M Plan. These staff will be dedicated to fishway operations, oversight, fish trap tending, and transporting fish upriver of the Project. These dedicated fishway O&M staff will complete the daily checklists and prepare weekly reports on fishway operations throughout the fishway operational season.

Reservoir Fisheries Habitat

The diverse habitat within the vicinity of the Ellsworth Project provides for an abundant variety of fish. Water quality throughout the basin is considered high, and is for the most part suitable for fish and wildlife resources and recreational uses. Graham Lake is about 10 miles long with a surface area of approximately 10,000 acres at normal water surface and Leonard Lake is about one mile long with a surface area of 90 acres at normal water surface elevation. Graham Lake is divided into two basins (a north and a south basin) by a large peninsula that originates from the western shore (USFWS 2005). The lake is irregular in shape with numerous coves and inlets. The maximum depth of Graham Lake is 47 feet, while the mean depth is 17 feet. The bathymetry of Graham Lake is shown in Section 4.4.2. Lake Leonard has a maximum depth of 55 feet and a mean depth of 25 feet.

Table E-13: Morphometric Information for the Lake Leonard and Graham Lake Impoundments

	Lake Leonard Graham Lake	Lake Leonard Graham Lake
Area (ac)	90	10,000
Perimeter (miles)	4.4	80
Mean Depth (ft.)	25	17
Maximum Depth (ft.)	55	47
Flushing Rate (flushes per year)	288	4.06
Total Volume (ac-ft.)	751	124,000
Direct Drainage Area (sq. mi)	12	48.56
Total Drainage Area (sq. mi)	547	499
Elevation (ft. msl)	66.7	104.2

Exposed boulder/ledge substrate is limited in, and around, Graham Lake. Boulder/cobble substrate mixed with sand and gravel is the most common substrate along the east shore and the islands in the lake. In general, these substrate types are present from the shoreline to at least 4 to 5 feet depths. The western shore of Graham Lake is made up of varying ratios of clay and finer sands as well as medium to coarse sands and some fine gravel. Some localized areas have boulder and cobble mixed in with the sand/gravel. The north end of the lake, where the Union River enters the lake also has clay/sand/gravel substrates with some organic substrate. This area tends to have somewhat coarser material than the lower west shore. Substrate surrounding the heath areas within Graham Lake are dominated by clay and fine sand (Northrop, Devine & Tarbell, Inc., 1990).

Lake Leonard and Graham Lake are the primary stocking locations for river herring in the Union River drainage, with Graham Lake containing the majority of potential spawning habitat in the watershed. Alewives use slow moving backwater habitats of various depths, including less than 3 feet for spawning.

In Graham Lake data were collected on fish habitat around the perimeter of the lake to determine if conditions were appropriate for spawning, and providing juvenile and adult habitat of primarily smallmouth bass and chain pickerel (Black Bear, 2012). The eastern shore of the lake and around the islands was observed to provide suitable habitat for smallmouth bass. The riprap area along the shore offers juvenile and spawning habitat for the bass. It was concluded that the chain pickerel would utilize the heath areas where aquatic vegetation is present, though habitat for spawning pickerel was documented as somewhat scarce (Northrop, Devine & Tarbell, Inc., 1990).

Riverine Fisheries Habitat

In order to assure water quality and to protect fishery resources in the lower river, a continuous minimum flow release of 105 cfs is maintained from the Ellsworth Dam and Graham Lake Dam from July 1 through April 30 and a continuous minimum flow release of 250 cfs is maintained from May 1 through June 30. Habitat in the Union River between Graham Lake and Lake Leonard primarily consists of runs with periodic pools and riffles upstream of Route 1A (Figure E-11). Black Bear conducted the Instream Flow and Union River Tributary Access Study in 2014 and evaluated habitat within the Union River between Graham Lake Dam and Lake Leonard at various flows.

The section of the Union River between Graham Lake Dam and Lake Leonard was divided into three reaches (upper, middle, and lower) and were representative of habitat characteristics of the Union River. The upper reach was just downstream of Graham Lake Dam, the lower reach was just upstream of Lake Leonard, and the middle reach was located in between these reaches.

Portions of the upper reach of the Union River were relatively wide and consisted of deeper pool/run, which is uncharacteristic of this reach. Most of this reach consisted of deep run habitat and instream cover was abundant, which included submerged woody debris, snags and vegetation. Substrate consisted of fine sediment, gravel, cobble, and bedrock. There is also a wetted remnant oxbow, which transitions into a shallower run/riffle habitat. Further downstream, the river deepens into a slower pool-type habitat with fish cover including submerged large woody debris and large boulders.

The middle reach of the study reach had distinct riffle, pool and run habitats. Riffle substrate consisted of gravel, cobble and large boulders. The pool substrate included silt, gravel and large boulders with submerged woody debris collecting along the left bank of the pool. The run substrate consisted of silt, gravel, and large boulders. All habitats had instream cover.

The lower reach was located at the upper extent of Lake Leonard. The lower reach had numerous large bedrock outcrops defining the channel where large boulders and woody debris provide instream cover. The habitat near Gilpatrick Brook (Figure E-11, Figure E-12) was a deep, run-type habitat with a large vegetated island located just downstream. Both sides of the island consisted of riffle habitat. Collectively, habitat information indicated the wetted width and depth at the estimated low flow release of 150 cfs provides an adequate wetted zone of passage for migratory fish and other aquatic species.

**Figure E-11: Habitat and Flow Study Transects,
Union River between Graham Lake and Lake Leonard**

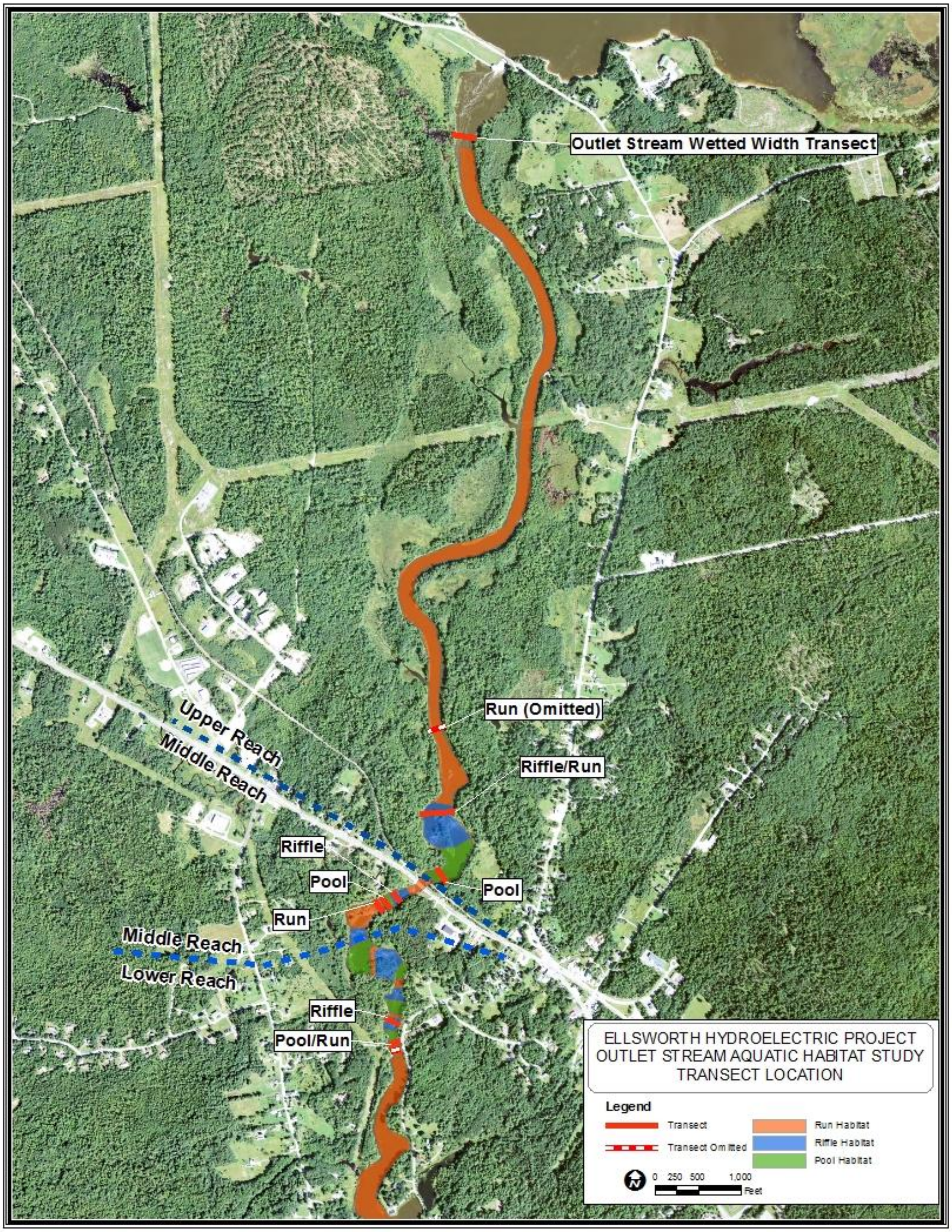
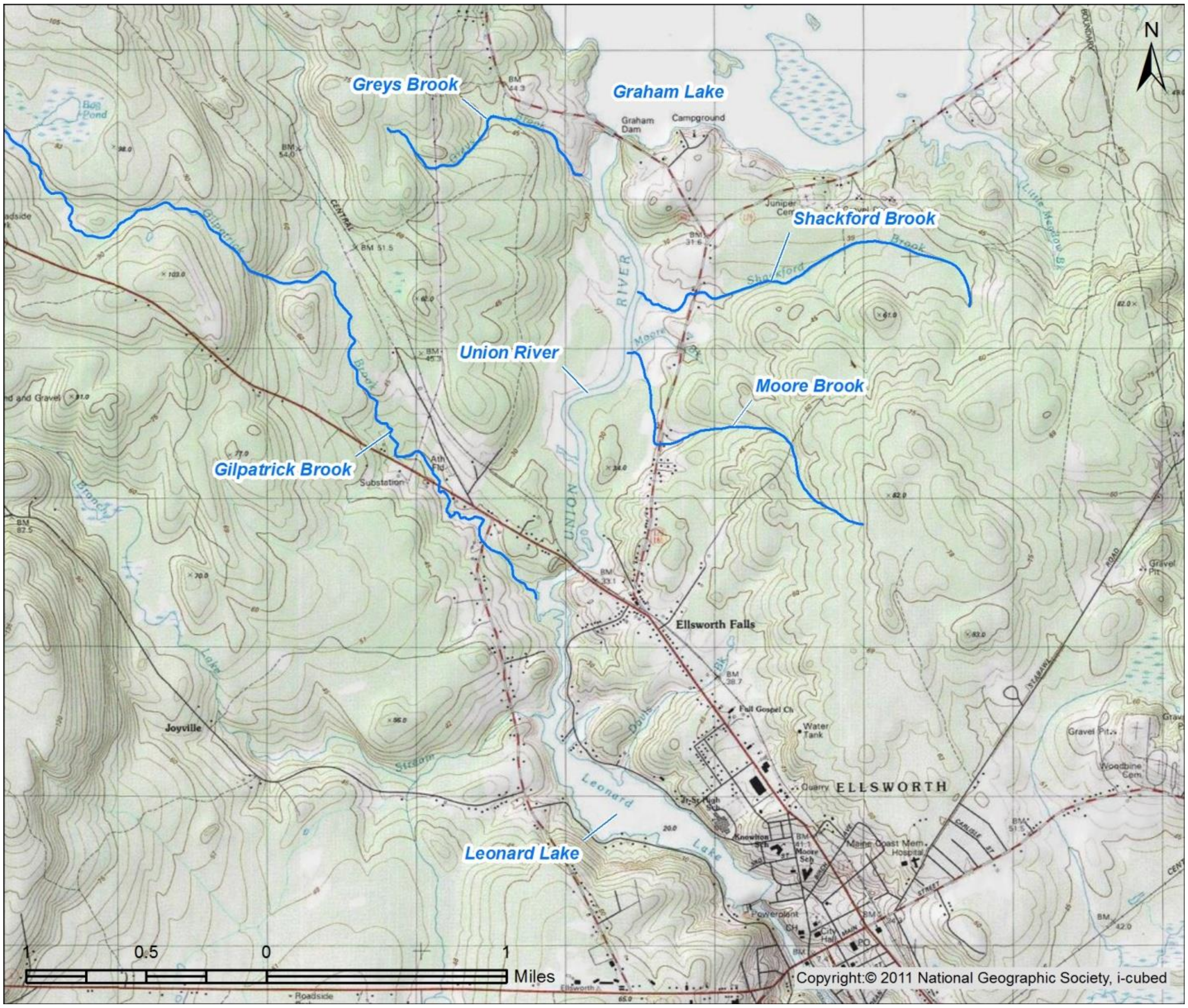


Figure E-12: Union River from Graham Lake Dam to Lake Leonard



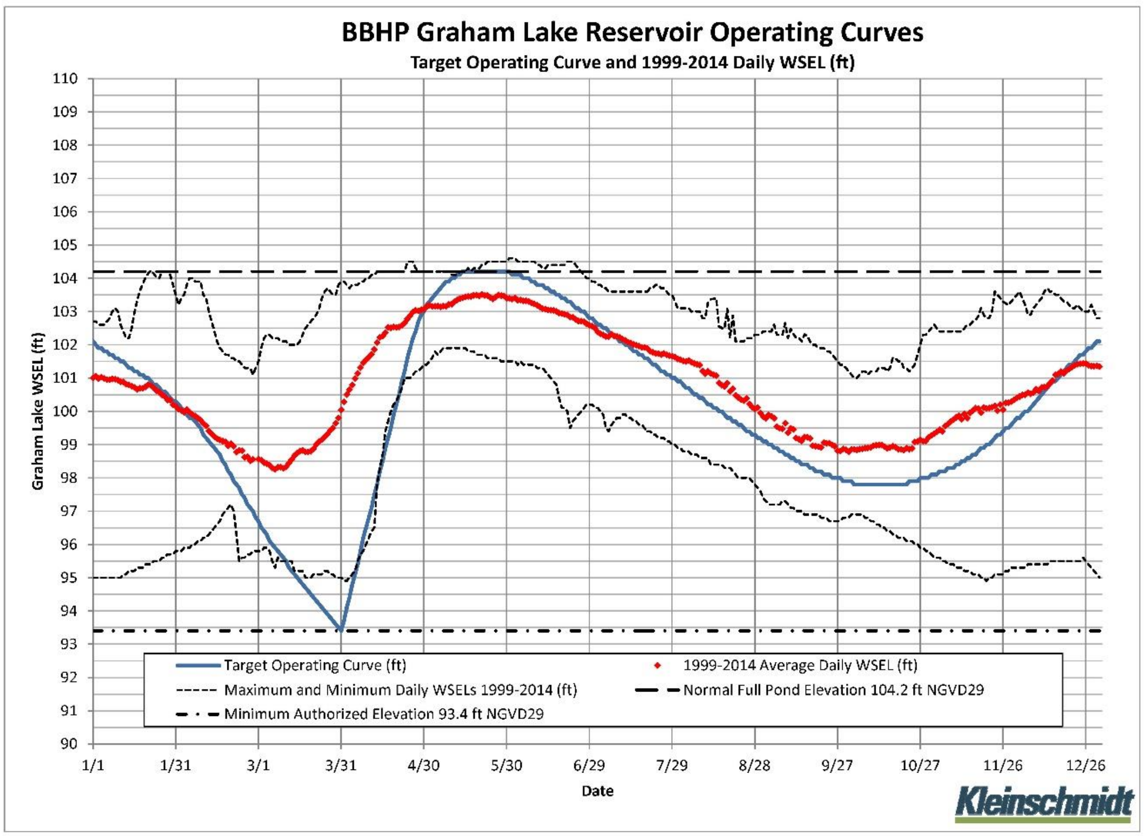
The Union River below the Ellsworth Dam is tidal water and as such the characteristics of the habitat changes with the tidal cycle and river flows. A large riffle area dominated by cobble and boulder substrates occurs downstream of the Project tailrace and is bound on one shore by large bedrock cliff.

4.4.3.2 Environmental Analysis

Water Level Fluctuations

An interest was identified by stakeholders during project scoping and study plan development regarding the effect of Project operations on the existing fish community and tributary connectivity. The Ellsworth Project currently operates with releases from Graham Lake used to generate electricity at the Ellsworth development powerhouse. Water levels in Graham Lake are typically managed consistent with the target operating curve depicted in Figure E-13, though elevations vary annually. Graham Lake water levels are maintained between elevations 93.4' (late winter in order to provide storage capacity for spring rains and snow melt) and 104.2' (typically in late May after spring runoff). This provides the ability to store and release water seasonally and also provides significant downstream flood control benefits. The Ellsworth development is effectively operated in a run-of-river mode, where nearly all inflows into the Ellsworth headpond are passed through the generating units, while the impoundment is maintained in a very stable state (i.e. within 1-foot of normal headpond).

Figure E-13: Graham Lake Historic Operating Curve



Warmwater species such as smallmouth bass, chain pickerel, and white perch provide sport fishing opportunities in Graham Lake (Black Bear, 2012). Largemouth bass have been expanding rapidly (Burr, G. Maine DIFW, personal communication, July 3, 2014). A Project area resident and former Maine Guide who has fished Graham Lake extensively for many years, and who kept extensive catch records, which he submitted to Maine DIFW, noted that originally, largemouth bass were being caught primarily in the north part of the lake, and could reach two to three pounds; they are now found throughout the lake and in much higher abundance, and can reach five pounds. He noted that he had caught 80 bass on Graham Lake in a day (Fennelly, D. personal communication July 23, 2014). Bass fishing tournaments are hosted in Graham Lake, also indicating that there are abundant bass, and Maine DIFW (2015) reports that Graham Lake has good action for medium size bass. Good white perch fishing exists at Graham Lake, which also has a productive pickerel fishery (URFCC 2010), as well as a brown bullhead fishery (Fennelly, D. personal communication July 23, 2014).

Graham Lake provides a majority of the spawning and rearing habitat for river herring in the Union River watershed, and Black Bear's trap and transport efforts have allowed for development of one of the largest alewife runs in the country.

In October 2014, impoundment tributary connectivity was assessed for tributaries during low water conditions in Graham Lake (97.9') and in Lake Leonard (65.7' to 66.7'). Observations in Graham Lake indicated tributaries maintain connectivity through at least early fall seasonal drawdown (Black Bear 2014). A similar evaluation of tributary access for the streams entering the Union River between Graham Lake and Lake Leonard (Greys Brook, Shackford Brook, Moore Brook, and Gilpatrick Brook) was conducted in September 2014, and results are discussed below regarding instream flows.

There is very little, if any, adverse impact to the resident fish or diadromous fish from the current operating regime for the Ellsworth Project.

Upstream Passage

Anadromous Species

The fish passage facility at the Project is designed to trap Atlantic salmon and river herring, and to transport fish to suitable upstream habitat located above the Project dams. Resource agencies and stakeholders expressed interest regarding the effectiveness of the upstream fishway at Ellsworth Dam and the potential for migration delay for diadromous species.

In 2014, Black Bear conducted an upstream fish passage study to evaluate the effectiveness of the existing upstream trap and transport operations (Black Bear, 2014)[2]. Black Bear evaluated the route and behavior of river herring approaching the fishway and trap, and the extent of any injury, stress or mortality during and after handling at the fishway and trap and release sites.

[2] As part of the relicensing effort, Black Bear is conducting an upstream fish passage alternatives analysis. Results from this report will be presented as part of the Updated Study Report in August 2015.

To evaluate the route and behavior of river herring approaching the fishway, Black Bear viewed the Union River from several stations at the base of the dam and powerhouse several times a day and prior to checking the fishway, as conditions allowed, to determine whether river herring were present and the approximate abundance. The 2014 alewife migration and trap and transport activity started on May 8 and extended to June 7 for Graham Lake, with an additional trap and transport to Lake Leonard on June 14. Observations of river herring presence and behavior as they approached the fishway indicated they use both sides of the river and occasionally, the middle of the river. The primary factor affecting alewife presence and abundance was the time of day, where the number of fish in the river as well as entering the fishway increased substantially during afternoon hours. There was no apparent pattern associated with tidal cycle, river flows, Project operations, or weather conditions.

To assess the extent of any injury, stress or mortality during and after handling at the fishway and trap and release sites, a total of 857 fish were held for 24 hours and evaluated during 4 net pen trials. The net pen trials resulted in a total of 21 mortalities (<2.5%), all of which resulted from net entanglement and did not appear to be related to delayed mortality from transport. Observations noted during the truck transport and release into Graham Lake and the results of the net pen trials indicated that the transport and release does not result in observed or measured immediate or delayed mortality, injury or stress.

The upstream fish passage study also evaluated the trap and transport capacity for adult river herring. Observations during the study showed that when fish are abundant, the fish trap fills rapidly, and transport trucks leave immediately and fish are released into Graham Lake in 14 minutes or less, 90 percent of the time. With two transport trucks running, as many as 25,920 (5,200 fish per hour) river herring were trapped and transported to Graham Lake during afternoon daylight hours in a single day. In 2015, the Union River target alewife stocking number was increased from 150,000 to 315,000 fish. The trap and transport study concluded operation is more than sufficient to provide the 2015 to 2017 target management spawning escapement goal of 315,000. An increase in the annual river herring runs to two million fish is anticipated to occur 4 to 5 years after the 2015 escapement increase is implemented (URFCC 2015).

The full spawning escapement that would utilize additional habitat in five other pond/lakes targeted for alewife stocking is calculated at 357,151 (35/acre). Thus, Black Bear will transport a sufficient number of river herring in 2015 to meet 88 percent of the calculated future spawning escapement for the watershed (315,000 stocked/357,151 revised spawning escapement calculated in 2015), which represents a considerable increase over transporting 47 percent of the spawning escapement in prior years (150,000 stocked/315,000 spawning escapement calculated prior to 2015).

Collectively, these data indicate the operation of the current Ellsworth fish trap and transport fishway facility has successfully developed and maintained a self-sustained river herring population and commercial fishery, which is among the largest in the country. Further, the Atlantic States Marine Fisheries Commission (ASMFC) assessed the status of populations of river herring along the Atlantic Coast, and concluded that the population of alewife in the Union River has increased between 1975 to the early 2000s. The ASMFC also concluded that the Union River has exhibited a stable population of alewife for the past 10 years (ASMFC 2012 *cited in* FERC's September 4, 2013 Study Plan Determination).

The vertical slot upstream fish passage and trapping facility at the Project has a positive effect on the Atlantic salmon GOM DPS, as it increases habitat connectivity in the event migrating adults seek to enter the Union River searching for access to suitable spawning habitats. Some potentially negative effects from the trapping and transporting of adult Atlantic salmon include migration delay/interruption, handling and holding stress or injury. While empirical studies of the upstream passage effectiveness for adult salmon have not been specifically conducted to date, (primarily due to a lack of available study fish) an Upstream Atlantic Salmon Passage Study is being conducted in 2015 to evaluate whether operations at the trapping facility may affect the capture of adult Atlantic salmon. The trap will be operated from sunrise to sunset from May 1 to October 31 in 2015, checked at least four times a day, and observations made regarding the potential effects of fishway operations on salmon. Any salmon captured will be counted, and condition and origin will be recorded.

Hydroelectric facilities may result in delays of both upstream and downstream migration of Atlantic salmon. Several studies on the Penobscot River have evaluated upstream passage behavior including the time needed for individual adult salmon to pass upstream of various dams once detected in the vicinity of a spillway or tailrace. These studies documented certain migratory behaviors that may contribute to migration delays, including frequent upstream and downstream movement, periods of holding in fast water, seeking thermal refuge in tributaries, attraction to spillage at dams, reduced migratory behavior in late summer, and inhibited movement at temperatures above 23°C (Power and McCleave 1980, Shepard 1995). However, upstream passage is site specific and passage studies conducted in the Penobscot River or other rivers may not be applicable to the Ellsworth Project.

As part of the ongoing relicensing of the Project, Black Bear reviewed historic information related to operations and environmental conditions during historic captures of Atlantic salmon to assist in evaluating the efficacy of the trap and transport facility and operations (Black Bear 2014). Recorded data on fishway operations when salmon were historically captured was available for years 2002 to 2005. There were no apparent trends in salmon captures and flow conditions as salmon were collected over a wide range of river flows, from summer flows as low as 48 cfs to the higher June flow of 937 cfs. Salmon were also captured over a range in to the higher June flow of 937 cfs. Salmon were also captured over a range in temperatures up to 74°F. The fish trap was not operated when water temperatures were at or exceeded 77°F.

Using an assumed production of 3.0 smolts/100 square yards of stream bottom, and a marine survival of 1 - 3%, the habitat in the Union River upstream of Ellsworth could generate a self-sustaining run of about 250 to 750 salmon (Baum 1997 *cited in* URFCC 2010). It should be noted however, current marine survival has been estimated to be even lower, 0.09 to 1.02%, from 1995 to 2004 (ICES 2008 cited in USFWS and NMFS 2009). Black Bear examined the Ellsworth fishway hopper capacity for salmon with regard to the estimated maximum self-sustained restored run size of 750 Atlantic salmon (Baum 1997 *cited in* URFCC 2010), and found that the Ellsworth lift hopper has more than four times the required capacity to pass a run of 750 Atlantic salmon (Black Bear 2014).

Catadromous Species

Juvenile eels are able to access upstream habitats by ascending the wetted surface of dams and adjacent ledge. Aggregations of juvenile eels moving upstream over the Ellsworth and Graham Lake Dams were observed during several nighttime eel surveys conducted in 2014, but their upstream passage success rate is unknown (URFCC 2015). Black Bear proposes to consult with fisheries agency staff to develop and install upstream eel passage facilities at the Project. The installation of such facilities will enhance upstream eel passage.

Downstream Passage

Project facilities have the potential to affect fisheries due to potential entrainment or impingement at the Project dams. Black Bear operates downstream passage facilities at both Project dams to provide downstream passage of out-migrating Atlantic salmon and river herring.

As part of the relicensing process and consistent with the approved study plan, Black Bear conducted a desk-top assessment of downstream passage survival at the Project including the potential for entrainment, turbine-induced mortality, migratory route selection, and whole station survival (Black Bear 2014). Downstream migrating fish must use the Project's downstream weirs, or pass through the Project turbines, or during rare cases of spill, pass over the spillway to migrate downstream to the Union River estuary and Atlantic Ocean. The study incorporated various physical and operational aspects of the Project with empirical passage data collected at numerous regional projects and others across the U.S. The target fish species evaluated for this assessment consisted of adult silver phase American eel, adult and juvenile river herring (blueback herring and alewife), and adult and juvenile Atlantic salmon.

Fish impingement and intake avoidance were evaluated utilizing intake velocity calculations, fish burst swim speeds, and trashrack spacing. The trashrack clear spacing for the Ellsworth Dam turbine intakes vary with unit intake as described in Table E-14. The average approach velocities are calculated as 1.16 feet/second at Unit 1, 2.97 feet/second at Units 2 and 3, and 2.79 feet/second at Unit 4 (Table E-14). Fish burst speeds were evaluated to predict the ability of target species to avoid entrainment (Table E-15). With the exception of juvenile river herring, the burst speed of fish species exceeded the intake velocity at all units. In 2015, Black Bear will collect field measurements in front of the trashracks at the Ellsworth Dam intakes to provide a more detailed understanding of intake velocities.

Table E-14: Ellsworth Trashrack Spacing and Calculated Intake Velocities

Parameter	Unit 1	Unit 2*	Unit 3	Unit 4
Trashrack Clear Spacing (in)	2.44	1.00 (top)/2.37(bottom)		
Approach Intake Velocity (feet/s)	1.16	2.97	2.97	2.79

*The Unit 2 and 3 trashracks start 7.8 feet below the normal headwater elevation of 66.7' (first 7.8 feet is concrete), then have 1-in clear-space trashracks between 7.8 and 14.0 feet before the trashrack clear-spacing increases to 2.37 inches below 14.0 feet deep. The Unit 4 trashracks start 5.7 feet below the normal headwater elevation of 66.7' (first 5.7 feet is concrete), then has the same clear-spacing sizes at slightly different depths.

Table E-15: Target Species Burst Swimming Speeds

Life Stage	Target Species	Size Range (in)	Burst Swim Speed	
			feet/s	Reference
Adult	American Eel	24-30	3.1-4.4	Bell 1991
	Alewife	10-12	10.2-15.4	Clough et al. 2004
	Blueback Herring	9-10		
	Atlantic Salmon	25-32	16.5-19.7	Wolter and Arlinghaus 2003
Juvenile	Alewife	1-6	1.4-1.6	Griffiths 1979
	Blueback Herring	1-3		
	Atlantic Salmon Smolt	5-8	6.0	Peake et al. 1997

Proportional estimates of body width to total length for the target species were also used to determine the minimum length of each species excluded or impinged on the trashracks (Table E-16). Based on this assessment, the juvenile stages of the target species would not be excluded or impinged on the trashracks because their maximum reported sizes are smaller than the minimum estimated exclusion size; however, it is expected that the trashracks still provide some level of deterrence due to the presence of the structures (Fay et al. 2006; Alden 2012; Brown et al. 2009).

Table E-16: Estimated Minimum Lengths of Each Species Excluded By Project Trashracks

Target Species	Scaling Factor for Body Width[1]	Size Range (in)[2]		Minimum Size (in) Excluded at Respective Trashrack Clear-Spacing		
		Adult	Juvenile	1.00	2.37	2.44
American Eel	0.037	24-30	NA	27	64	66
Alewife	0.086	10-12	1-6	12	28	28
Blueback Herring	0.087	9-10	1-3	11	27	28
Atlantic Salmon	0.104	25-32	5-8	10	23	23

[1]Scaling factor expresses body width as a proportion of total length based on proportional measurements for the target/surrogate species in Smith (1985)

Entrainment risk was evaluated based on species presence in the basin, outmigration periodicity, and downstream fish passage operations at the Project. Juvenile river herring have the highest entrainment risk due to their small size and long outmigration periodicity. The presence of the surface-weirs attracts surface-oriented herring during outmigration, although the high abundance and ability to physically pass through all trashracks at the Project, particularly for blueback herring, make entrainment a possibility. Adult river herring have a moderate risk due to their relatively small size and potential to pass through the trashracks. Since there are currently very few salmon expected at the Project, salmon (smolts and kelts) have a very low risk of entrainment; however, if the salmon run size increases, then smolts are predicted to have a moderate risk of entrainment due to their smaller size and ability to pass through the trashracks.[3] American eels have a higher risk of entrainment at the Project due to their benthic oriented outmigration and ability to pass through the trashracks at the lower levels of the units. They also have extensive outmigration periodicities (especially in the fall of the year), although abundances are not well known.

Whole station survival was estimated for each target species/lifestage and for direct survival at Ellsworth Dam as well as cumulative survival (Ellsworth Dam and Graham Lake Dam survival) (Table E-17). Estimated survival past both dams was 74.8 – 75.6 percent for adult eel, 91.5 – 92.6 percent for adult river herring, 94.7 – 95.2 percent for smolts, and 97.0 – 98.1 percent for juvenile river herring.

[3] A Project specific Atlantic Salmon Smolt Downstream Passage Study Plan has been approved and the study will be conducted in May and June of 2016.

Adult American eels have the lowest whole station survival rates due to their longer lengths at the silver phase, lower blade strike survival, and tendency to migrate along the bottom where larger trashrack spacing allows for physical passage. However, eel tracking studies have shown that even with spacing large enough for eel to pass through, individuals may search for other routes of passage, potentially passing through the surface-weirs (Brown et al. 2009). In response to a request by FERC in a letter dated December 30, 2014, Black Bear is conducting a field study in 2015 of downstream passage of eel at the Project to better understand potential effects to eel.

Juvenile blueback herring are predicted to have relatively high whole station survival at the Project due to their relatively small size and surface-orientation. Juvenile alewives also orient to the surface during outmigration and show slightly lower survival rates due to their large sizes. Adults of both species have whole station survival rates slightly lower than juvenile Atlantic salmon (Table E-17). Atlantic salmon kelt whole station survival is the highest of the target species, due to exclusion from entrainment by the trashracks. All kelt passage would occur through the surface-weirs at the river flows investigated, of which none resulted in spill at the Project. However, very few adult salmon currently access areas above the Ellsworth Dam due to extremely low returns.

Indirect survival, or delayed mortality, has been evaluated at some west coast projects. Alden (2012) used results from these studies that averaged 93% for indirect survival, and based on professional judgment, suggested that indirect survival would be 95% for Atlantic salmon passing the Penobscot River hydroelectric projects in Maine, due to the low head relative to the west coast projects where the studies were performed. There is considerable uncertainty regarding how to assess indirect survival, given the difficulty in measuring it. NMFS noted this in its Biological Opinion for evaluating project effects to Atlantic salmon for a number of Black Bear Penobscot River hydroelectric projects, and NMFS did not attempt to quantify delayed mortality (NMFS 2012). Therefore, indirect mortality was not evaluated as part of this Union River analysis, rather only direct survival was determined past Ellsworth Dam, in addition to passage through Graham Lake Dam (Black Bear 2014).

Table E-17: Whole Station Survival Estimates at the Project

Life Stage	Target Species	Size Range (in)	Outmigration Months	Ellsworth Development Total Survival			Cumulative Total Project Survival[1]		
				Exceedance Flow (%)[2]			Exceedance Flow (%)[2]		
				75%	50%	25%	75%	50%	25%
Adult	American Eel	24-30	July-November	0.753	0.753	0.761	0.748	0.748	0.756
	Alewife	10-12	July-October	0.919	0.919	0.919	0.915	0.915	0.915
	Blueback Herring	9-10	July-October	0.930	0.930	0.930	0.926	0.926	0.926
	Atlantic Salmon	25-32	April-May and October-November	0.990	0.990	0.990	0.985	0.985	0.985
Juvenile	American Eel	NA	NA	NA	NA	NA	NA	NA	NA
	Alewife	1-6	July-November	0.974	0.974	0.979	0.970	0.970	0.975
	Blueback Herring	1-3	July-November	0.986	0.986	0.986	0.981	0.981	0.981
	Atlantic Salmon	5-8	April-June	0.951	0.951	0.956	0.947	0.947	0.952

[1] Cumulative survival includes survival through the Graham Lake Dam Taintor gates and Ellsworth development.

[2] Varying inflows representing a dry, wet, and normal year were applied to this evaluation, which translated into using the 75%, 50%, and 25% monthly exceedance flows

Maine DMR has suggested post-spawn alewife are not surviving downstream passage of the Project[4]. This is based on principle components analysis and cluster analysis (Wards Method) the agency conducted on the age composition and repeat spawning frequency on combined data collected by harvesters and Maine DMR for the period 2008-2012 at 29 Maine harvesting sites. The Ellsworth harvest on the Union River had a low frequency of repeat spawning (i.e., a high proportion of fish had not previously spawned) and young spawners (age-3 and age-4). Maine DMR concluded that in the Union River "...alewives are only successfully spawning in one year" and offered two explanations "...either older, previous spawners are not able to reach the top of the upstream fish passage facility or post-spawn adults are not surviving downstream passage of the project" (Maine DMR letter to FERC, dated July 1, 2013). However, as FERC noted in its September 4, 2013 Study Plan Determination, in an analysis conducted by ASMFC (2012), ASMFC noted that high exploitation rates (the percentage of population that is harvested) can also reduce the number of older, repeat spawners in the population. Based on a review of the annual URFCC reports, FERC noted that the exploitation rate for alewives in the Union River ranged from 65 to 88 percent from 2000 to 2012, and the observed exploitation rates in the Union River overlap with the exploitation rate calculated by ASMFC (2012) that could cause population collapse (i.e., 62% to 80% depending upon the assumptions used regarding the population growth rate). Therefore, it is possible that the lower number of older, repeat spawners in the Union River is the result of high exploitation rates, rather than low downstream passage survival of post-spawned adult alewives.

Regardless, the alewife run has maintained high numbers of returns even with the current exploitation rates and has been the second largest run of alewives in the state. This is further supported by high numbers of returns in 2012, 2013, and 2014 when the total river herring run size (including both river herring harvested and transported upstream) was 1.2 million, 709,097, and 769,635, respectively. Licensee transported over 100,000 river herring (11.6 fish/acre) upstream annually since 2000, until increasing the spawning escapement to 125,000 in 2010, and 150,000 (18 fish/acre) in 2011. Black Bear has demonstrated it has the ability to transport the 315,000 fish now required in 2015.

Black Bear developed a study plan filed with FERC on March 31, 2015, in consultation with the agencies, to conduct a field study in 2016 to evaluate the effectiveness of downstream passage of Atlantic salmon smolts at the Ellsworth Project. This study proposes to monitor tagged salmon smolts passage through the Project area (from upstream of Graham Lake) using radio telemetry tags and monitoring gear and passage survival at the Ellsworth Dam using acoustic tags and receivers maintained by NFMS downstream of the dam. The field study is planned for spring

[4] Maine DMR letter to FERC dated July 1, 2013

2016, pending receipt of all required permits and approvals. Results of the study will be reported by December 31, 2016.

Instream Flows

Minimum flow releases from the Project dams have been developed to maintain fish habitat, to facilitate anadromous fish migration, and to protect downstream water quality. Resource agencies requested Black Bear evaluate the relationship between existing minimum flows, aquatic habitat and migratory fish behavior in the Union River below the Graham Lake Dam. Therefore, Black Bear conducted an instream flow study (Black Bear 2014). Flows analyzed included two low flows (150 and 300 cfs), a mid-range flow (1,230 cfs) and a high level (2,460 cfs) generating capacity flow.

The study found aquatic habitat criteria for river herring and Atlantic salmon is sufficient at all flows analyzed. In addition, a zone of passage for these species is provided throughout the Union River during the observed low flows. Tributaries to the Union River between Graham Lake and Lake Leonard (Greys, Shackford, Moore, and Gilpatrick brooks [Figure E-12]) maintained adequate connectivity for Atlantic salmon, river herring and other aquatic species during the flows observed.

Essential Fish Habitat

EFH for Atlantic salmon is described as all waters currently or historically accessible to Atlantic salmon within the streams, rivers, lakes, ponds, wetlands, and other water bodies of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut (NEFMC 1998). The EFH designated habitat for all life stages of Atlantic salmon (eggs, larvae, juveniles, and adults) in Maine includes the Union River and Union River Bay, including the Project area. The Project protects EFH for Atlantic salmon by providing upstream and downstream fish passage and migratory pathways to habitat, and ensuring suitable habitat downstream of each dam through minimum flows.

Endangered Species

Atlantic Salmon

The Licensee will also provide a detailed assessment of the effects of the Ellsworth Project on Atlantic salmon and Atlantic salmon critical habitat in its Biological Assessment being developed with the NMFS and USFWS under the ESA consultation requirements.

Atlantic Sturgeon and Shortnose Sturgeon

Due to the rarity of these species at the Project, normal operations would not affect shortnose or Atlantic sturgeon. There is a possibility that sturgeon could be captured in the fish trap and handled during the sorting process. Black Bear will develop and implement a sturgeon handling plan to provide for safe handling of any Atlantic or shortnose sturgeon that may be encountered by personnel during fish lift operations and Project maintenance operations (e.g., if the draft tubes need to be dewatered for maintenance activities).

Freshwater Mussels

The Brook Floater is listed as threatened under Maine's Endangered Species Act. No Brook Floater Mussels were found during the survey of the Union River.

4.4.3.3 Proposed Environmental Measures

Black Bear is proposing to continue to operate and maintain the Project under the existing licensed conditions including minimum flow, water level, and fish passage requirements. Black Bear proposes to enhance upstream eel passage by consulting with agencies and installing upstream eel passage facilities at both Project dams. Black Bear also proposes to develop and implement a sturgeon handling plan to provide for safe handling of any Atlantic or shortnose sturgeon that may be encountered by personnel during fish lift operations and Project maintenance operations.

4.4.3.4 Cumulative Effects

Impacts to fish from non-federal activities are largely unknown in the Union River. It is possible that occasional recreational fishing may result in incidental takes of Atlantic salmon. However, there is no information to suggest that the effects of future activities in the action area will be any different from effects of activities that have occurred in the past.

Collectively, Lake Leonard and Graham Lake provide spawning habitat for alewives and are the primary stocking locations in the Union River drainage. Neither water body existed prior to the construction of dams, and probably contributed little to the historical alewife population (URFCC 2010). However, dams can create a physical impediment to upstream and downstream fish passage. Cumulative effects from passage of multiple dams may also result in increased mortality and reduced fitness of fish. Black Bear operates fish passage facilities at the Project to promote access to upstream reaches of the Union River as well as minimize impacts associated with passage. Previous studies conducted by Black Bear have shown that the existing fish passage facilities are effective, which is reflected in the diverse and abundant fish community in the Project area. Black Bear does not propose to change the operation of the Project and no geographic or temporal cumulative impacts to fish and aquatic resources are expected.

4.4.3.5 Unavoidable Impacts

Graham Lake was constructed and is operated as a storage reservoir, with no generation. Pursuant to the FERC license, Black Bear maintains water levels in Graham Lake on an annual basis between elevations 104.2' and 93.4'. The reservoir levels are typically lower in late fall to late winter to accommodate high flows associated with spring runoff. The Ellsworth development is operated in a run-of-river mode where all inflows into the Ellsworth headpond are passed either through the generating units or over the dam. Therefore, water level fluctuations in Lake Leonard are minimal and normally within 1-foot of full headpond elevation. There are no significant unavoidable adverse impacts occurring at the Ellsworth development. Water level fluctuations can be greater in Graham Lake and results in shifts in littoral habitat, but field observations have showed connectivity is maintained with tributaries even during lower reservoir levels (Black Bear 2014).

Dams can create an impediment to upstream and downstream fish passage or result in migration delays. At the Ellsworth Dam, Black Bear provides upstream fish passage by trapping anadromous fish and transporting them to suitable habitat located upstream of the development. Operation of upstream trap and transport passage activities have been shown to be effective and current facilities are more than sufficient to meet management goals for river herring. It is anticipated that the annual river herring run will approach two million fish within 4 to 5 years through current trap and transport activities (URFCC 2015). Some potentially negative effects from the trapping and transporting of fish could include minor migration delay, handling and holding stress or injury. However, these activities do not appear to result in observed or measured immediate or delayed mortality, injury or stress.

Black Bear operates downstream passage facilities at both Ellsworth Dam and Graham Lake Dam, from April 1 to December 31 annually, as river conditions allow. Downstream migrating fish must use the Project's downstream facilities or pass through the Project turbines, or during rare cases of spill, pass over the spillway to migrate downstream to the Union River estuary and Atlantic Ocean. As described in the analysis above, fish passing through the turbines or over the spillway can be killed or injured; estimated total survival past both developments was 74.8 – 75.6 percent for adult eels, 91.5 – 92.6 percent for adult river herring, and 97.0 – 98.1 percent for juvenile river herring, and 94.7 – 95.2 percent for smolts.

Black Bear does not propose to change current operational conditions and additional unavoidable adverse impacts are not expected to occur on the existing fisheries.

4.4.4 Wildlife Resources

4.4.4.1 Affected Environment

Wildlife Habitats

The Ellsworth Project is located in the mid-coastal region of Maine, on the lower reach of the Union River in the city of Ellsworth, and the towns of Waltham and Mariaville, in Hancock County. Other than the project dams, the Ellsworth powerhouse, and associated structures and facilities, development in the immediate vicinity of the project includes year round and seasonal residences, commercial businesses, and a large portion of undeveloped forested areas. The Project area and immediate vicinity provides some diversity of surroundings such as forests, open areas, wetlands, islands, and riverside habitats.

The defined Project area encompasses Graham Lake and nearby lands, the Union River between Graham Lake and Lake Leonard, Lake Leonard, and a small portion of the Union River downstream of the Ellsworth Dam. The Project boundary is at, or along the shoreline of the Union River between Graham Lake and Lake Leonard, and along Lake Leonard. The Project boundary is located at elevation 107' around Graham Lake which is 2.8' above normal full pond elevation of 104.2'. In total, the Project boundary encompasses approximately 3,350 acres of land and 10,099 acres of open water cover types (See Table E-19 in Section 4.4.5: Botanical Resources and Figure 2-8 of the Initial Study Report [ISR], 2014). Most of the upland habitats and associated wildlife resources surrounding the Project water bodies occur on private lands adjacent to, but outside the Project boundary.

A detailed description of cover types within the Project boundary is provided in Section 4.4.5 – Botanical Resources. Cover types within and immediately surrounding the Project boundary are primarily comprised of forested communities. The predominant community type within the Project boundary is Northern Hardwood Forest.

There are distinct forested areas within the Project boundary that may more closely fit the characteristics of the Oak-Northern Hardwood Forest and Oak-Northern Hardwood-White Pine Forest Communities (Gawler and Cutko, 2010). Other areas more closely resemble Spruce-Northern Hardwood Forest. The Northern Hardwood, Oak-Northern Hardwood, Oak-Northern Hardwood-White Pine, and Spruce- Northern Hardwood community types within the Project area intergrade gradually, and Northern Hardwood Forest can be considered the matrix forest cover. Forest downstream of Graham Lake and around Lake Leonard can be described as Oak-Northern Hardwood and Oak-Northern Hardwood-White Pine communities, with some areas of early successional forest cover. The eastern shore of Graham Lake is where most of the Spruce-Northern Hardwood Forest is found, whereas the western shore and islands are primarily where forest cover can be described as Northern Hardwood, Oak-Northern Hardwood, and Oak-Northern Hardwood-White Pine Forest.

There are lacustrine, riverine and estuarine wetland systems associated with Graham Lake, Lake Leonard, the Union River and tributaries, and a number of palustrine wetlands - Palustrine Unconsolidated Bottom (PUB), Palustrine Aquatic Bed (PAB), Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), and Palustrine Forested (PFO) - within the Project boundary (Cowardin et al, 1979). The vast majority of palustrine wetlands within the Project boundary are associated with Graham Lake. Many of the wetlands associated with Graham Lake are narrow fringes along the lake itself or along tributary streams; some areas comprised of numerous wetland classes are more extensive. PEM wetland is associated with the islands within Graham Lake and the tributary streams to Graham Lake. While discrete areas of PEM and/or PSS are located on three large islands and on the peninsula in the southern portion of the lake, most of these areas are interspersed with PEM and PSS vegetation. Bog habitats persist under current project conditions on the three large wetland islands and the large wetland peninsula on the southern side of Graham Lake. Forested swamps are also associated with Graham Lake and wetland complexes within the Project boundary. Narrow fringes of wetland are located along Lake Leonard and the Union River in some areas. Wetland habitats within the Project boundary are described in detail in Section 4.4.5 – Botanical Resources.

Other habitat types found within the Project boundary include open field, electric transmission maintained shrub, and mowed lawn. These areas are very small in extent and are described in detail in Section 4.4.5 – Botanical Resources.

In addition to desktop level review, in order to accurately describe wildlife habitats within the Project boundary, Black Bear conducted wildlife habitat related studies in 2014 including a Common Loon Survey and a Marsh-Nesting Bird Habitat Survey (ISR, 2014).

Significant Habitat

Significant Wildlife Habitats are defined under Maine's Natural Resources Protection Act (NRPA), which is administered by the Maine Department of Environmental Protection (Maine DEP) (Maine DIFW, 2014a). Significant habitats which occur within the Project boundary include Deer Wintering Areas (DWA) and Inland Waterfowl/Wading-bird Habitat (IWWH). No known Significant Vernal Pools are located within the Project boundary, although specific surveys for SVPs were not conducted.

Deer Wintering Areas (DWA)

Deer congregate in DWAs for shelter, forage and thermal refuge during deep snow and cold conditions. Typically, deer will seek DWAs when snow gets more than 12 inches deep in open areas and in hardwood stands, when the depth that deer sink into the snow exceeds 8 inches in open areas and in hardwood stands, and when mean daily temperatures are below 32 degrees (Maine DIFW 2014b). DWAs are typically located within conifer stands (particularly hemlock) with tree height greater than 30 feet and crown closure of greater than 60% (Maine DIFW, 2014b).

According to Maine Department of Inland Fisheries and Wildlife (Maine DIFW) records, one DWA occurs within the Ellsworth Project area. This DWA is located on the eastern shore of Graham Lake in the town of Waltham to the west of Route 179. Because on-site investigation and verification by Maine DIFW staff has not occurred, this DWA has an indeterminate status.

Inland Waterfowl / Wading -bird Habitat (IWWH)

The Maine DIFW identifies moderate and high value IWWH as significant wildlife habitat. Significant Waterfowl and Wading Bird habitat and its associated protective buffer (250 feet) is identified based on a variety of factors including wetland type, the diversity of wetland types, the size of the wetland(s), the interspersion of the different wetland types, and the amount of open water (Maine DIFW, 2014a). IWWHs in organized townships were most recently mapped and rated by Maine DIFW in 2008, using the most current, high resolution imagery (Maine DIFW, 2014a).

Maine DIFW identifies nine IWWH areas within the Ellsworth Project boundary, all are associated with Graham Lake or tributaries to Graham Lake. Two of the IWWHs are associated with wetland islands within Graham Lake, one of the IWWHs is associated with the wetland peninsula on the southern side of Graham Lake (Great Meadow), and the other five are associated with emergent or emergent/shrub wetland complexes which are contiguous to tributaries to Graham Lake. One IWWH is located both along a tributary to Graham Lake and adjacent to the lake itself. Four of the IWWHs are ranked by Maine DIFW as moderate value and five are ranked as high value.

Bald Eagle Nest Sites

The bald eagle (*Haliaeetus leucocephalus*) was removed from the Federal endangered species list in 2007 and from the Maine endangered species list in 2009. For this reason, Essential Habitat designations and state regulations that were applied to bald eagle nest sites from 1990 - 2009 are no longer in effect. However, protection for bald eagles and their nests continues under the federal Bald Eagle and Golden Eagle Protection Act (BGEPA).

The U.S. Fish and Wildlife Service (USFWS) has been monitoring the occurrence of nesting bald eagles for many years, and maintains a comprehensive database of known bald eagle nest sites in the state of Maine. The USFWS database identifies three bald eagle nests sites within the Ellsworth Project boundary on Graham Lake that were "intact" as of 2013 (USFWS, 2015).

Email correspondence with Maine DIFW on March 31, 2015 (E. Call, Maine DIFW, March 31, 2015), indicates that two of these nest sites were intact in 2013. One of the intact eagle nests is located on a small island in Graham Lake, south of Harwood Hill Island and approximately 6.8 miles northeast of the Graham Lake Dam. The other intact eagle nest is located on a small island on the southern end of Graham Lake, approximately 1.0 mile northeast of the Graham Lake Dam. The northern nest hosted a breeding pair and one fledgling in 2013, while the southern nest hosted a breeding pair but no fledglings in 2013.

Wildlife

Based on identified habitats within the Ellsworth Project boundary and in its immediate vicinity, several mammalian and avian wildlife species have the potential to occur within the Project boundary. In order to obtain information on wildlife species occurrence and use, and to support an assessment of the potential effects of Project operation on these species, Black Bear conducted wildlife-related studies in 2014 and 2015. These studies consisted of a Common Loon Nesting Survey and a Marsh-Nesting Bird Habitat and Call Back Survey along with field observations of wildlife noted during other studies.

Several of the expected avian and mammalian wildlife species were observed (either directly or via sign) during the common loon nesting and marsh-nesting bird habitat surveys. The mammalian and avian wildlife species assemblage known or considered likely to occur in the area surrounding the Project is typical of those found in Hancock County, Maine. A representative listing of mammalian and avian wildlife species known or considered likely to occur in the vicinity of the Project is included in Table E-18 (DeGraaf and Yamasaki, 2001). Those species that were observed during field studies performed at the Ellsworth Project and State Species of Special Concern, state threatened species and state endangered species which may be located within the Project boundary are indicated in Table E-18.

Table E-18: Wildlife Species Which May Occur or Have Been Documented in the Vicinity of the Ellsworth Project

Common Name	Scientific Name
Mammals	
Beaver*	*Castor canadensis*
Big Brown Bat	*Eptesicus fuscus*
Black Bear*	*Ursus americanus*
Bobcat	*Lynx rufus*
Deer Mouse	*Peromyscus maniculatus*
Eastern Chipmunk	*Tamias striatus*
Eastern Coyote	*Canis latrans*
Ermine	*Mustela erminea*
Fisher	*Martes pennanti*
Little Brown Bat (SC)	*Myotis lucifugus*
Mink*	*Mustela vison*
Moose*	*Alces alces*
Muskrat	*Ondatra zibethicus*
Northern Flying Squirrel	*Glaucomys sabrinus*
Northern Long-eared Bat	*Myotis Septentrionalis*
Porcupine	*Erethizon dorsatum*
Raccoon*	*Procyon lotor*
Red Fox*	*Vulpes vulpes*
Red Squirrel	*Tamiaciurus hudsonicus*
River Otter*	*Lontra canadnesis*
Silver-haired Bat (SC)	*Lasionycteris noctivagans*
Snowshoe Hare	*Lepus americanus*
Striped Skunk	*Mephitis mephitis*
White-tailed Deer*	*Odocoileus virginianus*
Birds	
American Black Duck*	*Anas rubripes*
American Crow	*Corvus brachyrhynchos*
American Goldfinch*	*Spinus tristis*
American Kestrel*	*Falco sparverius*
American Robin	*Turdus migratorius*
Bald Eagle (SC)*	*Haliaeetus leucocephalus*
Barred Owl	*Strix varia*
Bay-breasted Warbler	*Dendroica castanea*
Belted Kingfisher	*Ceryle alcyon*
Black Tern (E)	*Chlidonias niger*
Blackburnian Warbler	*Dendroica fusca*
Black-capped Chickadee	*Poecile atricapillus*
Black-throated Green Warbler	*Dendroica virens*
Blue Jay	*Cyanocitta cristata*

Common Name	Scientific Name
Blue-winged Teal*	*Anas discors*
Broad-winged Hawk*	*Buteo platypterus*
Canada Goose*	*Branta canadensis*
Cedar Waxwing*	*Bombycilla cedrorum*
Common Gallinule (T)	*Gallinula galeata*
Common Grackle	*Quiscalus quiscula*
Common Loon*	*Gavia immer*
Common Merganser	*Mergus merganser*
Common Raven	*Corvus corax*
Common Redpoll	*Carduelis flammea*
Common Yellowthroat *	*Geothlypis trichas*
Downy Woodpecker*	*Picoides pubescens*
Gray Jay	*Perisoreus canadensis*
Great Blue Heron (SC)*	*Ardea herodias*
Green-winged Teal*	*Anas crecca*
Hairy Woodpecker	*Picoides villosus*
Hermit Thrush*	*Catharus guttatus*
Hooded Merganser	*Lophodytes cucullatus*
Least Bittern (E)	*Ixobrychus exilis*
Lesser Yellowlegs (SC)*	*Tringa flavipes*
Mallard*	*Anas platyrhynchos*
Merlin*	*Falco columbarius*
Northern Flicker*	*Colaptes auratus*
Northern Goshawk	*Accipiter gentilis*
Northern Parula	*Parula americana*
Osprey*	*Pandion haliaetus*
Pileated Woodpecker*	*Dryocopus pileatus*
Pine Siskin	*Carduelis pinus*
Purple Finch	*Carpodacus purpureus*
Red-breasted Nuthatch	*Sitta canadensis*
Red-wing Blackbird	*Agelaius phoeniceus*
Ruffed Grouse	*Bonasa umbellus*
Sedge Wren (E)	*Cistothorus platensis*
Sharp-shinned Hawk	*Accipiter striatus*
Spotted Sandpiper	*Actitis macularia*
Swamp Sparrow*	*Melospiza georgiana*
White-breasted Nuthatch	*Sitta carolinensis*
Wood Duck*	*Aix sponsa*
Yellow Rail (SC)	*Coturnicops noveboracensis*

Source: DeGraaf and Yamasaki, 2001
* Observed during field surveys and noted in Northrop, Devine & Tarbell, Inc., 1990
(SC) State Species of Special Concern (Maine DIFW, 2015a)
(T) State Threatened, (E) State Endangered (Maine DIFW, 2015b)

Temporal and Spatial Distribution of Wildlife Resources

Some of the wildlife species that occur within the Project vicinity are likely to be present year-round. Other species may migrate seasonally, utilizing separate and distinct breeding and wintering areas. The range of these movements varies significantly among species. Many migratory avian species that utilize the Project vicinity during temperate seasons are absent from the region in winter. Other species tend to display more moderate seasonal shifts of habitat usage, utilizing seasonally distinct areas within the Project vicinity and surrounding region in summer versus winter. Deer and moose exemplify this type of movement, gravitating between preferred breeding and wintering habitats. Some species make only very limited movements between closely associated habitats within a small geographical area, using proximate yet distinctly different habitats or microhabitats by season. Examples of this may include some small mammal species. The specific habits of major species are further described, below.

Large Mammals

Large mammal species that are most likely to occur in the Project area and immediate vicinity are white-tailed deer and moose. Black bear may also be occasionally present.

White-tailed deer are resident species in the area surrounding the Project and signs of white-tailed deer use were observed during field studies performed in 2014. Deer are highly selective herbivores, concentrating on whatever plants or plant parts are currently most nutritious. During the course of the year, deer may browse several hundred species of plants. A few are highly preferred while many others are consumed only when the best have been depleted. Deer consume grasses, sedges, ferns, lichens, mushrooms, weeds, aquatics, leaves (green and fallen), fruits, hard mast (acorns, beech nuts, etc.), grains, and twigs and buds of woody plants. Deer consume twigs and buds of dormant trees and shrubs only when more nutritious foods are unavailable. (Maine DIFW, 2014b).

Major habitats that provide food and cover for white-tailed deer in Maine are forest lands, wetlands, reverting farmlands, and active farmlands. Forest stands containing little or no canopy closure, wetlands, and reverting and active farmland tend to yield ideal forage for deer (Maine DIFW, 2014b), particularly during temperate months. Several of these preferred habitats are available within and near the Project area. For this reason, deer are expected to be present in and near the Project area in temperate months.

During the winter months, when snow depth exceeds 12 inches, deer will converge in DWAs (Maine DIFW, 2014b). These areas provide browse and crucial protection from the elements. One DWA is mapped within the Ellsworth Project boundary.

Moose are year-round residents of forested habitats in the Project region. Moose primarily subsist by browsing on the leaves and twigs of woody plants. Willow, aspen, birch, maple, pin cherry, and mountain ash are important, high quality browse utilized by moose throughout the year. Balsam fir provides additional forage for moose over the winter. Sodium is also important to moose: aquatic plants, such as pondweed and water lily, have higher sodium content than woody vegetation and are an important part of a moose's diet. (Maine DIFW, 2014c).

Habitat use by moose varies by season, and by gender. In general, in the summer, moose tend to spend considerable time near wetlands, where they forage on emergent plant materials. Bulls and cows, however, do use somewhat different habitats during the summer. Cows are typically found at low elevations in regenerating stands and adjacent softwoods, where food sources are concentrated. This concentrated food source limits the amount of time cows spend feeding, which, in turn, limits calves vulnerability to predators. Meanwhile, bulls are typically found at higher elevations in mixed and hardwood stands, where food supply is less available, but shading provides thermal refuge from summer's hot temperatures. (Maine DIFW, 2014c).

During the winter, moose tend to move to drier, mixed hardwood-coniferous habitats where they browse exclusively on trees. Regenerating clear-cuts and forest clearings are particularly important fall and winter foraging habitats for this species (DeGraaf and Yamasaki, 2001). Mature softwood is used as cover when snow depth exceeds 3 feet (Maine DIFW, 2014c).

Black bear are found nearly statewide in Maine, but are most common in northern, northwestern, and eastern Maine; black bear are rarely found in the heavily settled southern and central-coastal regions (Maine DIFW, 2014d). While not common, black bear may occasionally occur in the Project vicinity, particularly in temperate months.

Black bear require forests for protection and food. Bears are omnivores that feed opportunistically on a wide range of plant and animal sources, which vary seasonally. While bears do eat meat, their diet is primarily vegetarian. Early greening grasses, clover, and hardwood tree buds provide a forage base in the spring; fruits and berries are utilized in summer; and beechnuts, acorns, and hazelnuts are foraged in the fall. This diet is supplemented with insects, including ants and bees (their larvae, adults, and honey), and occasional mammals and birds. Bears may occasionally prey on young deer and moose in late spring, and they will also consume carrion. (Maine DIFW, 2014d).

Black bear may exhibit seasonal habitat use, depending on food supplies. In general, bears will inhabit low elevations more frequently in spring and summer, and higher elevations in the fall. These trends are driven by the seasonal abundance of herbaceous vegetation, insects, various berries and nuts (DeGraaf and Yamasaki, 2001).

Small Mammals

The forested and agricultural habitats in the immediate vicinity of the Project provide year-round homes to a number of small mammal species. Most widespread throughout the region are red fox, raccoon, and striped skunk, which are associated with edge habitats. These species inhabit a variety of habitats consisting of forest, cropland, and pastureland. In addition, they make extensive use of riparian habitats along streams, such as the Union River and its tributaries, during dispersal and foraging. Fisher may inhabit the denser and more extensive areas of coniferous or mixed forest while seeking out forested wetlands during winter. Porcupine may be found in coniferous forests, or mixed or deciduous stands in the Project vicinity. (DeGraaf and Yamasaki, 2001).

Coyote may inhabit the Project area. Coyote often inhabit fragmented habitats, particularly along the edges of second-growth forests, open brushy fields, old pastures, and etcetera; however, Maine DIFW (2014e) states that coyotes now occupy almost every conceivable habitat type, from open agricultural country to dense forest to downtown urban areas. Coyote are opportunistic hunters and scavengers. They primarily eat small animals, such as snowshoe hares, mice, rats, woodchucks, beavers, squirrels, snakes, frogs, fish, and birds. During summer and fall, grasses, fruits and berries may be incorporated into their diet. In the spring and summer coyotes may target deer and fawns as well as other forage items. Coyote may hunt deer more successfully in winter than other seasons, when snow depth restricts deer's movements, making them easier to capture. Where available, coyote will also eat carrion, pet food, garbage, garden crops, livestock and poultry. (Maine DIFW, 2014e). Coyote may occur within the Project vicinity year round.

Beaver are common inhabitants of rivers, streams, ponds, lakes, and occasionally watered roadside ditches in Maine. Beaver are known to be present in the Project vicinity, and are likely year-round inhabitants within the Project area. Bank dens are dug into the banks of streams, rivers and large ponds; they are used for shelter, birthing and rearing. One family of beavers may have several lodges or bank dens, but will typically use only one area during winter. Preferred forage includes leaves, inner bark, and the twigs of deciduous trees and shrubs. Aspen is the favorite food item, followed by birch, cottonwood, willow, oak, and maple. Beaver will also eat herbaceous plants, grasses, and some aquatic plants. Beaver store food for the winter months by stashing stems underwater and anchoring them to the bottom of the lake or stream. When ice makes it impossible to forage on land, they feed on the bark and stems in their cache, and on the roots and stems of aquatic plants, such as pond lilies and cattails. Beaver do not hibernate, but are less active during winter, spending most of their time in the lodge or den. (Maine DIFW, 2014f).

Muskrat are also likely present in the Project area and are likely year round inhabitants. Muskrat are found throughout still or slow-moving waterways, including marshes, beaver ponds, reservoirs, and the marshy borders of lakes and rivers. Muskrat eat a wide variety of plants, including cattails, sedges, bulrush, arrowhead, water lilies, pondweed and ferns. They will also eat alfalfa, clover, corn and other crops that happen to be in their territory. Muskrat will occasionally eat shellfish, snails, fish, frogs and salamanders, but these are a small part of the diet and are generally consumed when plant foods are scarce. Depending on site conditions, muskrat dens are located in banks or lodges. Bank dens range from a short tunnel leading to an enlarged nest chamber, to a long and complex system of chambers, air ducts and entrances. In marshes and other areas lacking steep banks, muskrats build dome-shaped lodges from leaves, stems, roots and mud. Lodges are constructed in open water that is two to four feet deep, and are built high enough to keep the den above high-water levels. (Maine DIFW, 2014g).

River otter were not observed during field investigations during 2014 relicensing studies, however, they may occasionally occur within the Project area, and their presence is possible year round. This highly aquatic species is known to inhabit riparian streams bordered by forested areas such as those that occur along the Union River and its tributaries (DeGraaf and Yamasaki, 2001). Although seldom seen, river otter are relatively common throughout Maine. In winter, river otter frequent areas that remain ice-free, such as rapids, the outflows of lakes, and waterfalls (Maine DIFW, 2014h). River otter subsist on a variety of aquatic wildlife, such as fish, crayfish, crabs, frogs, birds' eggs, birds, and some reptiles such as turtles. They are also known to incorporate some aquatic plants into their diet. River otter may occasionally prey on other small mammals, such as muskrat or rabbit. River otter dens can be found along the water in abandoned burrows or empty hollows. Den entrances are generally located underwater, so they can be easily accessed from the water. (Maine DIFW, 2014h).

Smaller mammal species that are likely to occur at the Project include numerous squirrel and mouse species. Example species include red squirrel, northern flying squirrel, deer mouse, and eastern chipmunk. Bat species may also potentially occur within the Project area; these include big brown bat, little brown bat and silver-haired bat. The little brown bat and silver-haired bat are Species of Special Concern in Maine. None of these species of bats were observed during field investigations.

Big brown bats are likely to occur within the Project vicinity. Big brown bats are versatile in their habitat choice and will hunt for insects over water, open forests and cliff sides. Day roosts are generally within deciduous forests, with maternity colonies forming beneath loose bark or in tree crevices. Colonies may also use tree-lined meadows or waterbodies. These bats also commonly roost in man-made structures including house attics, eaves, barns, silos, church steeples, and underneath bridges, in both urban and rural areas. Female big brown bats form large maternity colonies from spring through summer, sometimes numbering hundreds of bats.

Male bats are generally solitary and are more flexible about where they roost. These bats hibernate underground in caves and mines, or in buildings where temperatures seldom go below freezing. (Conserve Wildlife Foundation of New Jersey, 2015).

Little brown bats are most likely to occur within the Project vicinity in summer. Little brown bats feed primarily over wetlands and other still water where insects are abundant. They also use rivers, streams, and trails as travel corridors to navigate across the landscape. Little brown bats may potentially use areas within the Project vicinity for summer roosting as well, as they prefer summer roosts that are close to water. During the summer, male and female little brown bats roost separately. Summer roosting areas may include barns, attics, outbuildings, bat houses and tree cavities. Female little brown bats will gather into maternity colonies, selecting very warm roosts in which to bear and nurse their young. Males roost in smaller colonies, and may use tree cavities as well as buildings. (NHF&G, 2014).

In the winter, male and female little brown bats hibernate together in clusters in moderately sheltered hibernacula, including caves, mine tunnels, and occasionally in hollow trees. (NHF&G, 2014). Many little brown bats leave the state of Maine in search of adequate hibernacula in winter. No winter hibernacula for little brown bats is known to occur in the Project vicinity.

Silver haired bats are less common in Maine than little brown bats. Silver haired bats are migratory, leaving Maine for southern states in winter. For this reason, silver haired bats only have potential to occur in the Project vicinity in summer. In summer, these bats are usually found in heavily forested areas where preferred daytime refuges and roost habitat include tree cavities and areas under loose bark (Fidel and Denham, 2014). They are sometimes known to use buildings for shelter as well. These bats prefer breeding grounds close to lakes and ponds (Fidel and Denham, 2014). The eating habits of the silver haired bat are similar to other Maine bats, and primarily consists of small to medium sized insects. If silver haired bats do occur in the Project vicinity, they would be expected to forage over and near Project waters and possibly roost in upland forested areas in the vicinity during temperate seasons.

Birds

Bird species that occur within the Project boundary and immediate vicinity are those typical of Hancock County and of Downeast Maine. Waterfowl observed or likely to occur on the Project impoundment include Canada geese, mallard ducks, black ducks, blue-winged teal ducks, wood ducks, common mergansers, and hooded mergansers. Other avian species that are associated with aquatic environments, such as belted kingfisher, great blue heron, spotted sandpiper, lesser yellowlegs, osprey, common loon, and bald eagle, were also observed or are likely to occur within the Project boundary.

A diverse array of other species, such as corvids, woodpeckers, raptors, passerines, and game birds are also are expected to occur in shoreline and wetland habitats of the Project area. Many of these are migratory species, but some, such as black-capped chickadee, woodpecker species and corvid species, are expected to remain in the Project vicinity year-round.

Avian species that rely on open water habitats typically do not overwinter on lakes and ponds such as the Graham Lake and Lake Leonard impoundments, due to winter ice cover. Species such as osprey, common loon, great blue heron and other wading birds and waterfowl would typically leave the Project area by late fall or early winter. Some avian species that utilize open water habitats, such as bald eagle and common merganser, are highly individual in seasonal use. Individuals of these species may remain in the immediate area of the Project during part or all of the winter, utilizing isolated pockets of open water and/or other foraging areas; meanwhile other individuals of the same species may leave the region completely.

According to the listing of Species of Special Concern provided on Maine DIFW's website (last updated March 1, 2011) (Maine DIFW, 2015), three of the avian species that are known or are likely to occur within the Project area are Species of Special Concern. These are great blue heron, bald eagle, and lesser yellowlegs. All three of these species were observed within in the Project area during the 2014 field investigation (see Table E-18).

Great blue heron occur in various saltwater and freshwater habitats, including open coasts, marshes, sloughs, riverbanks, lakes and small ponds. Great blue herons typically stalk fish, frogs and other prey in shallow waters, but they also occasionally forage in grasslands and agricultural fields (Cornell, 2014). Breeding herons gather in colonies ("rookeries") and build stick nests high off the ground, in tall trees or snags. No heron rookeries are known to occur in the Project vicinity, and none were observed during the study. Great blue herons are a partial migrant; many migrate south to warmer climates in winter, but some may attempt to overwinter in southern Maine (Maine Encyclopedia: Great Blue Heron 2014). Great blue herons are not expected to overwinter in the Project area, but do utilize the Project area for foraging in wetland and shallow water areas during temperate seasons.

Bald eagle is the only bird Species of Special Concern with potential to occur in the Project area year-round. Bald eagles are highly nomadic and some individuals may roam great distances when not breeding. Alternatively, some individuals may stay in interior Maine over winter in areas where food is available. Bald eagles were observed frequently on the impoundments and in the vicinity during relicensing studies. Two intact and actively used eagle nests were documented within the Project boundary in 2013, according to correspondence with Maine DIFW. One of the nests was located on a small island in Graham Lake, south of Harwood Hill Island and approximately 6.8 miles northeast of the Graham Lake dam. The other intact eagle nest was located on a small island on the southern end of Graham Lake, approximately 1.0 mile northeast of the Graham Lake dam. The northern nest hosted a breeding pair and one fledgling in 2013, while the southern nest hosted a breeding pair but no fledglings.

Lesser yellowlegs occur in various shallow saltwater and freshwater habitats. Lesser yellowlegs eat aquatic and terrestrial invertebrates, particularly flies and beetles, and occasionally small fish and seeds. Lesser yellowlegs are active feeders, often running through shallow water to chase prey. They breed in open boreal forest with scattered shallow wetlands; they do not breed within the Project vicinity (Cornell, 2015). Lesser yellowlegs are not expected to overwinter in the Project area, but do utilize the Project area for foraging in wetland and shallow water areas during temperate seasons.

Common loons occur and breed on Graham Lake. While not a rare species or a Species of Special Concern in Maine, common loons are frequently a subject of interest on bodies of water that are subject to water level fluctuations. The common loon is a piscivorous bird that is highly adapted for diving and submergent swimming. These adaptations include heavy bones and posteriorly attached webbed feet, which make the loon awkward and poorly mobile on land. Loons nest at the water's edge where their nests are very susceptible to water level fluctuations. Due to its susceptibility to the effects of water level fluctuations during the nesting season, the common loon is frequently identified by wildlife agencies as a species to be evaluated in connection with FERC relicensing of certain reservoir-inclusive projects, such as Graham Lake in the Ellsworth Project.

Common loons may be found in a wide variety of freshwater aquatic habitats, however, they generally prefer lakes larger than 60 acres with clear water, an abundance of small fish, numerous small islands, and an irregular shoreline that creates coves (Evers, 2007). As noted, loons nest in close proximity to the water's edge. Preferred nesting sites include small islands, floating bog mats, and marshy hummocks. Marsh and mainland sites are less preferable and are typically only used when more preferable (particularly island) sites are unavailable (Evers, 2007).

In order to assess the potential impacts of Project operation on common loons nesting on Graham Lake, nesting surveys were performed on seven dates in 2014: June 9, 16 and 28; July 7, 16, and 29; and August 17. The results of the 2014 survey were reported in Black Bear's ISR (2014) for the Project and are summarized below.

Of the four common loon pairs that attempted to nest on Graham Lake in 2014, three were judged to have been successful in hatching at least one chick. Each of the nesting pairs made a single nesting attempt on floating, or partially floating bog mats. The successful nests were located in the areas of Hardwood Hill East, Great Meadow, and Southeast Meadow. Evidence of hatch was observed at all three nests, however, offspring were observed only at Hardwood Hill

East and at Great Meadow. At Southeast Meadow, no chicks were observed; successful nesting was deduced based on incubation time and eggshell fragments (that were consistent with hatching) located on the nest site.

Of the four total nesting attempts made among five territorial loon pairs on Graham Lake in 2014, one failed. The failed nest was located in the area of Hardwood Hill West. The two eggs at the Harwood Hill West nest site were abandoned, for unknown reasons, after partial incubation. While the actual cause of abandonment is unknown, common causes of nest abandonment while eggs are present include (but are not limited to) human disturbance, territorial interactions, and insect infestations. At the time of abandonment, and for some time after, this nest was judged by surveying biologists to be accessible to incubating loons. That is, water levels did not inundate or strand the nest during or after active incubation. For this reason, water levels have been discounted as a possible cause of nest failure.

RTE Species

During study plan development, Maine Natural Areas Program (MNAP), Maine DIFW and USFWS were consulted to assist in identifying RTE species with potential to occur within the Project boundary and its vicinity. Maine DIFW identified five wildlife RTE and species of special concern.

Species of Special Concern

The Pre-application Document identified six vertebrate wildlife species that are Species of Special Concern in Maine and that have the potential to occur in the Project vicinity: Arctic char, little brown bat, silver-haired bat, bald eagle, northern leopard frog, and wood turtle. In addition, a current listing of Maine's Species of Special Concern, as presented on Maine DIFW's website (Maine DIFW, 2015), identifies two additional bird species (great blue heron and lesser yellowlegs) that were observed within the Project Boundary during field investigations as Species of Special Concern.

An isolated population of silver char (formerly known as Sunapee or blueback trout) occurs within the Union River basin, in Floods Pond and Green Lake (URFCC 2010). Because of their preference for cold water, it is not expected that silver char would occur in Project waters.

As previously discussed, bald eagles are no longer recognized as a Threatened Species under federal or Maine state law. For this reason, Essential Habitat designations and state regulations that applied to bald eagle nest sites from 1990 - 2009 are no longer in effect. Protection for bald eagles and their nests continues under the BGEPA.

Northern leopard frogs live in wetlands, ponds, lakes, meadows, or fields in close proximity to water. Northern leopard frogs feed on insects, slugs, snails, and other frogs. The Northern leopard frog overwinters in the mud of lakes and large ponds. (Tekiela, 2004). Northern leopard frogs are expected to utilize the Project area in the temperate seasons and overwinter in the Project impoundments.

Wood turtles can be found in slow rivers and streams with woodland floodplains. Wood turtles are a terrestrial species that feed on land consuming plants, berries, mushrooms, worms, and slugs. During the winter months, wood turtle reside underwater beneath the ice. Wood turtle females lay eggs in riverbanks and sandbars. (Tekiela, 2004). Wood turtles are expected to utilize the Project area in temperate seasons and overwinter in the Project impoundments.

RTE Marsh-Nesting Birds

In February 2013, Maine DIFW and USFWS expressed an interest in determining if any rare-marsh nesting birds occur in the Project area and if operation of the Graham Lake dam is potentially affecting their productivity. In accordance with the FERC approved RSP for the Ellsworth Project, Black Bear conducted a marsh-nesting bird habitat survey on Graham Lake in 2014 (Black Bear, 2014; Marsh-nesting Bird Habitat Survey). Based on agency consultation, the survey focused on identification of suitable habitat for RTE species, including least bittern (state endangered), sedge wren (state endangered), black tern (state endangered), common gallinule (state threatened), and yellow rail (state species of special concern). In accordance with the FERC approved RSP, the objectives of the survey were to: map the nature and extent of emergent marsh habitat associated with Graham Lake; and document the habitat quality and vegetative composition of this habitat.

Black Bear conducted a desktop study of emergent herbaceous/shrub wetlands associated with Graham Lake, based on review of aerial photographs and Maine DIFW-mapped inland waterfowl and wading bird habitats. A field verification survey was conducted on July 28 and 29, 2014. The survey identified 26 seasonally flooded emergent herbaceous or emergent herbaceous/shrub wetlands that are five acres in size or larger. These wetlands include the three large islands within Graham Lake, the wetland peninsula that juts out into the southern basin of Graham Lake, smaller islands, and numerous wetland complexes associated with tributary streams to Graham Lake. The wetland complexes identified range in size from approximately 5 acres to 417 acres.

After review of the marsh-nesting bird habitat survey data, the Maine DIFW requested broadcast call-back surveys be conducted in three areas mapped by Black Bear as emergent/shrub wetlands, based on coincidence with Maine DIFW-mapped IWWH. These three areas are large in size; one is the large wetland peninsula on the southern end of Graham Lake (Great Meadow) and the other two areas are large islands in the middle portion of Graham Lake. During consultation with the Maine IFW, the yellow rail was removed from the study request. In May/June 2015 the broadcast call-back survey was conducted on three separate occasions at each sampling location. Black Bear surveyed the two northern locations (9 sites) and the Maine DIFW surveyed the southern location (8 sites). No call-back responses were heard at any of the sampling sites for five of the six sampling periods (3 north, two south). Results for the final south location sampling period have not yet been received from Maine DIFW.

Brook Floater Mussel Survey

In addition to state-listed species of concern, the Maine DIFW requested that Black Bear conduct a study to document the presence of the Brook Floater (*Alasmidonta varicose*), which is a state-listed threatened mussel species. Black Bear conducted a survey for the Brook Floater in the riverine and shoreline areas of the Union River between Graham Lake and Lake Leonard. Black Bear performed the survey on July 24, August 22, and September 22, 2014, using a combination of widely used methodologies (walking the entire shoreline, 19 survey transects using viewing tubes, face masks, and SCUBA, for determining presence/absence of freshwater mussels. No Brook Floaters were observed; nor were any Brook Floater shells found along the shore or in shell middens (Black Bear 2015).

4.4.4.2 Environmental Analysis

Any potential effects of continued Project operation on wildlife habitats within the Project boundary would primarily be related to water level and flow regulation regimes. The Ellsworth Project is operated for water storage and power generation. Operationally, the Project is typically run as a peaking plant, with water being released from the Graham Lake reservoir, which provides storage and has no power facilities, and then is used to generate electricity at the downstream Ellsworth powerhouse. Ellsworth Dam operates in a run-of- river mode automatically via pond level control. As required by its’ FERC license, Black Bear releases a continuous minimum flow of 105 cfs from the Ellsworth Dam and the Graham Lake Dam from July 1 through April 30 and 250 cfs from May 1 through June 30 for the protection of fishery resources (FERC, 1987).

Water levels in Graham Lake are managed in accordance with the FERC license between elevations of 93.4’ and 104.2’ and Lake Leonard between 65.7’ and 66.7’ (FERC, 1987). Water levels in Graham Lake on an annual basis can vary up to 10.8 feet per year, while water levels in Leonard Lake vary very little (approximately 1 foot) over the course of the year. Generally, this operation regime creates four distinct areas of hydraulic influence within the Project boundary: Graham Lake reservoir; a riverine portion of the Union River between Graham Lake and Lake

Leonard; Lake Leonard impoundment; and the portion of the Union River in the Ellsworth Dam tailwater.

Habitats between 104.2’ and 107’ surrounding Graham Lake that are not associated with developed facilities are not affected by Project operation. Approximately 35 acres of uplands within the Project boundary are occupied by managed vegetation or development; these include open field (approximately 11 acres), electrical transmission corridor/shrubland meadow (approximately 4 acres, non-Project owned and managed) and maintained lawn (approximately 20 acres). No changes to the management of these areas are expected and no new impacts to habitats in these areas will occur.

No changes are proposed to current Project operation. Therefore, no adverse effects to wildlife habitats within the Project area are expected.

Graham Lake Reservoir

Graham Lake Dam impounds the Union River and creates Graham Lake, a water storage reservoir, which has a surface area of approximately 10,000 acres at normal maximum surface elevation of 104.2’. The impoundment is fluctuated between full pond and elevation 93.4’, which can result in up to a 10.8-foot yearly drawdown. The Project generally follows an operating curve where the impoundment is drawn down during the summer and winter and refilled in the fall (partial) and spring (full). Habitats that currently exist within the Project area in the vicinity of the Graham Lake impoundment drawdown zone are, in part, a product of the current operational regime and are expected to persist as they have under present operation. No changes are proposed to current Project operation, therefore, no new effects to habitats within the drawdown zone are expected. No adverse impacts to existing wildlife habitats within the impoundment are expected to result from the continued operation of the Project, as proposed.

Riverine Portion of the Union River between Graham Lake and Lake Leonard

The portion of the Union River that is between Graham Lake and Lake Leonard is riverine. The Project boundary is basically the bank of the river. Habitats that currently exist within this reach of the Union River are, in part, a product of the current operational regime and are expected to persist as they have under present operation. No changes are proposed to current Project operation, therefore, no new effects to habitats within the Union River in this area are expected.

Lake Leonard Impoundment

The Ellsworth powerhouse operates as a peaking facility based primarily on flow management out of Graham Lake. Lake Leonard is managed with very little fluctuation, generally within one foot of normal full pond. Lake Leonard has a surface area of approximately 90 acres at normal maximum pool elevation at 66.7'. Habitats that currently exist within the Lake Leonard impoundment are, in part, a product of the current operational regime and are expected to persist as they have under present operation. No changes are proposed to current Project operation, therefore, no new effects to habitats are expected. No adverse impacts to existing wildlife habitats within the impoundment are expected to result from the continued operation of the Project, as proposed.

Downstream of the Ellsworth Project Dam

Ellsworth Dam operates in a run-of-river mode automatically via pond level control. River flows released from the Project are relatively stable. As a result of this relatively uniform downstream flow, wildlife habitat downstream of the dam are maintained by normal operations throughout important bio-periods. Black Bear is not currently proposing any changes to current Project operations, therefore, no new effects to habitats downstream of the dam are expected. For these reasons, it is anticipated that continued operations will not result in adverse effects on wildlife resources downstream of the dam.

Significant Habitat

Deer Wintering Areas (DWA)

Maine DIFW records indicate that one indeterminate-status DWA is located within the Ellsworth Project boundary. The deer wintering area is located within and extends immediately adjacent to the Project in the town of Waltham to the west of Route 179. The deer wintering area occurs almost entirely on private property with the exception of where the mapped area overlaps a small portion of the Project boundary directly adjacent to the eastern side Graham Lake. This DWA is not subject to any effects related to current or proposed Project operation.

Inland Waterfowl and Wading-bird Habitat (IWWH)

Nine mapped IWWHs have been identified within the Ellsworth Project boundary; all of the mapped IWWHs are associated with Graham Lake or tributaries to Graham Lake. Two of the IWWHs are associated with wetland islands within Graham Lake, one of the IWWHs is associated with the wetland peninsula on the southern side of Graham Lake (Great Meadow), and the other five are associated with emergent or emergent/shrub wetland complexes which are contiguous to tributaries to Graham Lake. One IWWH is located both along a tributary to Graham Lake and adjacent to the lake itself. Four of the IWWHs are ranked by Maine DIFW as moderate value and five are ranked as high value.

All of the IWWHs, as they currently exist, have developed in situ and have become established and stabilized under the existing operating regime. Because Black Bear is proposing no changes to the operation of the Ellsworth Project, it is anticipated that continued operations will not adversely impact these existing wetland communities.

Wildlife

Continued operation of the Ellsworth Project, as proposed, will have no adverse impacts to Project associated wildlife or wildlife habitats. Potential Project effects on wildlife species are limited to those species using areas that are directly subject to Project operation.

Long-term fluctuations of the Graham Lake reservoir resulting from Project operation will continue to result in an annual cycle of exposure and inundation of areas within the drawdown zone. Impacts to some species of wildlife may occur, but many species have adapted to the fluctuating water level regime, and will not be adversely affected. In addition, areas within the drawdown zone may present unique foraging opportunities, and may benefit some opportunistic foragers, such as some waterfowl, eagles, herons, shorebirds (e.g. sandpipers) and some small mammals. The Lake Leonard impoundment is very stable normally fluctuating only within a one foot range.

Approximately 35 acres of uplands within the Project boundary are occupied by managed vegetation (i.e. potential wildlife habitat); these include open field (approximately 11 acres), electrical transmission corridor/shrubland meadow (approximately 4 acres), and maintained lawn (approximately 20 acre). These areas provide habitat opportunities for several generalist, grassland and edge-habitat species. No changes to the management of these areas are expected or proposed and no new impacts to species that utilize these habitats will occur.

A study of common loon population and nesting success on the Ellsworth Project indicates that the continued operation of the Project, as proposed, will not result in adverse impacts to common loons. The details of this study and its findings are described, below.

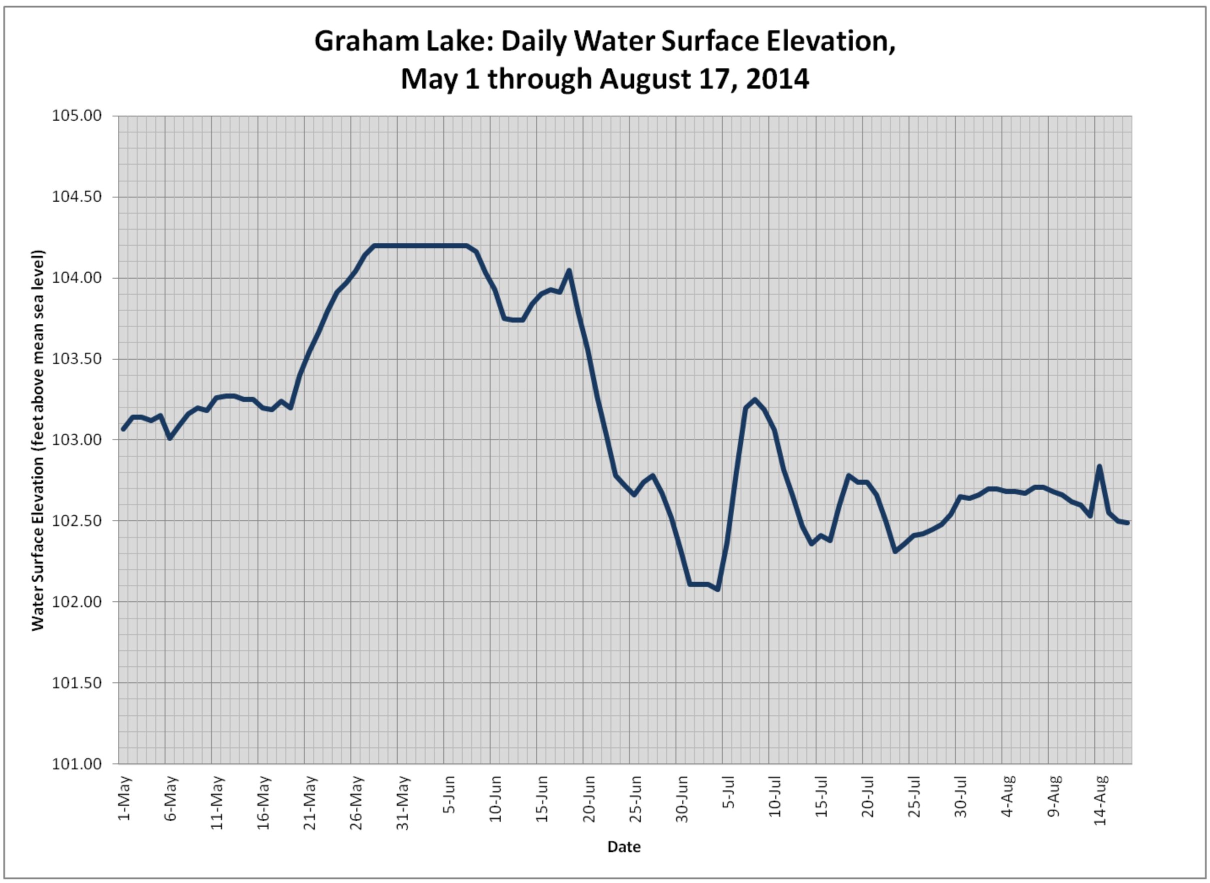
Common Loons

Generally, Common loon nests are highly susceptible to water level fluctuations during the nesting season. It is known that, on average, a change in water level greater than 0.5 vertical feet up, or 1 vertical foot down occurring within a 28-day period can significantly impact the nesting success of common loons (Fair, 1979). Increases in water level can result in flooding of the nest, while decreases potentially hinder accessibility. Reduced accessibility may cause greater time elapse between attendant nest switches, leaving eggs exposed to cooling or predation, or it may render a nest entirely unreachable to the incubating birds.

In order to assess the potential impacts of water level fluctuations on common loons nesting on Graham Lake, Black Bear analyzed Graham Lake water level data for the common loon nesting season of 2014. Daily water levels for Graham Lake for the 2014 common loon nesting season were evaluated by graphing the daily recorded elevations at Graham Lake Dam for the period of May 1 to August 17, which encompasses the duration of common loon nesting activities on Graham Lake. These data are presented in Figure E-14.

Water level data were analyzed with attention to vertical magnitude, frequency, and rate of water level fluctuations during the breeding and nesting season. Daily and weekly changes expounding the bounds of known common loon tolerance during the nesting period were noted and, as appropriate, compared to the concurrent condition of observed nesting attempts on Graham Lake.

Figure E-14: Graham Lake Daily Water Surface Elevation, May 1 through August 17, 2014



This assessment shows that water level changes during the common loon nesting season in 2014 did exceed the range of fluctuation that is known to potentially impact common loon nesting success. Despite this fact, no loon nests failed due to water level fluctuations on Graham Lake in 2014. This is largely attributable to the fact that all four loon nests that were identified were located on floating, or partially floating bog mats, which buffered the effects of changing water levels by moving with them.

Floating bog mat islands are abundant and widely distributed on Graham Lake, making this substrate widely available for use by nesting loons throughout the lake. As previously noted, small islands and floating bog mats are among preferred nesting sites for common loons, with marsh and mainland sites typically only used when preferable sites are unavailable (Evers, 2007). This would suggest that loons are likely to select the abundant and widely available floating island sites on Graham Lake before selecting non-floating sites.

In summary, the continued operation of the Ellsworth Project, as proposed, will result in continued fluctuations of Graham Lake water levels that exceed the normal range of common loon tolerance. However, as shown in 2014, common loons can and do successfully nest on Graham Lake, despite water level fluctuations that exceeded the range that can cause adverse impacts to common loon nesting success. The abundance of floating bog mats on Graham Lake, and the preference of such habitat by loons for nesting (Evers, 2007) naturally mitigates the potential effects of water level fluctuation on nesting success.

RTE Wildlife Species

Two mammal species of state Special Concern may occur within the Ellsworth Project area; these are the little brown bat and silver haired bat. These aerial insectivores may forage over Project waters and along riparian edges in summer, but are not expected to be adversely affected by water level fluctuations as a result of Project operation. Both bat species roost in upland areas (trees, dwellings, and etc.), outside of the range of potential Project operational affects. Both bat species are expected to migrate out of the Project vicinity in winter.

Three avian Species of Special Concern are known to occur within the Project area. These are bald eagle, great blue heron, and lesser yellowlegs. None of these species have foraging, breeding or nesting behaviors or needs that are expected to be adversely affected by fluctuating water levels as a result of Project operation.

Northern leopard frog and wood turtle may use the Project area. Neither of these species has foraging or breeding behaviors or needs that are expected to be adversely affected by fluctuating water levels as a result of Project operation.

4.4.4.3 Proposed Environmental Measures

There are no existing PME measures in-place relative to wildlife resources, and because there are no impacts to wildlife resources anticipated under proposed Project operations, none are proposed.

4.4.4.4 Unavoidable Adverse Impacts

No adverse impacts to Project wildlife or their habitats have been identified or are expected to occur as a result of continued operation of the Ellsworth Project, as proposed.

4.4.5 Botanical Resources

4.4.5.1 Affected Environment

General Setting

The Ellsworth Project lies within the Acadian Plains and Hills Level III Ecoregion. This mostly forested region, with dense concentrations of continental glacial lakes is less rugged than the Northeastern Highlands Ecoregion to the west, is considerably less populated than the Northeastern Coastal Zone Ecoregion to the south, and is bordered to the south and east by the Atlantic Ocean. Vegetation in this ecoregion is mostly spruce-fir on lowlands with maple, beech, and birch on the hills (Griffith et al, 2009). More locally, the project is predominantly within the Central Interior biophysical region of Maine; portions of the project also lie within the Eastern Lowlands and Penobscot Bay biophysical regions (USDA, 2005). In general, these biophysical regions are a transition zone from a northern Appalachian forest of oak, pine, and mixed hardwoods in southern Maine, to a spruce-fir-northern hardwood forest in northern and eastern Maine (Maine DIFW, 2005).

The Ellsworth Project is located on the lower reach of the Union River in the city of Ellsworth, and the towns of Waltham and Mariaville in Hancock County, Maine. The defined Project area encompasses Graham Lake and nearby lands, the Union River between Graham Lake and Lake Leonard, Lake Leonard, and a very short stretch of the Union River downstream of the Ellsworth Dam. The Project boundary is very close to the shoreline along the Union River between Graham Lake and Lake Leonard, and along Lake Leonard. The Project boundary is located at elevation 107’ around Graham Lake which is 2.8 feet above the normal full pond elevation of 104.2’ and includes associated tributary streams, wetlands and upland areas. In total, the Project boundary encompasses approximately 3,350 acres of land and 10,099 acres of open water cover types (Black Bear, 2014).

Vegetation cover type identification and mapping for the Ellsworth Project area was performed in 2014 as part of the Botanical Reconnaissance Survey (Black Bear, 2014). This effort included desktop photo interpretation, followed by field verification of general cover types. Based on these investigations, vegetation types and land use classifications were assigned. Presence of rare or unique species and habitat was investigated, with particular focus on bog bedstraw (*Galium labradoricum*), estuary bur-marigold (*Bidens hyperborea*), mudwort (*Limosella australis*), Nantucket shadbush (*Amelanchier nantucketensis*), and pale green orchis (*Platanthera* *flava var herbiola*). Significant communities of noxious and invasive species were also documented.

Open water and terrestrial cover types are summarized in Table E-19.

Table E-19: Cover Types Identified within the Ellsworth Project Boundary

Cover Type	Acres	% Total Project Acreage
Water		
Open Water	***10,099***	***75***
Land		
Forested Upland	2,144	16
Wetland	1,171	9
Maintained Lawn	20	<1
Open Field	11	<1
Electrical Transmission Corridor/Shrubland-Meadow	4	<1
Land subtotal	***3,350***	***25***
TOTAL:	***13,449***	

The predominant plant community on lands within the Project boundary is forest, followed by wetlands. Significantly smaller areas of maintained open field occur. Areas that are associated with Project facilities and Project-related recreation facilities are very small in extent (as compared to other cover types), and are comprised of gravel surfaces, mowed grass, and non-Project maintained electric transmission corridor, and unvegetated surfaces. A small area of maintained electric transmission corridor (non-Project owned) is associated with the Project facilities (Table E-19). Major community types are further described in the following paragraphs.

Upland Habitat Communities and Species

The majority of upland plant communities within the Project area are forest, with approximately 2,144 acres identified as this cover type (Table E-19). Upland plant communities within the Project area are predominantly variations of the Northern Hardwood Forest Community.

There are distinct forested areas within the Project boundary that may more closely fit the characteristics of the Oak-Northern Hardwood Forest and Oak-Northern Hardwood-White Pine Forest Communities (Gawler and Cutko, 2010). Other areas more closely resemble Spruce-Northern Hardwood Forest. The Northern Hardwood, Oak-Northern Hardwood, Oak-Northern Hardwood-White Pine, and Spruce- Northern Hardwood community types within the Project area intergrade gradually, and Northern Hardwood Forest can be considered the matrix forest cover. Forest downstream of Graham Lake and around Lake Leonard can be described as Oak-Northern Hardwood and Oak-Northern Hardwood-White Pine communities, with some areas of early successional forest cover. The eastern shore of Graham Lake is where most of the Spruce-Northern Hardwood Forest is found, whereas the western shore and islands are primarily where forest cover can be described as Northern Hardwood, Oak-Northern Hardwood, and Oak-Northern Hardwood-White Pine Forest.

Other upland plant communities occur far less frequently than forested areas within the Project boundary, collectively comprising <1% of the total area within the Project boundary. These small inclusions consist of isolated occurrences of open fields, electric transmission corridor, shrubland-meadow, and maintained lawn.

Wetland Habitat Communities and Species

Wetland cover types occupy approximately 1,171 acres (approximately 9% of all cover types, including water) within the Project boundary (Table E-19). Wetland types within the Project boundary are described herein based on the Cowardin (1979) classification system. Wetland types found within the Project boundary include Lacustrine, Riverine, Estuarine, Palustrine Unconsolidated Bottom (PUB), Palustrine Aquatic Bed (PAB), Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), and Palustrine Forested (PFO). The vast majority of palustrine wetlands within the Project boundary are associated with Graham Lake and the various types are generally found together as wetland complexes. Many of the wetlands associated with Graham Lake are narrow fringes along the lake itself or along tributary streams; some areas comprised of numerous wetland classes are more extensive. Narrow fringes of wetland are located along Lake Leonard and the Union River in some areas; these areas are classified as PAB, PEM, and PSS Black Bear, 2014).

Lacustrine areas within the Project boundary include Graham Lake and Lake Leonard, which are impoundments of the Union River. Much of the lacustrine areas within the Project area are not vegetated, however some of the shallower areas of Graham Lake are dominated by emergent vegetation. The Project boundary in the vicinity of the Union River between the two impoundments is generally the banks of the river; this area is classified as riverine. There is very little associated riparian wetland associated with the Union River between Graham Lake Dam and Lake Leonard. Below the Ellsworth Dam the Union River is classified as estuarine.

PEM/PSS is the most common vegetated wetland type associated with Graham Lake. PEM wetland is associated with the islands within Graham Lake and the tributary streams to Graham Lake. While discrete areas of PEM and/or PSS are located on three large islands and on the peninsula in the southern portion of the lake, most of these areas are interspersed with PEM and

PSS vegetation, and are considered PEM/PSS wetlands. Some of the islands also contain PFO wetland areas. Many contiguous narrow fringes of PEM, PSS, and PFO wetland border Graham Lake or tributary streams within the Project boundary, making up wetlands with varying classifications; some of the wetland areas are more extensive. A few PUB wetlands are also located within the Project boundary.

Bog habitats, dominated by low-growing herbs and stunted shrubs, apparently present prior to Project inception many years ago, persist under current project conditions on the three large wetland islands and the large wetland peninsula on the southern side of Graham Lake. There are also many areas of sphagnum-dominated bog located on the islands and peninsula. These areas are generally classified as PEM/PSS, although they are sometimes classified as PSS where shrub species are the dominant strata. Dominant shrub species in these habitats are ericaeous shrubs. Subdominant but common species include herbaceous species which occur in nutrient-poor, generally soft waters.

Small scrub-shrub swamp habitats (PSS) are also located around the perimeter of Graham Lake and along tributary streams in conjunction with other wetland types. These wetland areas are generally dominated by deciduous shrubs. Forested swamps are also associated with Graham Lake and wetland complexes within the Project boundary.

Shallow fringing marshes dominated by emergent plants (PEM) are few and restricted to coves and other protected locations within the Project boundary. There are only small patches of deep marsh, apparently due to wave action (i.e., high-energy dynamics) that limits their presence. Some small shrubs are also found within PEM wetlands within the Project area. Limited areas of mudflats or vegetated-but-inundated communities were observed. Floating-leaved aquatic beds are uncommon in Graham Lake, with only a few sparse patches observed. Shallow open water PAB area is inundated by the impoundment, and is found in areas of low water velocities along the fringes of the deeper water of the impoundment.

Unique Plant Communities and RTE Botanical Resources

Maine Natural Areas Program (MNAP) online data (MNAP, 2011) and correspondence with MNAP identified five RTE/species of special concern (bog bedstraw, estuary bur-marigold, mudwort, Nantucket shadbush, and pale green orchis) as potentially occurring in the vicinity of the Project.

Of the five RTE plant species, including plants of special concern, reported as potentially occurring in the vicinity of the project by the MNAP, only Nantucket shadbush was observed during field surveys for botanical resources conducted on July 28 and 29, 2014. The shadbush was found on dry ledge, elevated several feet above the Project influence, in the known location just downstream of the Ellsworth Dam. This plant is listed as threatened in the State of Maine and does not have a federal status. No other plant species federally or state-listed as threatened or endangered, or tracked as a species of special concern by MNAP was encountered.

Suitable habitat for three of the other reported species – bog bedstraw, estuary bur-marigold, and pale green orchis – was not observed in the immediate Project environs. Suitable habitat for mudwort was observed in the Union River below Leonard Lake, as well as in some areas of shallow water in Graham Lake, but the species was not encountered. Each of these four species are listed as special concern in the State of Maine and are not listed federally listed.

Beginning with Habitat (BwH) mapping and MNAP correspondence indicates the presence of a raised level bog ecosystem (Great Meadow) within Graham Lake. Great Meadow is located on the wetland peninsula that juts into the southern portion of Graham Lake. This natural community is considered to be an outstanding example of a more common community type (S4). Raised level bog ecosystems are flat peatlands in basins with mostly closed drainage, receiving water from precipitation and runoff from the immediate surroundings. In general, Sphagum moss dominates the ground surface, the surface of the bog is flat and featureless, and often areas are partially treed with black spruce and larch (Gawler and Cutko, 2010). Field reconnaissance revealed that this bog ecosystem also contains eastern white pine.

Invasive Plants and Noxious Weeds

Noxious and invasive plant species that have been identified within the Project boundary are limited to common reed, Japanese knotweed (*Fallopia japonica*), and purple loosestrife (*Lythrum salicaria*). Of these occurrences, only the common reed and Japanese knotweed form significant communities within the Project boundary; a few purple loosestrife plants were observed sporadically throughout the Project area. Three large stands of common reed are located on the western side of the northernmost island within Graham Lake; the emergent marsh in this location is dominated by the common reed. Small stands of common reed were observed sporadically along the northwestern and northeastern shores of Graham Lake and are generally near residences; these areas are too small to be depicted on the invasive species mapping. An approximately 150-foot long stand of Japanese knotweed and two other smaller stands of the plant were observed on the south side of Graham Lake adjacent to Route 179 in Ellsworth Black Bear, 2014). No invasive, purely aquatic species such as variable-leaved milfoil were observed.

4.4.5.2 Environmental Analysis

The Ellsworth Project is operated for water storage and power generation. Operationally, the Project is run as a peaking plant, with water being released from the Graham Lake reservoir, which provides storage and has no power facilities and is then used to generate electricity at the downstream Ellsworth powerhouse. Ellsworth Dam operates in a run- of-river mode automatically via pond level control. As required by its FERC license, Black Bear releases a continuous minimum flow of 105 cubic feet per second (cfs) from the Ellsworth Dam and the Graham Lake Dam from July 1 through April 30 and 250 cfs from May 1 through June 30.

Water levels in Graham Lake are managed in accordance with the FERC license between elevations of 93.4' and 104.2' and Lake Leonard between 65.7' and 66.7' (FERC, 1987). Water levels in Graham Lake on an annual basis can vary up to 10.8 feet per year, while water levels in Leonard Lake vary very little (approximately 1 foot). Generally, this operation regime creates four distinct areas of hydraulic influence within the Project boundary: Graham Lake reservoir; a riverine portion of the Union River between Graham Lake and Lake Leonard; Lake Leonard impoundment; and the portion of the Union River in the Ellsworth Dam tailwater area.

Botanical resources within the Project boundary may be exposed to, or isolated from, different potential influences depending on their location relative to Project waters. Potential Project effects to botanical resources that are associated with the Project's impoundments and riverine and estuarine components are discussed, respectively, below.

Very small amounts of upland are located within the Project boundary adjacent to the Ellsworth Dam tailrace, Lake Leonard, and the Union River between Graham Lake and Lake Leonard; the Project boundary is very close to the river and impoundment banks in these areas. Uplands between 104.2' and 107' surrounding Graham Lake that are not associated with Project facilities are not affected by Project operations. Approximately 35 acres of upland within the Project boundary are occupied by managed vegetation or development; these include open field (approximately 11 acres), electrical transmission corridor/shrubland meadow (approximately 4 acres, non-Project owned and managed) and maintained lawn (approximately 20 acres). No changes to the management of vegetation in these areas are expected, and because no changes are proposed to current Project operations, no new impacts to vegetation within these upland areas would occur.

Graham Lake Reservoir

Graham Lake Dam creates Graham Lake, a water storage reservoir, which has a surface area of approximately 10,000 acres at normal maximum surface elevation of 104.2'. The impoundment is fluctuated between full pond and elevation 93.4', which can result in up to a 10.8-foot yearly drawdown. The Project generally follows an operating curve where the impoundment is drawn down during the summer and winter and refilled in the fall (partial) and spring (full). Plant communities within this drawdown zone are subject to water level fluctuations as a result of Project operations on an annual basis.

Approximately 1,171 acres of vegetated wetlands are found within the Project boundary, and the vast majority of these wetlands are associated with Graham Lake. The wetland plant communities that currently exist within the Ellsworth Project boundary and which are associated with the Graham Lake impoundment have become established and stabilized under the existing operating regime that has been in practice since 1979. Prior to that time the normal maximum surface elevation for Graham Lake was 105.2'.

Because Black Bear is proposing no changes to the operation of the Ellsworth Project, it is anticipated that continued operations will have no impact on existing wetland communities and other botanical resources associated with Graham Lake.

Riverine Portion of the Union River Between Graham Lake and Lake Leonard

The portion of the Union River that is between Graham Lake and Lake Leonard is riverine. This area of river has very little associated riparian wetland and the Project boundary is basically the bank of the river. Botanical and vegetation resources in this area are not subject to any effects as a result of the Ellsworth operations.

Lake Leonard Impoundment

Lake Leonard has a surface area of approximately 90 acres at normal maximum pool elevation at 66.7'. The Ellsworth powerhouse operates as a peaking facility and the Lake Leonard impoundment is managed within 1 foot on a daily basis. Plant communities within this zone are subject to very limited fluctuations as a result of Project operations. A very small amount of PAB, PEM, and PSS wetland is associated with Lake Leonard

Because Black Bear is proposing no changes to the operation of the Ellsworth Project, it is anticipated that continued operations will have no impact on existing wetland communities and other botanical resources associated with Lake Leonard.

Downstream of the Ellsworth Dam

Ellsworth Dam operates in a run-of-river mode automatically via pond level control. This results in a relatively uniform downstream flow. The Ellsworth Dam is located at the head-of-tide and as such is subject to varying water levels on a daily basis. Wetlands and wetland habitat downstream of the dam are maintained by normal operations and tidal flows throughout important bio-periods. Black Bear is not proposing any changes to current operations. For these reasons, it is anticipated that continued operations will not result in adverse effects on wetland or other botanical resources downstream of the dam.

Unique Plant Communities and Botanical Resources

During consultations with the Maine NAP, Black Bear (via letter on October 3, 2012) was informed that Nantucket shadbush, a state threatened species, occurs downstream of the Ellsworth dam. A Nantucket shadbush was observed in the documented location in 2014 during botanical surveys, but the plant was located several feet above the Project influence. Given that no changes in Project operation are proposed, no impacts to this species or its habitat are expected. No other RTE plant species were documented within the Project boundary.

Invasive Plants and Noxious Weeds

Noxious and invasive plant species that have been identified within the Project boundary are limited to common reed, Japanese knotweed and purple loosestrife. Of these occurrences, only the common reed and Japanese knotweed form significant communities within the Project boundary; a few purple loosestrife plants were observed sporadically throughout the Project area. No purely aquatic invasive species such as variable-leaved milfoil were observed during botanical surveys. The larger invasive communities are generally located near residences on the shore of Graham Lake or adjacent to roads and their presence seems to be attributed to residential land use and road use or construction. Given that no changes in Project operation are proposed, no impacts to or spread of invasive species are expected as a result of continued Project operations.

4.4.5.3 Proposed Environmental Measures

There are no existing PME measures in-place relative to wetland and botanical resources, and because there are no impacts to botanical resources anticipated under proposed Project operations, no PME are proposed.

4.4.5.4 Unavoidable Adverse Impacts

Continued operation of the Ellsworth Project, as proposed, will have no new impacts to existing Project area wetlands or botanical resources.

4.4.6 Rare, Threatened and Endangered Species

4.4.6.1 Affected Environment

The Ellsworth Project area includes aquatic and terrestrial habitats that are known to or have potential to be utilized by Federal rare, threatened, or endangered (RTE) species.

Atlantic salmon, and Atlantic and shortnosed sturgeon are federally-listed aquatic species. The affected environment for these species is addressed in Section 4.4.3 of this Exhibit E.

Northern long-eared bats, a federally-listed threatened species, may occur within the Project area. DePue and the National Park Service documented northern long-eared bats in Acadia National Park in the summers of 2012 and 2014 (USFWS, Department of Interior, 2015). Northern long-eared bats primarily feed in the understory of forested areas on moths, flies, leafhoppers, caddisflies, and beetles, which they catch in flight with echolocation. They also glean insects from vegetation. In the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or crevices in both live trees and in snags. Non-reproductive females and males sometimes also roost in cooler places, like caves or mines. Northern long-eared bats appear to be flexible in selecting roosts, choosing trees of varying species which are generally deciduous. Northern long-eared bats have rarely been observed roosting in human structures, such as barns and sheds. Northern long-eared bats spend the winter hibernating in hibernacula, which generally include caves or mines of varying sizes, with constant temperatures, high humidity, and no air current. Pregnant females roost in small colonies (generally 30 to 60 females and young) and give birth in the summer. (USFWS, 2015).

4.4.6.2 Environmental Analysis

The environmental analysis for Atlantic salmon, and Atlantic and shortnosed sturgeon is addressed in Section 4.4.3.2 of this Exhibit E. Black Bear will also provide a detailed assessment of the effects of the Ellsworth Project on Atlantic salmon and critical habitat in its Biological Assessment being developed in consultation with the NMFS and USFWS under the ESA requirements.

One federally-threatened mammal species may occur within the Ellsworth Project area; the northern long-eared bat. This aerial insectivore may forage adjacent to Project waters in forested habitats in the summer, but is not expected to be adversely affected by water level fluctuations as a result of Project operation. This bat species roosts in upland areas outside of the range of potential Project operational affects. This bat species spends winters months in hibernacula, and is not expected to be adversely by water level fluctuations.

4.4.6.3 Proposed Environmental Measures

Black Bear is proposing to continue to operate the Project under the current operating regime. Proposed environmental measures for Atlantic salmon, and Atlantic and shortnosed sturgeon is addressed in Section 4.4.3.3 of this Exhibit E. Black Bear is not proposing any PME for the northern long-eared bat.

4.4.6.4 Unavoidable Adverse Impacts

Black Bear anticipates that no unavoidable adverse effects on RTE species would result from the proposed relicensing of the Ellsworth Project.

4.4.7 Recreation and Land Use

4.4.7.1 Affected Environment

Recreation Access and Facilities

The Project is located within the Downeast & Acadia Tourism Region (MOT, 2012). The region includes many tourist attractions including Acadia National Park and Lamoine State Park and offers, boating (motorized and non-motorized), fishing, hunting, hiking, biking, and climbing opportunities and, whale watching and puffin watching.

The Ellsworth Project also provides a variety of public recreation opportunities. The area surrounding the Project is a mixture of year-round and seasonal residential development and undeveloped forest land. The Project is easily accessible from US Route 1 to the south and State Route 9 to the north via Route 179 along the easterly side of the Project and Route 180/181 on the westerly side of the Project. Public access to the Project is available over a combination of public highways, city streets, and private roads, as well as by boat from several launching areas on the impoundments. Black Bear provides public recreation access at several locations for motorized and non-motorized boating and shoreline fishing. Project recreation facilities owned and managed by the Black Bear include: a carry-in boat launch off Shore Road on the Lake Leonard impoundment; the Graham Lake Dam boat launch on Graham Lake; and a canoe portage trail around Graham Lake Dam. The existing canoe portage trail also serves as an angler access trail to the Union River downstream of Graham Lake Dam. Municipal, state and private lands provide additional recreation access to the Project. These include: a picnic area/day use site (municipal) on Shore Road on the east shore of Lake Leonard opposite the Middle School; Infant Street access (municipal) on both sides of the Union River; Fletcher's Landing (State) an unimproved boat launch on Graham Lake; Mariaville carry-in boat launch (municipal) on the west side of Graham Lake; and a carry-in (private) on the West Branch of the Union River. There are no commercial recreation facilities that provide direct access to the Project.

The carry-in boat launch off Shore Street provides a small (2 vehicle) parking area and a six-foot wide concrete plank ramp for carry-in boat launch and take out on the east shore of Lake Leonard. Additional vehicles can park along the Pump Station Access Road. The site is also used by bank and shoreline anglers. A Part 8 sign is maintained on site.

The Graham Lake Dam boat launch is a motorized boat launch with a 12-foot wide concrete plank ramp and gravel parking area just westerly of Graham Lake Dam. The parking area will accommodate approximately eight vehicles and trailers. Access to the site is off Mariaville Road (former Route 180) on the west side of the impoundment. Motorized boat launching is the primary activity at this site. A Part 8 sign is maintained on site.

The canoe portage trail is located on the east side of Graham Lake Dam off Patriot Road (former Route 180). The northerly portion of the trail (Graham Lake to Patriot Road) is approximately 200 feet long with minimal improvements. There is a "portage" sign facing inland near the take-out point on Graham Lake. The trail crosses Patriot Road and parking areas on either side of the road and extends through the woods on the south side of Patriot Road to multiple points on the Union River downstream of Graham Lake Dam. The trail from the parking area to the shoreline is well worn and steep from the parking area for approximately 60 feet. The total length of this section of the trail (south of Patriot Road) is approximately 100 to 160 (varies with downstream access points) feet. A "danger, water may rise" sign is located at approximately the mid-point of the trail. The two parking areas associated with this site along Patriot Road will accommodate approximately 19 vehicles. The primary use of this site is for shoreline angling downstream of Graham Lake Dam.

The other existing recreation facilities are outside the Project boundary. The picnic area/day use site off Shore Street is located on City of Ellsworth property. The site provides two picnic shelters and informal trails and access to the east shore of Lake Leonard. Parking for the site is provided at the Ellsworth Elementary School across from the site.

Infant Street is a discontinued city street that once crossed the Union River approximately 1.5 miles upstream of Ellsworth Dam; the bridge has been removed and the city still owns the public right-of-way on either side of the Union River. The site consists of small parking areas (two vehicles on east shore; six vehicle on west shore) and informal footpaths to the respective shorelines. The east side is used primarily for shoreline angling and west shore for angling and picnicking.

Fletchers Landing is located on the east side of Graham Lake in Fletchers Landing Township (T8 SD) and access is directly off Route 179. The site consists of a compacted gravel and grass parking area that will accommodate approximately ten trailer rigs. The boat launch area is approximately 15 feet wide and has an asphalt surface. The ramp facilitates the launching of small trailered watercraft. Site use appears to be primarily by locals due to the number of boats stored on site, both in the parking area and tied up along the shoreline.

The Mariaville carry-in is located on the west shore of Graham Lake off the Morrison Farm Road in Mariaville. The site consists of a graveled circular entrance road and gravel launch area. Though signed as a carry-in launch, there is evidence trailered boat launching occurs as well. The site has limited roadside parking for approximately six vehicles.

The West Branch access site is located on the River Road at its junction with Route 181 in Mariaville. The site consists of a level gravel and grass parking area that accommodates approximately seven vehicles, and a short steep gravel/sand ramp for launching hand-carry watercraft into the West Branch. The launch area exhibits moderate erosion, which may be due to trailered boat launching that appears to occur at the site. This site is privately-owned.

Informal recreation likely occurs along undeveloped portions of the shoreline and on some of the islands on Graham Lake. Such areas can be accessed by boat and by vehicle over private roads. Camping and fishing are the likely predominant activities occurring at informal recreation sites.

Some boating occurs on the Union River between Graham Lake Dam and Lake Leonard, although sections of this stretch of the river may be limited to non-motorized boats due to shallow areas and scattered rips and rapids (Class I-II). Some whitewater boating occurs on this portion of the river based on the availability of flows below Graham Lake Dam, or coordinated releases for events such as the annual Maine Canoe & Kayak Race Organization's race from Graham Lake Dam to the tidal section of the Union River. Based on available data and information, whitewater boating use on this section of the river is low.

Winter activities within the Project area include snowmobiling, ice fishing, snowshoeing, Nordic skiing, and ice skating. A local snowmobile club trail crosses the Project on U.S. Route 1A over the Union River. There are no State Interconnected Trails System snowmobile trails in the Project area.

Recreation Use

Black Bear conducted recreational use counts at Project recreation facilities from April to October 2014. Based on a statistical analysis of the field data collected, annual Project recreational use is estimated to be approximately 2,620 recreation days with peak weekend use estimated at approximately 50 recreational users. FERC defines a recreation day as "each visit to a development for recreational purposes during any portion of a 24-hour period."

One hundred percent of the 2014 Project recreational use is attributable to daytime activities. Recreational use is fairly evenly spread among the Project recreation facilities: the Graham Lake Dam boat launch had an estimated 920 users, or 35 % of total use; the Lake Leonard carry-in site had an estimated 890 users, or 34 % of total use; and the Graham Lake portage trail/downstream access site had an estimated 820 users, or 31% of total Project use. Most of this latter use is downstream shoreline fishing, and very little portage use.

None of the recreation facilities were reported to be at peak capacity on non-holiday weekends. The Graham Lake Dam boat launch and Lake Leonard carry-in were both reported to be at approximately 20% capacity for non-holiday weekends, while the portage trail/downstream access was reported to be at approximately 10% of capacity on non-holiday weekends. Existing recreation facilities are adequate to meet current recreational use and demand.

Land Use

The project is located on the lower reach of the Union River in the City of Ellsworth, and the towns of Waltham, Mariaville and Fletchers Landing Township in Hancock County, Maine. The watershed is located in an area with mixed land uses. The City of Ellsworth, with a population of 7,741 (U.S. Census Bureau 2010) is located on the southerly portion of the Project and straddles the lower end of Lake Leonard. There are several smaller towns (Otis, Waltham, Eastbrook, Mariaville, Osborn, and Aurora) all with populations less than 600 are scattered throughout the watershed. Developed land including residential, commercial, industrial, transportation, and utility uses, accounts for only a small percentage of the land use in the watershed.

Much of the surrounding lands are privately owned, some by timber management companies. There are private docks scattered along both impoundments' shorelines where there is residential development. Other than the urban portion of Ellsworth, there are no large-scale industrial or commercial developments in the area. Approximately 160 acres on the southern end of Hardwood Hill Island in Graham Lake has been placed under conservation by a local land trust. Black Bear's land use in the Project boundary is limited to project operations and maintenance. 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.

Non-Project transmission lines cross through the Project boundary in the northern reach of Graham Lake, over the Union River between Lake Leonard and the Graham Lake Dam, near Branch Lake Brook, and south of Ellsworth Dam.

4.4.7.2 Environmental Analysis

The Ellsworth Project is located on the lower reach of the Union River, in central coastal Maine. The Project includes Graham Lake which discharges to Lake Leonard, which discharges to the tidal portion of the Union River. The primary recreation interest at the Project is whether existing recreation facilities are adequate for current and future demand and whether the continued operation of the Project would impact the recreational facilities and use.

Black Bear's recreational use studies confirm that public use of Project recreation facilities and the impoundments is currently very low. The Project impoundments are used primarily for fishing and boating. The Graham Lake Dam tailwater area is popular with anglers. Recreation use data collected in 2014 as part of the relicensing studies and for the FERC Form 80 Report indicate that the existing Project area recreation facilities are adequate to meet demand and none of the facilities are at or near their capacity.

At the January 15, 2013 Scoping Meeting, one individual from the public stated the Union River below Graham Lake Dam should be assessed for whitewater boating opportunities. Black Bear conducted a desk-top whitewater boating analysis. In addition, consultants with whitewater boating experience boated the Union River on two occasions and evaluated whitewater boating opportunities. Based on the desk-top analysis and the field reconnaissance, the Union River provides Class I-II boating opportunities. However, due to the limited number of whitewater features, the river is an occasional, local resource at most.

The proposed operation of the Project will continue to provide recreational access and support existing recreation uses and facilities, and will not alter or impact land use. Black Bear is not proposing any changes to current Project operations, and therefore, there will be no adverse impacts on recreation facilities, their use, or Project and adjacent lands.

4.4.7.3 Proposed Environmental Measures

Black Bear proposes to make enhancements to several of the Project recreation facilities.

Black Bear will improve drainage at the Graham Lake Dam boat launch to remedy an erosion problem area near the top of the boat ramp. This will entail redirecting drainage from the parking lot away from the boat ramp and toward vegetative buffers on either side of the ramp and hardening the sloped gravel ramp approach with material that will not migrate toward the ramp and lake due to vehicle traffic and run-off events.

Black Bear proposes to relocate the existing portage trail to the west side of Graham Lake Dam and develop a take-out area on the existing Graham Lake Dam boat launch property separate from the hard surface ramp to avoid conflicts with launching and retrieving motorized watercraft. The portage trail would cross Mariaville Road and traverse a level field parallel the south side of the flood control structure to a new put-in on the Union River. Portage trail directional signage and “Danger Water May Rise” signage will be installed, and side and overhead vegetation along the trail cleared and maintained, where needed, to accommodate portaging a 16-foot canoe. Shoreline improvements at the downstream put-in will be required. Total length of the relocated trail will be approximately 1,000 feet, compared to approximately 360 feet for the existing trail. The portage trail is being relocated for safety considerations including the current trails very close proximity to the upstream boat barrier.

The downstream portion of the existing east shore portage trail would still be maintained for downstream angler access.

Black Bear proposes to develop and implement a Recreation Management Plan for the project, which will address management of Project recreation sites over the term of the new license.

Black Bear is not proposing any environmental measures associated with land use.

4.4.7.4 Unavoidable Adverse Impacts

The continued operation of the Ellsworth Project will support the existing recreational uses and will not alter land use associated with the Project. The proposed recreation enhancements will improve public access, public safety and provide additional opportunities at the Project.

4.4.8 Aesthetics

4.4.8.1 Affected Environment

The Project is located in south-central Hancock County, Maine. Both Project dams are located in the City of Ellsworth and the Graham Lake impoundment extends into the Towns of Mariaville, Waltham, and Fletchers Landing Township T8 SD. Ellsworth Dam and the southerly portion of its associated impoundment, Leonard Lake, are within the urban area of the city and are adjacent to commercial and residential in-town development. The remainder of the Project is rural in nature with undeveloped forest lands and scattered residential development. Terrain around the immediate Project is relatively flat, though some low elevation mountains (< 1,600') are within view of the Project (Black Bear, 2012).

Though close to the downtown area and a major transportation corridor, the Lake Leonard shoreline is well buffered with vegetation and views of development along the shoreline are very limited. Riverbanks downstream of the Ellsworth Dam are of moderate slope; the west riverbank has a few residential structures along the top of the bank and a few commercial and municipal buildings are set back along the east riverbank (Black Bear, 2012).

Lake Leonard is approximately 0.3 mile wide at its widest point and extends approximately 1 mile upstream from the dam to where the impoundment becomes narrow and more riverine. Slopes along both shorelines are gentle with some scattered residential development. Public access points providing views of the impoundment exist from a public trail opposite the Ellsworth Middle School on the east shore and from the dam on the west shore. Limited views of the impoundment also occur along portions of the public roads on the east and west shorelines (Black Bear, 2012).

The Union River extends from the head of the Lake Leonard approximately 3 miles upstream (north) to Graham Lake Dam. This section of the river is approximately 200 feet wide and contains a few short Class I/II areas. Slopes along the river are gentle to moderate. Shore Road parallels the lower east shoreline providing some views of the river, and US Route 1A crosses the river approximately 0.7 mile upstream of the head of the Lake Leonard impoundment. Infant Street on the west shoreline provides access to and a limited view of the river. The shoreline along this section of river is wooded, except where Shore Road extends along the riverbank, with very minimal development (Black Bear, 2012).

The shorelines between Rt. 1A and Graham Lake Dam are mostly undeveloped with the exception of a small residential development on the east shore below Graham Lake Dam, a railroad crossing immediately upstream of the Rt. 1A Bridge, and a non-Project transmission line corridor crossing approximately 0.8 mile downstream of the dam. The shorelines are gentle wooded slopes interspersed with wetlands and minor water courses (Black Bear, 2012).

Graham Lake Dam is located in the northeasterly portion of Ellsworth. Graham Lake extends approximately 10 miles upstream from the dam to the East Branch and West Branch of the Union River. Several other tributaries also feed into the lake. Islands of various size ranging from less than one acre to Hardwood Hill Island (approximately 625 acres) are located throughout the lake. Slopes along the shoreline consist of gentle to moderate slopes (Black Bear, 2012).

The lake shoreline is a mixture of land use classifications. The majority of the shoreline consists of forest growth. Year-round and seasonal residences are scattered along the shoreline and are generally accessed by paved public or private gravel roads (Black Bear, 2012).

Routes 179 and 180/181 roughly parallel the east and west shores, respectively, and offer various views depending on proximity and elevation of the road to the shoreline. Views of much of the Project from these roads are screened by vegetation, topography, and/or distance. There are limited Project views from two high points along State roads: off Route 179 near the intersection of Cemetery Road (elevation 330’, view to the southwest); and off Route 181 south of Tannery Brook (elevation 220’, view to the southeast). Several public access points provide views of portions of the Project. These include the boat ramp and downstream fishing access trail near Graham Lake Dam, the Morrison Farm Road carry-in and the Route 181 boat launch both on the northern end of the Project in Mariaville, and Fletchers Landing off Route 179 on the southeast shoreline (Black Bear, 2012).

Although the limited views are scenic, the Project’s aesthetic quality is not unique, particularly for this area of coastal Maine. Acadia National Park is approximately 15 miles southwest of the Project (Black Bear, 2012).

4.4.8.2 Environmental Analysis

Current operations of the of the Project facilities has little affect or impact on the aesthetic quality of the impoundments and the section of the Union River downstream of Graham Lake Dam.

4.4.8.3 Proposed Environmental Measures

Black Bear is proposing to operate the Project as it has in the past. This will maintain the existing scenic quality, therefore Black Bear is not proposing to specifically enhance Project aesthetics.

4.4.8.4 Unavoidable Adverse Impacts

The continued operation of the Ellsworth Project will have little impact on aesthetic resources of the Project.

4.4.9 Cultural Resources

Black Bear conducted several studies to identify cultural resources eligible for listing on the National Register of Historic Places (NRHP) in accordance with Section 106 of the National Historic Preservation Act (NHPA). Studies were conducted for Precontact resources (i.e., Native American archaeological resources), Postcontact resources (i.e., Euroamerican archaeological resources) and historic structures (i.e. architectural resources).

4.4.9.1 Affected Environment

Area of Potential Effect

The Area of Potential Effect (APE) for Precontact and Postcontact archaeological resources for the Ellsworth Project was defined in consultation with the MHPC as lands enclosed within the Project boundaries and/or lands located within 50 feet (15 meters) of the edge of the impoundments or river bank, whichever is the greater of the two areas.

The APE for architectural resources was defined in consultation with the MHPC as the lands enclosed by the Project's boundary and lands or properties outside of the Project's boundary where Project construction and operation or Project-related recreational development or other enhancements may cause changes in the character or use of historic properties, if any historic properties exist."

Archaeology

The Union River valley has a long history of human occupation with the arrival of people into the area approximately 11,000 years ago. Professional survey by archaeologists from the Abbe Museum in Bar Harbor and the Maine State Museum in Augusta (Bourque 1971; Bourque and Kopec 1984) showed that human use of the Project area around Leonard Lake has occurred almost continuously from the Late Archaic period up until the time of Native American contact with Europeans (ca, 5,000 - 400) years ago.

The Phase I archaeological investigation conducted for the Ellsworth Project included shoreline survey of Graham Lake and Lake Leonard, as well as all tasks specified in a letter dated September 10, 2012 from the MHPC including Phase I archaeological survey testing to determine whether any evidence of the historic Learoyd Hill Farmstead (ME 145-013) (Mosher 2010) was present within the Project boundary.

Historic and Architectural Resources

An architectural survey of the Project APE was conducted in November 2013, with follow up work in 2014. The purpose of the survey was to identify historic resources within the Project APE currently listed or determined eligible for listing in the NRHP.

4.4.9.2 Environmental Analysis

During the summer and fall of 2013, Black Bear conducted a Phase I archaeological survey of the Ellsworth Project. As part of the initial survey, Black Bear conducted background research and identified a number of previously known Precontact sites located at the Project vicinity. In addition, at the request of the Maine State Historic Preservation Officer (SHPO), Black Bear reviewed select existing archaeological reports and amateur artifact collections from the Project area. A desktop sensitivity analysis followed by field inspection and survey work led to the identification of three new Precontact sites. The sites range in age from the Late Archaic to Contact periods. All three sites were recommended for further evaluation (Phase II) to determine their potential eligibility for listing to the National Register of Historic Places (NRHP). Phase II investigation of the three new sites occurred in the summer of 2015. The findings will be reported in late 2015.

The historic architecture survey found, and the Maine State Historic Preservation Officer concurred (letter dated June 3, 2014), that there are three architectural resources in the project's area of potential effect that are either listed in or are eligible for listing in the National Register of Historic Places. These include: the Ellsworth Powerhouse and Dam (NR listed), Graham Lake Dam and Bridge (previously determined NR eligible), and the Maine Central Railroad Bridge over the Union River (NR eligible). No other NRHP-eligible historic structures were found within the Project APE.

Section 106 of the National Historic Preservation Act (NHPA) requires FERC to take into account the effect of its undertakings on historic properties and to allow the Advisory Council on Historic Preservation (ACHP) the opportunity to comment. For hydropower licensing actions, FERC typically completes Section 106 consultation by entering into a Programmatic Agreement (PA) or Memorandum of Agreement (MOA) with the licensee, the ACHP, and the state and tribal preservation offices. FERC typically requires the licensee to develop and implement a Historic Properties Management Plan (HPMP) as a license condition. Through an approved

HPMP, FERC can require consideration and management of effects on historic properties for the license term, thus meeting the requirements of Section 106 for its undertakings.

An HPMP implemented under a license is a plan for considering and managing the effects of hydropower facility activities (such as construction, operation, and maintenance) on historic properties. Historic properties include those properties listed in, or eligible for listing in, the NRHP. The HPMP establishes a decision-making process for considering the potential effects on historic properties and manages the effects of implementing the license over its entire term. The HPMP being developed for the Ellsworth Project will be filed separately with the Commission as part of the Final License Application.

4.4.9.3 Proposed Environmental Measures

Black Bear is proposing to develop and implement an HPMP for the Ellsworth Project. The HPMP considers the effects of the Project and its continued operation on historic properties. Moreover, the HPMP establishes specific steps to be taken by Black Bear to protect and manage these historic properties over the term of the license. With the implementation of an approved HPMP, the continued operation of the Project as proposed by Black Bear will have no adverse impacts on historic properties at the Project.

4.4.9.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts to cultural resources are expected to occur as the result of the continued operation of the Ellsworth Project as proposed.

4.4.10 Socioeconomics

4.4.10.1 Affected Environment

The Ellsworth Project is located in Downeast Maine within Hancock County. Hancock County is the second most eastern county in the state and is the eighth most populous of the state's 16 counties. The Project boundary is contained within the City of Ellsworth, the Towns of Mariaville and Waltham, and Fletchers Landing Township. The following sections provide a summary of selected socioeconomic variables for Maine, Hancock County, the City of Ellsworth, and the Towns of Mariaville, and Waltham, as they are available.

General Land Use Patterns

Approximately 90.2 percent of Hancock County is comprised of forested land (USDA, 2005). The City of Ellsworth, Towns of Mariaville and Waltham, and Fletchers Landing Township are in the Northeast Maine nonmetropolitan area (BLS, 2013). While lands within the Project vicinity are predominately undeveloped forest lands and wetlands, the city of Ellsworth is an area of dense population (relatively) within the County. Forestry is a common land use in the area, while agricultural uses include apple orchards and blueberry barrens (Ellsworth Comprehensive Planning Committee, 2004, Mariaville Comprehensive Planning Committee, 2006).

Population Patterns

According to the US Census Bureau (2015), the population of Hancock County in 2010 was 54,418 (Table E-20). From April 1, 2010 to July 1, 2013, the population of the County increased by approximately 0.8 percent. The population density of the County in 2010 was 34.3 people per square mile within a land area of 1,586.89 square miles, which is approximately 20.4 percent lower than the state's average of 43.1 people per square mile (US Census Bureau, 2015h).

The City of Ellsworth had a population of 7,741 in 2010, while Mariaville had a population of 513, and Waltham had a population of 353 (US Census Bureau, 2015a, 2015d, 2015e, 2015f, and 2015g).

Table E-20: Population Statistics for Hancock County and the State of Maine

	Hancock County	Maine
Population		
Population (2013 Estimate)	54,845	1,328,702
Population (2010)	54,418	1,328,361
Population Growth (April 1, 2010 to July 1, 2013)	0.8%	Z*
Geography (2010)		
Land Area in Square Miles	1,586.89	30,842.92
Population Density (per square mile)	34.3	43.1
Gender (2013)		
Male	48.9%	49.0%
Female	51.1%	51.0%
Age (2013)		
Persons Under 5 Years Old	4.4%	4.9%
Persons Under 18 Years Old	17.6%	19.7%
Persons 18 to 64 Years Old	57.3%	57.5%
Persons 65 Years Old and Over	20.7%	17.7%
Race (2013)		
Caucasian	95.5%	94.0%
Black	0.6%	1.4%
American Indian and Alaska Native	0.5%	0.7%

	Hancock County	Maine
Asian	1.0%	1.1%
Hispanic or Latino	1.3%	1.4%
Two or More Races	1.2%	1.6%

* Value greater than zero but less than half of a percentage unit of measure shown.
Source: US Census Bureau, 2015h

Households/Family Distribution and Income

There were an estimated 24,355 households in Hancock County, which was approximately 4.4 percent of the state's households based upon the Census 2009-2013 American Community Survey Estimate values. The County had 2.17 persons per household, which is slightly less than the state's average household size of 2.33 people (US Census Bureau, 2015h).

The median household income in Hancock County was $47,460, which is approximately one percent below the state median household income of $48,453 between 2009 and 2013. In addition, Hancock County had a higher per capita income ($27,797) than the state of Maine ($26,824), based upon the Census 2009-2013 American Community Survey Estimate values. Approximately 14.0 percent of the population of Hancock County was below the poverty level, while the percent of the state's population living below poverty level was lower at 13.6 percent (US Census Bureau, 2015h). Hancock County had a higher unemployment rate (7.8 percent) as compared to the overall state (5.5 percent) in December 2014 based upon the data derived from the Local Area Unemployment Statistics (LAUS) program (Maine CRWI, 2015).

Project Vicinity Employment Sources

In Hancock County, as well as the entire state of Maine, the top two sources of employment are in education and health services (7,336 people employed) (Table E-21) and in the retail trade industry (3,286 people employed) (US Census, 2015b and 2015c). The largest employer in Hancock County is Jackson Laboratory, which employed over 1,000 people in 2014 (MDOL, 2014).

Table E-21: Employment Statistics for Hancock County and the State of Maine

	Hancock County	Maine
Civilian Labor Force Employment Status (2009 - 2013)		
Number Employed	27,336	647,099
Employment by Industry (2009 - 2013)		
Agriculture, Forestry, Fishing, Hunting, and Mining	1,522	15,732
Construction	2,547	45,585
Manufacturing	1,604	60,165
Wholesale Trade	436	15,318
Retail Trade	3,286	88,065
Transportation and Utilities	935	25,138
Information	548	11,762
Financial Activities	1,163	39,587
Professional and Business Services	2,926	56,228
Education and Health Services	7,336	177,466
Leisure and Hospitality	2,767	55,256
Other Services	1,453	28,612
Public Administration	813	28,185

Source: US Census Bureau, 2015b and 2015c)

Flood Control

Graham Lake reservoir provides significant mitigation of downstream flooding in the downtown area of the City of Ellsworth by attenuating peak flows. Spring flooding is generally the period of most concern, when rain and snow melt combine to provide high levels of inflow. Graham Lake is generally operated in a manner such that the time of maximum drawdown, usually around late-March is just before the high spring flows that fill the lake by mid-May.

4.4.10.2 Environmental Analysis

The Project is currently utilized by the City of Ellsworth, fishermen, and recreationists. Existing shoreline development is currently limited almost exclusively to private residences and seasonal cottages. Other than recreation and the seasonal harvesting of alewives for lobster bait, and American eel elvers for export, there are no significant non-Project socioeconomic resources or uses of the Ellsworth Project.

The Project provides a positive economic benefit to the City of Ellsworth each spring as alewife are harvested below the Ellsworth Dam on the Union River. Alewives have been harvested in

Maine for economic purposes for many years. There is high demand for alewives for use as lobster bait. The City of Ellsworth holds a license for harvesting alewives in the Union River and in turn issues permits to fish alewives for commercial purposes, earning 40% of the license holder's revenue as a permit fee (College of the Atlantic 2004). The following table shows annual revenue to the city from the alewife harvest for the past 10 years.

Table E-22: City of Ellsworth Revenue from Alewife Harvest 2005 – 2014

Year	Revenue
2005	$9,500
2006	$2,778
2007	$21.053
2008	$20,287
2009	$12,355
2010	$13,306
2011	$11,700
2012	$58,799
2013	$31,816
2014	$35,872
Total	**$217,466**

*Data supplied by City of Ellsworth

Migrating American juvenile eel , also known as elvers, are also harvested by licensed fishermen on the Union River (Bangor Daily News, 2012). Elvers are second only to lobster in value in Maine's seafood industry (Boston Globe, 2013).

The recreational opportunities in the Project vicinity attract visitors for camping, birding, wildlife viewing, boating, and fishing. There will be no significant changes to the basic operations of the Project reservoirs, and therefore, there would be no changes to any socioeconomic resources in the Project area.

4.4.10.3 Proposed Environmental Measures

Black Bear is proposing to continue to operate and maintain the Project under the existing licensed regime. Black Bear will generally maintain the current Project schedule of seasonally variable minimum flows and pond level management.

Black Bear is making no proposal for the Project directly aimed at enhancing area socioeconomic resources. However, several of the resource proposals being made will indirectly support the continued use of the Project area for recreation, and will allow the Project to continue to contribute to the recreation and tourism based economy of the region.

4.4.10.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts to socioeconomic resources are expected to occur as a result of the continued operation of the Ellsworth Project as proposed.

4.5 Economic Analysis

4.5.1 Costs and Value of Developmental Resources Associated with the Project

Black Bear is not proposing to add capacity or make major modifications to the project in this license application.

The nameplate rated capacity of the Ellsworth Project is 8.9 MW. The Project has generated an average annual energy output of 30,333,000 MWh over the past 21 years. As shown in Exhibit D, the value of the Project power is determined based on historic annual generation and current power purchase rates.

4.5.2 Cost of Proposed PMEs

Recreational Facilities

Black Bear will develop a Recreation Management Plan to provide for management of Project recreational facilities throughout the term of the license.

Graham Lake Boat Launch

- Black Bear will improve the boat launch by grading/compacting the gravel section of the boat launch to improve drainage (away from the boat ramp and toward a vegetative buffer) and stabilize existing erosion areas. In addition, Black Bear will investigate the need to improve the surface of the launch.

- Black Bear will develop a new portage trail around Graham Lake Dam. The new trail would be located at the west end of the dam. The portage trail will originate in the vicinity of the existing hard-surfaced boat launch, but be designed to not conflict with the boat launch area. The trail will enter the Union River just below the existing flood control structure on the west side of the river.

- For safety reasons, Black Bear will discontinue the existing portage trail at the east end of Graham Lake Dam while at the same time improving and maintaining a portion of the trail for fisherman access to the Union River below the dam.

- Black Bear will provide appropriate Part 8 and directional and safety signage.

Fish Passage

- Black Bear will develop and implement, in consultation with the fisheries agencies, upstream eel passage measures at both the Ellsworth and Graham Lake Dams.

Cultural Resources

- Black Bear will develop a Historic Properties Management Plan to provide for appropriate management of effects on historic resources throughout the term of the license.

Table E- 23 below details the estimated cost of the proposed PME's. [to be provided in the Final License Application]

Table E-23: Estimated Cost of Proposed PME's

PME	Est. Cost [to be provided in the Final License Application]	Project Year of the Project	Annual O&M Costs
Graham Lake Boat Launch Improvements			
New Graham Lake Portage Trial			
Improve fisherman's downstream access trail at Graham Lake Dam			
Part 8 and Directional and Safety Signage			
Upstream eel passage measures			
Recreation Management Plan			
Historic Properties Management Plan			

4.6 Consistency with Comprehensive Plans

Section 10(a)(2) of the Federal Power Act requires FERC 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. The comprehensive plans are discussed in Exhibit H of this License Application.

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APPENDIX E-1

SUMMARY OF CONSULTATION

Summary of Consultation Record

From	Date	To	Description
FERC	December 9, 2011	Kirk Francis, Chief Penobscot Indian Nation Bonnie Newsom, THPO Penobscot Indian Nation FERC Mailing List	Invitation to participate in relicensing process
Black Bear Hydro Partners, LLC	October 24, 2012	FERC Distribution List	Notice of Intent (NOI) and Pre-Application Document (PAD) for the Ellsworth Hydroelectric Project
Maine Historic Preservation Commission	November 20, 2012	Black Bear Hydro Partners, LLC K. Bose; USFERC	Correspondence on PAD the Ellsworth Hydroelectric Project
FERC	December 20, 2012		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 dates and locations
FERC	January 15/16, 2013		Scoping Meeings
Mark Whiting	February 15, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies
Maine Department of Marine Resources	February 19, 2013	FERC O. Cox, G. Wippelhauser, and R. Spencer; MDMR M. Brown; MDIFW K. Howatt; MDEP S. Shepard; USFWS S. McDermott and J. Murphy; NOAA	Comments on PAD, Scoping Document 1 and Request for Studies
Maine Department of Inland Fisheries	February 20, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies
U.S. Fish and Wildlife Service	February 21, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies

From	Date	To	Description
		A. Tittler; DOI/SOL K. Mendik; NPS C. Stringer; BIA R. Abele; EPA B.Towler; RO/EN K. Howatt; MDEP G. Wippelhauser and P. Christman; MDMR S. Walker and G. Burr; MDIFW Reading File	
NOAA	February 21, 2013	FERC S. Hall; BLACK BEAR S. Shepard; USFWS O. Cox, G. Wippelhauser, and R. Spencer; MDMR S. Walker and G. Burr; MDIFW K. Howatt; MDEP	Comments on PAD, Scoping Document 1 and Request for Studies
Douglas H. Watts	February 21, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies
Atlantic Salmon Federation	February 21, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies
Maine Department of Environmental Protection	February 21, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies
Downeast Salmon Federation	February 21, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies
Atlantic Salmon Federation	February 21, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies
Kenneth S. Cline	February 21, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies
Proof of Publication – The	February 25, 2013	FERC	NOI to file license application document commencement of pre-filing process & scoping; request for comment on the

From	Date	To	Description
Ellsworth American			PAD & Scoping document & identification of issues & associated study requests
Black Bear Hydro Partners, LLC	February 22, 2013	FERC	Submits the 2012 Annual Report - Union River Fisheries Coordinating Committee for the Ellsworth Hydroelectric Project
Penobscot East Resource Center	February 21, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies
Downeast Salmon Federation	February 21, 2013	FERC	Comments on PAD, Scoping Document 1 and Request for Studies
Black Bear Hydro Partners, LLC	April 08, 2013	FERC Distribution List	Submits its Proposed Study Plan for the Ellsworth Hydroelectric Project
Black Bear Hydro Partners, LLC	April 22, 2013	FERC Distribution List	Submits notice of rescheduling of the Study Plan Meeting for the Ellsworth Hydroelectric Project
FERC	May 8, 2013	N. Palso, M Watts, B. Connelly, and Carolyn X, FERC S. Hall, D. Dominie, P. Browne, K. Maloney, Black Bear K. Hewett and R. Mohlar, Maine DEP J. Murphy and D. Dow, NOAA S. Sheperd, USFWS O. Cox, Maine DMR	Study Plan Meeting and site visit
Black Bear Hydro Partners, LLC	May 9, 2013	Kathy Howatt, Rob Mohlar, and Barry Mower, Maine DEP	Discussion of Water Quality Standards and Protocols
Black Bear Hydro Partners, LLC	May 28, 2013	N. Palso, B. Connelly, FERC S. Hall, D. Dominie, P. Browne, K. Maloney, Black Bear J. Murphy, D. Dow, S. McDermott, NOAA S. Sheperd, USFWS O. Cox, R. Spencer.Maine DMR	Meeting with fisheries agencies to discuss Atlantic salmon issues

From	Date	To	Description
Maine Department of Environmental Protection	June 06, 2013	FERC	Comments on Proposed Study Plan
Black Bear Hydro Partners, LLC	June 19, 2013	B. Connelly, FERC S. Hall, D. Dominie, P. Browne, K. Maloney, Black Bear J. Murphy, NOAA S. Sheperd, USFWS O. Cox, R. Spencer.Maine DMR M Beal, A. Atherton, City of Ellsworth G. Whipplehauser, Maine DMR Greg Burr, Maine DIFW Richard Welch Richard Dill	Meeting with fisheries agencies to discuss river herring issues
NOAA	June 28, 2013	FERC	Comments on Proposed Study Plan
Maine Department of Marine Resources	July 01, 2013	FERC O. Cox, G. Wippelhauser, and R. Spencer; MDMR K. Howatt; MDEP S. McDermott and J. Murphy; NOAA	Comments on Proposed Study Plan
U.S. Fish and Wildlife Service	July 08, 2013	FERC A. Tittler; DOI/SOL K. Mendik; NPS C. Stringer; BIA R. Abele; EPA B.Towler; RO/EN K. Howatt; MDEP G. Wippelhauser and P. Christman; MDMR S. Walker and G. Burr; MDIFW Reading File	Comments on Proposed Study Plan

From	Date	To	Description
Black Bear Hydro Partners, LLC	August 05, 2013	FERC Distribution List	Submits its Revised Study Plan for the Ellsworth Hydroelectric Project
Maine Department of Marine Resources	August 19, 2013	FERC O. Cox, G. Wippelhauser, and R. Spencer; MDMR J. Perry; MDIFW K. Howatt; MDEP S. Shepard; USFWS S. McDermott and J. Murphy; NOAA	Comments on Revised Study Plan
National Marine Fisheries Service	August 19, 2013	FERC S. Hall; BLACK BEAR S. Shepard; USFWS O. Cox, G. Wippelhauser, and R. Spencer; MDMR J. Perry and G. Burr; MDIFW K. Howatt; MDEP Service List	Comments on Revised Study Plan
U.S. Fish and Wildlife Service	August 19, 2013	FERC A. Tittler; DOI/SOL K. Mendik; NPS R. Abele; EPA B.Towler; RO/EN K. Howatt; MDEP G. Wippelhauser and O. Cox; MDMR J. Perry and G. Burr; MDIFW Reading File	Comments on Revised Study Plan
Maine Department of Environmental Protection	August 20, 2013	FERC	Comments on Revised Study Plan
National Marine Fisheries Service	August 16, 2013	FERC S. Hall; Black Bear S. Shepard; USFWS	Comments on Revised Study Plan

From	Date	To	Description
		O. Cox, G. Wippelhauser, and R. Spencer; MDMR J. Perry and G. Burr; MDIFW K. Howatt; MDEP Service List	
Black Bear Hydro Partners, LLC	August 23, 2013	FERC Distribution List	Response to comments on Revised Study Plan
FERC	September 4, 2013	Scott Hall, Black Bear FERC Mailing List	FERC issued Study Plan Determination
Black Bear Hydro Partners, LLC	September 27, 2013	FERC D. Dominie; TRC	Response to Additional Information Request Study Plan Determination
National Marine Fisheries Service	September 30, 2013	FERC S. Shepard; USFWS O. Cox, G. Wippelhauser; MDMR J. Perry; MDIFW L. Chiarella and S. McDermott; HCD J. Murphy and K. Damon-Randall; PRD K. Howatt; MDEP Service List	Comments on Study Plan Determination
FERC	November, 8, 2013	Peter Browne and Mary McCann, Black Bear	Discussion re revision of Upstream Fish Passage Study Plan
FERC	January 29, 2014	Peter Browne, Black Bear	Discussion re revision of Upstream Fish Passage Study Plan
Black Bear Hydro Partners, LLC	February 03, 2014	FERC Distribution List	Submits the modified Upstream Fish Passage Study Plan
Black Bear Hydro Partners, LLC	February 10, 2014	FERC Distribution List	Submits its first study progress report
Black Bear Hydro Partners, LLC	April 03, 2014	FERC	2013 Annual Report - Union River Fisheries Coordination Committee, March 2014 Pursuant to Comprehensive Fishery Management Plan
Black Bear Hydro Partners, LLC	May 1, 2014	Barry Mower, Maine DEP	Flow data provided per Maine DEP request

From	Date	To	Description
Black Bear Hydro Partners, LLC	May 8, 2014	Kirk Mohney, Maine Historic Preservation Commission	Submitted Historic Architecture Survey
National Marine Fisheries Service	September 03, 2014	Black Bear Hydro Partners, LLC N. Palso; FERC R. Spencer; MDMR L. Zicari; USFWS J. Murphy and K. Damon-Randall; PRD	Follow up letter on unlawful take of endangered Atlantic salmon
Black Bear Hydro Partners, LLC	September 04, 2014	FERC Distribution List	Submits the Initial Study Report
National Marine Fisheries Service	September 18, 2014	Black Bear Hydro Partners, LLC K. Bose; FERC O. Cox and R. Spencer; MDMR S. Shepard; USFWS J. Perry; MDIFW K. Howatt; MDEP	Comments regarding the proposed 2014 Comprehensive Fisheries Management Plan
Black Bear Hydro Partners, LLC	October 02, 2014	FERC Distribution List	Initial Study Report Meeting Summary
Douglas H. Watts	October 02, 2014	FERC	Comments on Initial Study Report
Douglas H. Watts	October 03, 2014	FERC	Comments on Sept. 2014 Initial Study Report
Union Salmon Association	October 08, 2014	FERC	Comments on Sept. 18, 2014 Initial Study meeting
Douglas H. Watts	October 10, 2014	FERC	Comments on Sept. 2014 Initial Study Report
NOAA Fisheries Service	November 03, 2014	FERC and Black Bear Hydro Partners Service List	Comments on Request for Study Clarification and Modification
Maine Department of Environmental Protection	November 03, 2014	FERC S. Hall; BLACK BEAR P. Browne; HDR Inc. D. Dominie; TRC Solutions O. Cox; MDMR J. Perry; MDIFW A. Bentivoglio; NOAA T. Burrowes; MDACF	Comments on Initial Study Report

From	Date	To	Description
Maine Department of Marine Resources	November 03, 2014	FERC O. Cox and G. Wippelhause; MDMR J. Perry; MDIFW K. Howatt; MDEP L. Zicari, A. Bentivoglio; USFWS S. McDermott, J. Murphy; NOAA	Comments on Initial Study Report
Black Bear Hydro Partners, LLC	December 02, 2014	FERC	Submits the Response to Comments on Initial Study Report and Requests for Modified Study Plan
Black Bear Hydro Partners, LLC	December 15, 2014	B. Connelly, FERC	Provided requested information re Upstream and Downstream Fish Passage Studies
FERC	December 30, 2014	Scott Hall, Black Bear FERC Mailing List	Determination on Requests for Study Modifications and New Studies
Black Bear Hydro Partners, LLC	February 24, 2015	B. Connelly and N. Palo, FERC D. Dominie, F. Dunlap, and M. McCann, Black Bear	Telephone discussion of recommended downstream salmon passage study and possible extension of study schedule
Black Bear Hydro Partners, LLC	February 27, 2014	J. Murphy and S. McDermott NMFS S. Sheperd, A. Bentivoglio, A. Firmenich, USFWS R. Spencer, C Enterline, and G. Whipplehauser, Maine DMR J. Perry, G. Burr, Maine DIFW B. Witham and G. Leinbaugh Union River Salmon Association A. Kane, Atlantic Salmon Federation M. Beal and A. Atherton, City of Ellsworth Ken Cline, College of the Atlantice	Article 406 Compliance – provided 2014 Annual Report – Union River Fisheries Coordinating Committee; Comprehensive Fishery Management Plan for the Union River Drainage
Douglas H Watts	March 04, 2015	FERC	Comments and appendices on 2015-2017 URFCC Fisheries Plan
Black Bear Hydro Partners, LLC	March 30, 2015	FERC Distribution List R. Dewechter and J. Clere; Black Bear	Supplemental Information regarding changes in filing schedule for draft license application

From	Date	To	Description
Black Bear Hydro Partners, LLC	March 31, 2015	FERC J. Murphy; NMFS S. Shepard; USFWS R. Spencer; MDMR Ellsworth Project Relicensing Distribution List R. Dewechter and J. Clere; Black Bear	Submittal of Downstream Smolt Study Plan
Black Bear Hydro Partners, LLC	March 31, 2015	FERC J. Murphy, S. McDermott; NMFS S. Shepard, A. Bentivoglio; USFWS O. Cox, R. Spender; MDMR K. Howatt; MDEP J. Clere, R. Richter, A. Zarella, T. Wynn, R. Dewechter, J. Cole, J. Stayn, R. Brochu, N. Stevens, F. Dunlap; Black Bear	Supplemental Information regarding fish passage
Black Bear Hydro Partners, LLC	April 01, 2015	FERC	Form 80 Report for Ellsworth Dam & Lake Leonard
Black Bear Hydro Partners, LLC	April 01, 2015	FERC	2014 Form 80 Report for the Graham Dam & Lake
Black Bear Hydro Partners, LLC	April 03, 2015	FERC	Filing of Methodology 2015 FERC Form 80 Recreation Report Monitoring
FERC	April 21, 2015	K. Bernier, Black Bear	Approval of Atlantic Salmon Downstream Passage Study Plan
Maine MDIFW	May 4, 2015	F. Dunlap, Black Bear	Approval of 2015 Marsh-nesting Bird Survey Scope
Maine DEP	June 16, 2015	K. Howatt, B. Mower, L. Tsomides, R. Mohler, M. Bergeron, A. McLauflin, D. Witherill Maine DEP F. Dunlap, D. Dominie, P. Leeper Black Bear	Discussion of Class B and GPA water quality classification, and macroinvertebrate sampling

APPENDIX E-2

COMMENTS ON DRAFT APPLICATION

[To be provided in the Final License Application]

EXHIBIT 9

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APPENDIX E-3

RECREATION FACILITIES MANAGEMENT PLAN

EXHIBIT 9

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EXHIBIT 9

ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

DRAFT
RECREATION FACILITIES MANAGEMENT PLAN

TABLE OF CONTENTS

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1.0 INTRODUCTION AND BACKGROUND

The Ellsworth Hydroelectric Project (Project) is licensed by the Federal Energy Regulatory Commission (FERC) as Project No. 2727. The Project is licensed to Black Bear Hydro Partners, LLC ("Black Bear" or "Licensee").

As part of the relicensing process, Black Bear conducted a Recreation use and Capacity Survey and a Whitewater Boating Assessment.

This Draft Recreation Facilities Management Plan (Plan) describes the existing available public recreation facilities that provide access to Project lands and waters. This Plan also identifies proposed measures for enhancing public access to Project lands and waters that collectively, will maintain the existing recreation opportunities provided at the Ellsworth Project over the term of the new license.

2.0 CONSULTATION

The results of the Recreation Site/Facilities Inventory are described in the Initial Study Report (ISR), which was provided to FERC and participating agencies, tribes, non-governmental organizations (NGOs), local governments, and the public for comment. No comments regarding the recreation sites/facilities were received.

3.0 PROJECT LANDS AND WATERS

In total, the Project boundary encompasses approximately 3,350 acres of land, and 10,099 acres of open water. Waters within the Project boundary include Lake Leonard (90 acres), Graham Lake (approximately 10,000 acres) and an intervening three mile riverine segment of the Union River. Black Bear owns or has rights to all lands within the Project boundary. The majority of lands surrounding the Project boundary are privately owned.

4.0 PROJECT-RELATED RECREATION AREAS AND FACILITIES

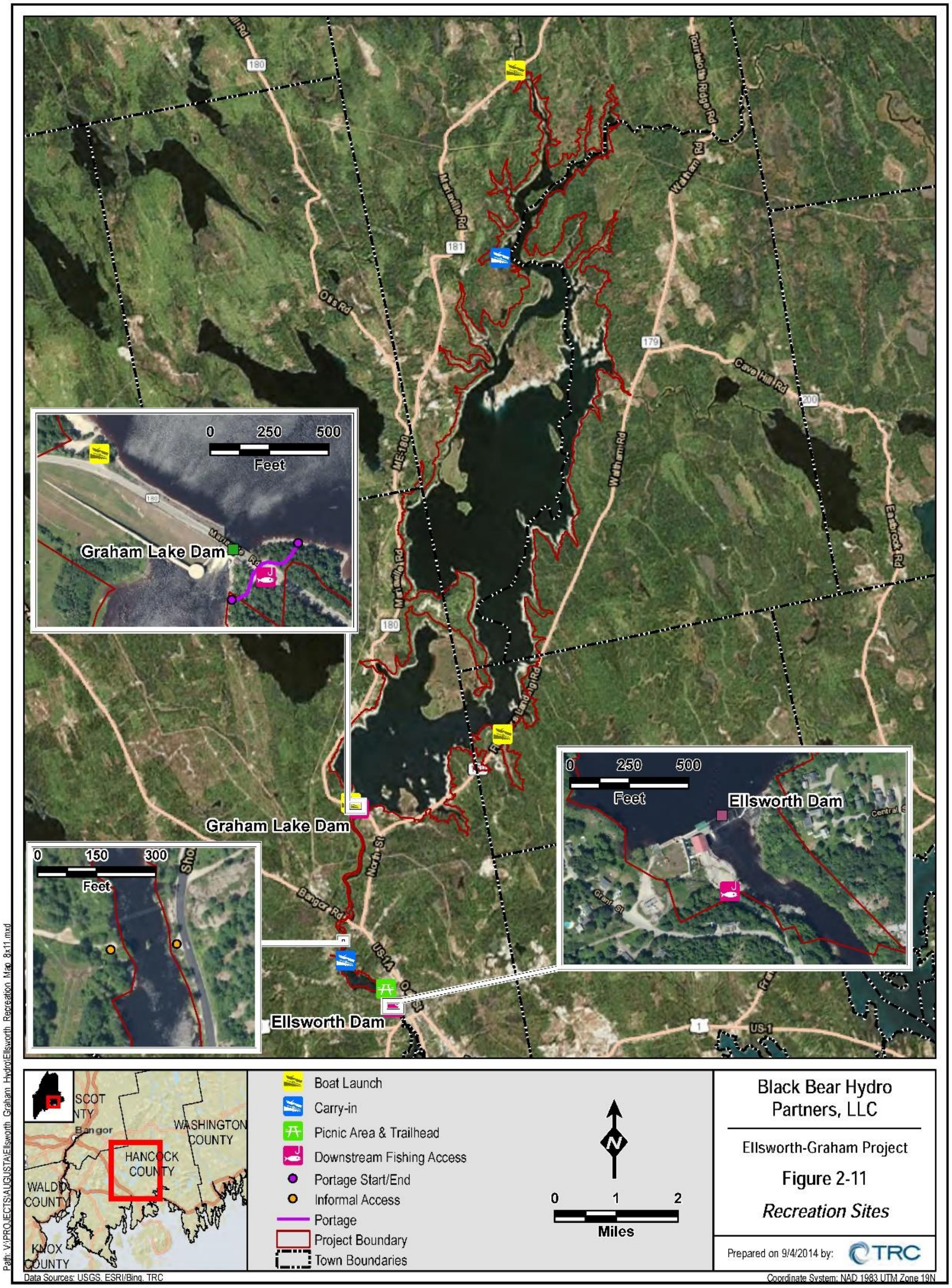
4.1 Existing Project Recreation Sites and Facilities

The Ellsworth Project has three existing public Project Recreation Sites that are maintained by Black Bear. These include a carry-in boat launch on Lake Leonard, a boat launch on Graham Lake, and a canoe portage/angler access trail around Graham Lake Dam (this trail will be limited to angler access only in the future and a new portage trail will be developed at the existing boat launch at the west end of the dam). Table 4-1 provides an overview of these sites and associated facilities. Detailed descriptions of each site follow. In addition to the Black Bear owned and maintained facilities, there are several other public sites that provide access to the Project (See Section 5.0 Other Public Access)

Table 4-1: Summary of Existing (2015) Ellsworth Project Recreation Sites

Project Recreation Site Name	Recreation Facilities
Lake Leonard carry-in boat launch	a small gravel parking area and a six-foot wide hard surface carry-in ramp; additional parking occurs along the edge of the access road
Graham Lake boat launch	a 12-foot wide concrete plank boat ramp and gravel parking area that will accommodate approximately eight trailer rigs; the site is level with a gentle slope to the shoreline
Canoe portage and downstream angler access trail around Graham Lake	the downstream section of the trail is a well-worn footpath to the access points on the shore; parking areas are available on both sides of Patriot Road where the trail crosses; the northerly area will accommodate nine vehicles and the southerly area ten vehicles.

Figure 4-1: Recreation Facilities Location Map



Ellsworth Development

Site Name: Lake Leonard Carry-in Boat Launch

Location: The Lake Leonard carry-in boat launch is located in Ellsworth, on the Shore Road on the east side of Lake Leonard.

Description of Facilities and Primary Recreational Activities[1]: The carry-in boat launch and associated parking area is located at the northern end of Lake Leonard and is accessed via the Shore Road which runs along the eastern shore of the lake.

Black Bear owns and manages the boat launch. At the time of the field inspection in June 2012 and on subsequent visits, the carry-in boat launch was observed to be in good condition, with no erosion or compaction.

Site Regulations: The multi-use parking area is intended for day use, and signage clearly indicated that overnight camping or parking are strictly prohibited.

Site Inventory: An inventory of site amenities for the carry-in boat launch is provided in Table 4-2.

Disabled Access Assessment: There are no designated parking spaces at the carry-in boat launch area, including those for the disabled. While the area is not designed to be fully accessible to the fully disabled, there are no barriers that would restrict use of the parking lot or access to the associated boat launch. At this time, there is no apparent demand for fully accessible facilities at this site.

[1] Primary recreational activities generally correspond to the types of facilities available.

Lake Leonard Carry-in boat launch

Photo 4-1: Lake Leonard carry-in boat launch

Photo 4-2: Lake Leonard carry-in boat launch parking area

Photo 4-3: Lake Leonard carry-in boat launch ramp

Photo 4-4: Lake Leonard carry-in boat launch sign

Graham Lake Development

Site Name: Graham Lake Boat Launch

Location: The Graham Lake boat launch is located at the southern end of Graham Lake just west of Graham Lake Dam in Ellsworth. The site can be accessed via Eagle Road (formerly Route 180).

Description of Facilities and Primary Recreational Activities: The site occupies approximately 1 acre, including approximately 60 feet of shoreline frontage. The boat ramp is comprised of 12-foot wide concrete planks and the gravel parking area can accommodate eight vehicles with trailers.

The Graham Lake boat launch is used primarily for launching (or retrieving) trailered watercraft on the reservoir. Launching of personal and non-motorized watercraft also occurs. The boat launch and nearby shoreline areas are occasionally used by anglers.

Black Bear owns and manages the Graham Lake boat launch site. At the time of the field inspection in June 2012, the boat launch was observed to be in overall good condition. However, it was noted, at the time of inspection, that some erosion had taken place in the vicinity of the launch ramp.

Site Regulations: The Graham Lake boat launch is intended for day use, and site signage clearly states the overnight camping or parking is prohibited.

Site Inventory: An inventory of site amenities for the Graham Lake boat launch is provided in Table 4-2. Photos of the site follow.

Disabled Access Assessment: There are no designated parking spaces at the Graham Lake boat launch, including those for the disabled. The boat launch is not fully accessible to the fully disabled. Currently, there is no apparent demand for fully accessible facilities at this site.

Graham Lake Dam Boat Launch

Photo 4-5: Graham Lake boat launch facility sign

Photo 4-6: Graham Lake boat launch ramp

Photo 4-7: Graham Lake boat launch parking area

Graham Lake Development

Site Name: Canoe Portage and Downstream Angler Access Trail

Location: The current Graham Lake canoe portage and downstream angler access trail is located on the east side of Graham Lake Dam in Ellsworth. The portal trail take-out is located on the south shore of Graham Lake near the easterly anchor point for the upstream boat barrier. The trail extends approximately 200' to the parking area on the north side of Patriot Road (former Route 180). The trail crosses the now dead end Patriot Road and the parking area on the south side of the road, and extends down the bank to the shoreline downstream of the dam. The trail forks and extends to two access points approximately 100 and 160 feet below the dam.

Description of Facilities and Primary Recreational Activities: Boaters traveling down Graham Lake in personal watercraft (i.e. kayaks or canoes) can take-out at the south end of the reservoir, portage their boats around the dam, and enter the Union River below the dam. The take-out is marked with a sign (posted on a tree at the water's edge) stating "canoe portage" and showing a portage symbol. Anglers can also use the trail for access to the Union River for shore fishing below the dam.

Based on observations made during recreation studies performed in 2013 - 2014 (i.e. site visit observations, and recreation use data), the canoe portage trail appears to be seldom used for full portage from the impoundment to the tailwater. The put-in is occasionally used for launching personal, non-motorized watercraft on the Project tailwater; however, the put-in location appears to be used most frequently by anglers to access the tailwater for fishing. The canoe portage trail was observed to be steep, with uneven footing in spots and also had areas of minor erosion.

Black Bear owns and manages the canoe portage trail.

Site Regulations: The canoe portage trail is intended for day use, however, no site regulations are posted.

Site Inventory: An inventory of site amenities for the canoe portage trail is provided in Table 4-4.

Disabled Access Assessment: The portage/access trail is not accessible for the fully disabled. The portage/access area does not require full accessibility for the disabled.

Photo 4-9: Graham Lake downstream canoe portage/angler access trail

Photo 4-10: Graham Lake upstream canoe portage trail

Photo 4-11: Graham Lake canoe portage/angler access trail parking area (south side)

Photo 4-12: Graham Lake canoe portage/angler access trail parking area (north side)

4.2 Proposed Project-Related Recreation Sites and Facilities

Black Bear is proposing to continue to operate and maintain the Project under the existing licensed regime. Black Bear proposes to continue to operate and maintain the Lake Leonard carry-in boat launch, and the Graham Lake boat launch and their associated facilities and amenities.

In order to enhance boater (personal watercraft) access to the Union River below Graham Lake Dam, and also to address safety concerns, Black Bear is proposing to relocate the east-side Graham Lake Dam canoe portage trail to the west side of the dam. The current canoe portage trail take-out location is in very close proximity to the Graham Lake Dam gate structure and the east end anchor point for the boat barrier floats. In addition, due to the difficulty in carrying personal watercraft down the steep and uneven woods/ledge trail down to the put-in locations below the dam, Black Bear determined that relocating the portage trail to the west side of the dam would be a significant improvement. The new portage trail take-out area will be co-located with the Graham Lake boat launch, though it would be designed to avoid interference with use of the trailered boat launch ramp. The new put-in location will be downstream of the Graham Lake flood control structure, an area that is currently used by some boaters as an informal put-in site. The existing east-side angler's access trail will continue to be used, and will be improved and maintained. Black Bear will also provide Part 8 and directional and safety signage at each Project recreational area.

Table 4-2: Approved Recreation Amenities for the Ellsworth Hydroelectric Project FERC No. 2727

Project No.	Development Name	Recreation Amenity Name	Recreation Amenity Type	Amenity Status	Latitude*	Longitude*	FERC Citation & Date	Notes
P-2727	Lake Leonard	Lake Leonard boat launch	Carry-in boat launch	constructed	44.555049	-68.444943	68 FERC ¶62,240 09/14/1994	a six-foot wide hard surface carry-in ramp
P-2727	Graham Lake	Graham Lake Boat Launch	Boat Launch	constructed	44.592155	-68.442680		single lane, concrete planked ramp, approximately 12 feet wide
P-2727	Graham Lake	Downstream access trail	Downstream access trail	constructed	44.590857	-68.440227		forked path to two access points approximately 120 and 200 feet below the dam; the path is steep in spots with areas of erosion and irregular footing

*North American Datum (NAD) 1983 State Plane Coordinate System, Maine West, Feet

5.0 OTHER PUBLIC ACCESS

In addition to the Black Bear-owned and maintained facilities, there are several other public access sites associated with the Project. These sites are described below.

Ellsworth Elementary/Middle School Day Use Area:

The Ellsworth Elementary/Middle School day use area is located on the east shore of Lake Leonard in Ellsworth. The site is accessible by boat, foot, or by vehicle from the Shore Road. This site is owned and managed by the City of Ellsworth. Site improvements include three small open-sided shelters and informal trails to the shoreline. Vehicle parking for the site is provided at the school parking lot directly across the Shore Road. There is a footpath from Shore Road to the shelters. This site and facilities are outside the Project boundary, but the informal trails provide access to Project waters.

Photo 4-13: Day-use area shelters and path

Mariaville Carry-In Boat Launch:

The Mariaville carry-in is located on the west shore of Graham Lake off the Morrison Farm Road in Mariaville. The site is accessible by boat or by vehicle. The site has limited roadside parking for approximately six vehicles. The entrance road, parking areas and carry-in are compacted gravel on a gentle slope. The site is signed as a carry-in launch, although there is evidence that the site is used for trailered boat launching as well. The site is owned and managed by the Town of Mariaville and is outside the Project boundary, but provides access to Project waters.

Photo 4-14: Mariaville carry-in boat launch

Fletchers Landing:

Fletchers Landing is located on the east side of Graham Lake in Fletchers Landing Township (T8 SD). Access to the site is directly off Route 179. The site consists of a compacted gravel and grass parking area that will accommodate approximately ten trailer rigs. The boat launch area is approximately 15 feet wide and at one time had an asphalt surface. The asphalt ramp surface has degraded in some areas and has been repaired with gravel, stone, and concrete block. Local users appear to store boats on-site, both in the parking area and tied up to the shoreline. The site is owned by the State of Maine and outside the Project boundary, but provides access to Project waters.

Photo 4-15: Fletchers Landing boat launch and parking area

West Branch access site:

The West Branch Union River access site is located on the River Road in Mariaville. The site is accessible by boat and by vehicle from Route 181. A level gravel and grass parking area accommodates approximately seven vehicles and hand-carry watercraft can be launched into the West Branch via a short, steep, natural soil ramp. The site is privately-owned and outside the Project boundary, but provides access to Project waters. A dry hydrant for use of the local fire department is located on site.

Photo 4-16: West Branch Union River access site

Infant Street East Access

The Infant Street site is located off Shore Road on the east side of the Union River in Ellsworth. This is a discontinued City road that once crossed the Union River; the bridge has been removed. The site consists of a small (two vehicle) parking area (former road right-of-way) and a narrow informal footpath over the steep bank to the river. This site is owned by the City of Ellsworth and is outside the Project boundary, but provides access to Project waters.

Photo 4-17: Infant Street east access

Infant Street West Access

This site is located on the westerly side on Union River off Christian Ridge Road on the discontinued Infant Street in Ellsworth. The site consists of the discontinued road bed, which is accessible by vehicle, informal parking areas, and informal trails to the river. A trail leads to a large ledge outcrop on river's edge that is used for fishing, picnicking and other day use activities. The site is owned by the City and is located outside the Project boundary, but provides access to Project waters.

Photo 4-18: View upstream from ledge area of Infant Street west

6.0 MANAGEMENT MEASURES

6.1 Project Recreation Site Management and Maintenance

Black Bear will manage the proposed Project Recreation Sites, including the Graham Lake boat launch, the fisherman access trail parking area, and the canoe portage trail to provide safe and appropriate recreation access to the Project. Black Bear will ensure that the sites and facilities remain usable over the term of the new license.

Typical routine maintenance activities will include periodic mowing, litter clean-up, removal of fallen trees that hinder facility use, trimming overgrowth along the canoe portage trail, and checking that portage trail signage is in-place and readable. Black Bear will also conduct other improvements or repairs on an observed, as-needed basis.

Black Bear will complete the periodic FERC Form 80 process, as required by FERC.

6.2 Determining the Need for Additional Measures or Expansion of Existing Sites

In the event that the next FERC Form 80 process finds that an existing site has reached capacity, the need for additional access or improvements to existing sites will be further evaluated.

7.0 COST [to be provided in the Final]

Black Bear estimates the periodic cost of preparing the FERC Form 80 to be approximately [$].

Black Bear estimates the annual cost of inspecting and maintaining the existing recreation sites and facilities to be approximately [$] per year (2015 dollars), excluding capital replacements and improvements.

Black Bear estimates the cost of proposed improvements to the Graham Lake boat launch to be approximately [$].

Black Bear estimates the cost of proposed improvements to the fisherman access trail to be approximately [$].

Black Bear estimates the cost of developing a portage trail on the west side of Graham Lake Dam to be approximately [$].

Black Bear estimates the cost of developing Part 8, and directional and safety signage to be approximately [$].

8.0 SCHEDULE AND REPORTING

Black Bear will conduct inspection and maintenance of the all the recreational sites and facilities described herein on an as-needed basis.

Development of the new Graham Lake canoe portage trail, improvements to the fisherman's downstream access trail at Graham Lake, improvements to the Graham Lake boat launch, and placement of the Part 8, and directional and safety signs will all be completed during the first full calendar year following issuance of a new license.

9.0 MODIFICATIONS TO PLAN

Any proposed modification to this Plan will be submitted to appropriate agencies for review and comment prior to submittal to FERC.

Prior to constructing any new structures or implementing major improvements to existing recreation facilities, design drawings will be submitted to FERC for approval. Any plans that may be developed for future recreational facilities will be provided to FERC for approval prior to construction. Any such plans will be provided along with drawings of facilities, documentation of consultation, cost estimates and schedule. The Maine Historic Preservation Commission will be included in the consultation process regarding the construction of new facilities or modifications to existing facilities that involve ground-disturbing activities.

10.0 REFERENCES

Black Bear Hydro Partners, LLC. 2014. Initial Study Report for the Ellsworth Hydroelectric Project (FERC No. 2727), filed with the Federal Energy Regulatory Commission on September 4, 2014.

APPENDIX E-4

401 WATER QUALITY CERTIFICATION APPLICATION TO MAINE DEP

[To be provided in the Final License Application]

EXHIBIT 9

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APPENDIX E-5

DRAFT BIOLOGICAL ASSESSMENT FOR ATLANTIC SALMON, ATLANTIC STURGEON, AND SHORTNOSE STURGEON

[To be provided in the Final License Application]

EXHIBIT 9

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EXHIBIT 9

EXHIBIT F

GENERAL DESIGN DRAWINGS
AND SUPPORTING DESIGN REPORT

EXHIBIT 9

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ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT F
GENERAL DESIGN DRAWINGS AND SUPPORTING DESIGN REPORT

The design drawings showing plan, elevations, and sections of the principal Project works are included as follows:

Sheet No.	Title
Sheet 1	Ellsworth Powerhouse and Dam Plan and Section
Sheet 2	Ellsworth Powerhouse Plan
Sheet 3	Ellsworth Powerhouse and Intake Section
Sheet 4	Ellsworth Powerhouse and Dam Sections
Sheet 5	Graham Lake Dam Site Plan and Section
Sheet 6	Graham Lake Dam Plan, Sections and Details

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 9

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EXHIBIT 9

EXHIBIT G

PROJECT MAPS

EXHIBIT 9

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ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

EXHIBIT G
PROJECT MAPS

The following maps show the location of the Ellsworth Hydroelectric Project, principal features, and Project boundary:

Sheet No.	Title
Sheet 1	Project Detail Map
Sheet 2	Project Detail Map
Sheet 3	Project Detail Map

EXHIBIT 9

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Traverse "A"			
FROM STA.	TO STA.	DIST.	BEARING
1	2	79.5	N 82° 10' W
2	3	80	N 05° 25' W
3	4	50	N 82° 10' W
4	5	99	N 05° 25' W
5	6	148.5	N 38° 05' W
6	7	282.9	S 86° 04' W
7	8	38	N 25° 01' 50" W
8	9	23.7	N 11° 09' 40" W
9	10	49.4	N 11° 30' 10" W
10	11	39.8	N 12° 49' 40" W
11	12	34.4	N 25° 10' 50" W
12	13	15.9	N 51° 46' 00" W
13	14	24.8	S 77° 53' 50" E
14	15	144.3	N 55° 24' 50" W
15	16	8.3	N 26° 23' 50" W
16	1	By Shore	

Traverse "B"			
FROM STA.	TO STA.	DIST.	BEARING
A	B	50	N 44° 22' E
B	C	130	S 51° 40' E
C	D	585	N 23° 14' W
D	E	231	N 16° 23' W
E	F	75	N 44° 22' E
F	G	83	N 07° 48' W
G	H	172.3	N 84° 00' E
H	I	To Shore	S 06° 50' W
I		By Shore	

Recreation Site Table			
Site #	Site Name	Northing	Easting
A	Carry-in	16186521	1785054
B	Boat Launch	16200057	1785508
C	Downstream Fishing Access	16199533	1786210

Reference Point Table
NAD83 State Plane Maine West Zone U.S. Feet

Sheet #	*Reference Point #*	*Northing*	*Easting*
1	1	320496.0	993822.0
1	2	333311.0	997964.0
1	3	325298.0	1002791.0
2	4	348299.0	1000410.0
2	5	335732.0	1014127.0
2	6	356720.0	1017132.0
3	7	382421.0	1011112.0
3	8	368961.0	1021908.0
3	9	393752.0	1027245.0

NOTES:
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 THE PROJECT

Legend

- Recreation Site
- Reference Point (NAD83 State Plane, Maine East Zone, U.S. Survey Feet)
- Traverse Point
- Road
- Stream

DRAFT

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 3

ELLSWORTH HYDRO PROJECT
FERC NO. 2727

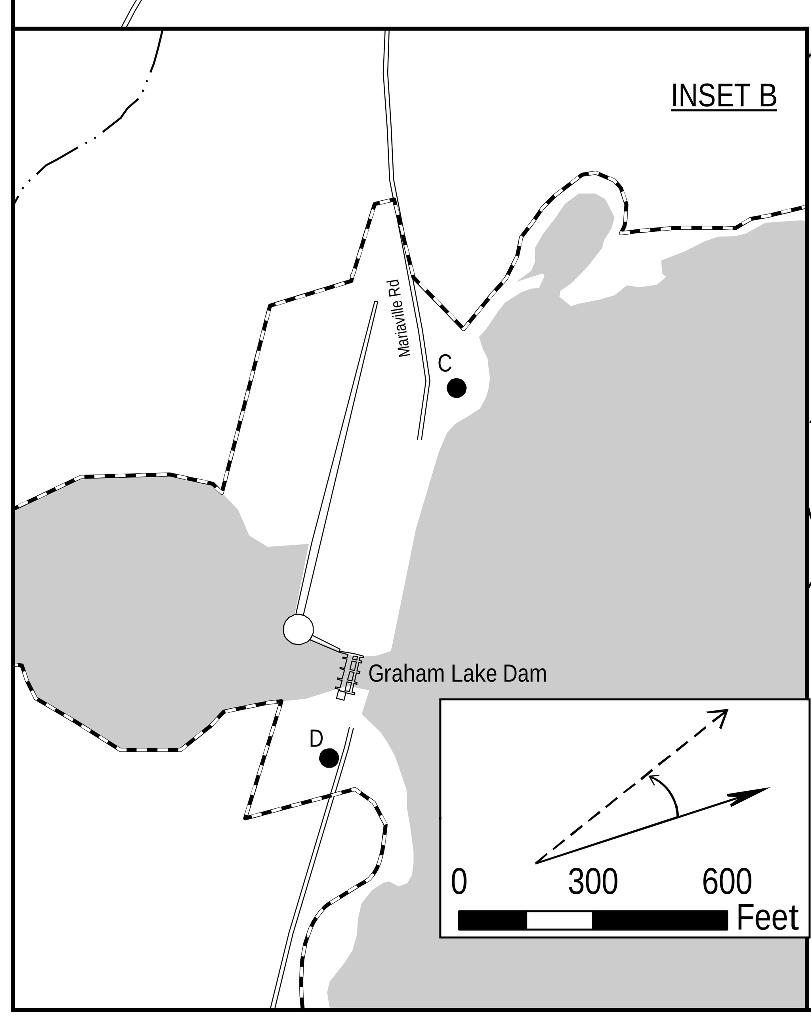
PROJECT DETAIL MAP

BLACK BEAR HYDRO PARTNERS, LLC

0 500 1,000 Feet

1 inch = 500 feet

PRELIMINARY



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3	8	368961.0	1021908.0
3	9	393752.0	1027245.0

Legend

- Recreation Site
- Reference Point (NAD83 State Plane, Maine East Zone, U.S. Survey Feet)
- Traverse Point
- Road
- Stream

N

DRAFT

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EXHIBIT G — SHEET 2 OF 3

ELLSWORTH HYDRO PROJECT
FERC NO. 2727

PROJECT DETAIL MAP

BLACK BEAR HYDRO PARTNERS, LLC

0 — 1,000 — 2,000 Feet

1 inch = 1,000 feet

PRELIMINARY

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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 THE PROJECT

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Legend

- Recreation Site
- Reference Point (NAD83 State Plane, Maine East Zone, U.S. Survey Feet)
- Traverse Point
- Road
- Stream

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EXHIBIT G

SHEET 3 OF 3

ELLSWORTH HYDRO PROJECT
FERC NO. 2727

PROJECT DETAIL MAP

BLACK BEAR HYDRO PARTNERS, LLC

0 1,000 2,000 Feet

1 inch = 1,000 feet

PRELIMINARY

EXHIBIT 9

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EXHIBIT 9

EXHIBIT H

DESCRIPTION OF PROJECT MANAGEMENT AND NEED FOR PROJECT POWER

EXHIBIT 9

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EXHIBIT 9

ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)

APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM

DRAFT EXHIBIT H
DESCRIPTION OF PROJECT MANAGEMENT
AND NEED FOR PROJECT POWER

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LIST OF FIGURES

APPENDICES

**ELLSWORTH HYDROELECTRIC PROJECT
(FERC NO. 2727)**

**APPLICATION FOR NEW LICENSE
FOR MAJOR PROJECT – EXISTING DAM**

**DRAFT EXHIBIT H
DESCRIPTION OF PROJECT MANAGEMENT
AND NEED FOR PROJECT POWER**

1.0 INTRODUCTION

The Ellsworth Project (Project) is an existing hydroelectric project owned by, and licensed to, Black Bear Hydro Partners, LLC (Black Bear). Black Bear is an independent power producer and, as such, does not provide electric service to any particular group or class of customers. The Project generates renewable power that is currently sold into 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 Ellsworth Dam to Operate and Maintain the Project

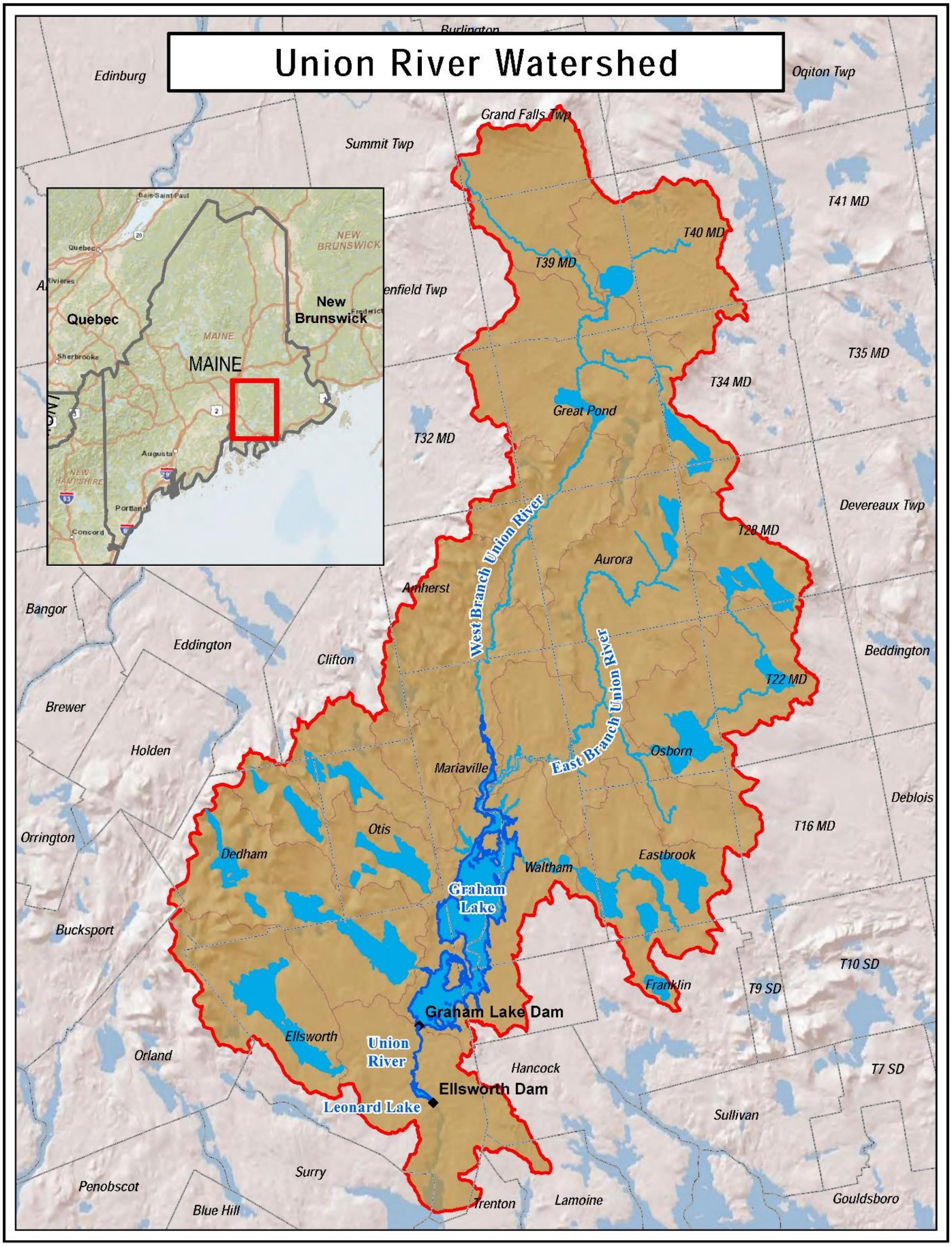
2.1.1 Plans to Increase Capacity or Generation

Black Bear is not proposing herein the addition of any turbine-generator units at the Project as a part of this relicensing.

2.1.2 Plans to Coordinate the Operation of the Project with Other Water Resource Projects

The Project, owned by Black Bear is the only facility located on the Union River. The facility consists of two developments; Graham Lake Dam and Ellsworth Dam and their respective reservoirs typically operated for water storage and power generation. Operationally, the Project is typically run as a peaking plant, with water being released from the Graham Lake reservoir used to generate electricity at the downstream Ellsworth powerhouse to follow the electrical load of customers in the NEPOOL market.

Figure H-1: Union River Watershed



2.1.3 Plans to Coordinate the Operation of the Project with Other Electrical Systems

Black Bear is an independent power producer and member of NEPOOL that currently sells power from the Project wholesale 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 Black Bear 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. ISO New England's primary responsibilities are to coordinate, monitor, and direct the operations of the major generating and transmission facilities in the region. The objective of ISO New England is to promote a competitive wholesale electricity marketplace while maintaining the electrical system's integrity and reliability. ISO New England seeks to 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.

The 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 also is 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 renewable power. The electrical output from the Project is sold wholesale into the ISO New England administered market.

The replacement of energy and capacity provided by the Project would be met through other sources, likely to be fossil-fired generating units, whose fuel and other variable costs would be significantly higher than those of the Project. As the lowest variable cost resource among power supply alternatives, hydroelectric assets such as the Project can bid energy into the ISO New England market at lower prices than alternative resources. Thus, loss of a low-variable cost resource such as the Project would result in upward pressure on the clearing prices in the NEPOOL market and ultimately paid by electric consumers in New England.

The Project provides 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. The following are examples of actions in New England.

- In 1998, the Maine legislature enacted P.L. 1997, Chapter 31, "*An Act to Restructure the State's Electric Industry*". This Act requires that: as a condition of licensing pursuant to Section 3203, each competitive [retail] electricity provider in this State must demonstrate in a manner satisfactory to the Commission that no less than 30 percent of its portfolio of supply sources for retail electricity sales in this State is accounted for by renewable resources. 35-A M.R.S.A §3210(3).
- In Connecticut the General Assembly stated (*Act Concerning Electric Restructuring, Public Act 98-28*) that as a licensing condition effective in 2000, an electric supplier must demonstrate that: not less than one-half of one percent of its total electricity output shall be generated from Class I renewable energy sources and an additional 5.5 percent of the total output shall be from Class I or Class II renewable energy sources. These minimum requirements increased annually until 2009, at which time the minimum percentage for "Class I" renewable sources became 6 percent and the minimum total percentage for Class I and Class II renewables became seven percent. Class II renewables include hydroelectric facilities with a current or pending license.

As these statues and rules are implemented or adopted in New England, "clean" 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 Black Bear is not granted a license, this Project would cease to provide affordable and clean electricity to the New England Power Pool from its generation. An unquantified increase in costs would likely occur to the New England electric consumer if a license for continued operation of the Project was not granted. In addition, providing regulated, relatively stable downstream flows for downstream flood control benefits and flow augmentation during dry periods would not occur.

2.2.3 Effects of Alternative Sources of Power

Effects on Licensee's Customers

This section is not applicable to Black Bear, since Black Bear is a wholesale supplier.

Effect on Licensee's Operating and Load Characteristics

Black Bear 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.

Effect on Communities Served by the Project

Because Black Bear provides wholesale electricity to the regional system, the Project does not serve specific communities. It provides low cost, reliable capacity and energy for the regional electric customers. 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.

Because Black Bear 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.

2.3 Need, Reasonable Cost, and Availability of Alternative Sources of Power

Black Bear 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 Black Bear, 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 Ellsworth Project.

2.6 Impacts on the Operations and Planning of Licensee's Transmission System

Because Black Bear is an independent power producer and does not own the local transmission system, this section is not applicable to Black Bear. However, power generated by the Project is currently transmitted to the local utility transmission/distribution system as shown in the Single Line Diagram for the Ellsworth Project (Exhibit A of this License Application).

2.7 Statement of Need for Modifications

Black Bear is not proposing any fundamental changes to the Project facilities or operation. Black Bear conducted a standard redevelopment study of the Project in accordance with 18 CFR §5.18 (c)(1)(A)(1) to assess the feasibility of increasing power production including additional generation capacity, efficiency upgrades and increasing the impoundment level by up to one foot. The Project Redevelopment Study was conducted to evaluate potential generation and operations modifications, so that any feasible alternatives to increase or improve project generation, as well as any potential effects on natural resources, could be evaluated as part of the relicensing process. One part of the study assessed the potential for up to a 1 foot increase in the Graham Lake normal full pool reservoir elevation. The second part of the study examined the potential for adding additional generation capability. In addition, the potential for installing a unit to utilize available flows at Graham Lake was evaluated. Of the options evaluated, raising the normal maximum headpond level would present structural and project land issue considerations that would likely be cost prohibitive. Based on those issues, a detailed, further, in-depth evaluation is not recommended. Therefore Black Bear has no plans to add a generation unit at Graham Lake Dam at this time.

A review of system head losses and unit efficiencies at the Ellsworth Dam were investigated. In comparing calculated potential station capacity to actual historical generation, there may be some opportunity to increase Project generating capacity through efficiency upgrades (e.g., upgrade generators that limit turbine output). However, there is a factor of diminishing returns to consider given the number of units and the potential equipment cost to achieve higher generation levels.

2.8 Consistency with Comprehensive Plans

Relicensing and continued operation of the Project will 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, and approved by FERC, as discussed below.

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 Commission approved federal and state comprehensive plans was reviewed to determine applicability to the Ellsworth 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. In addition, the State of Maine’s plans include policies related to ensuring that the State’s energy needs are met and supporting hydropower, a renewable and indigenous source, as a valuable portion of the energy mix. These plans also address water quality, water pollution control, wetlands, recreation, and land management issues. The Ellsworth Project's consistency with pertinent state and federal comprehensive plans is discussed below.

2.8.1 FERC-Approved State of Maine Comprehensive Plans

In 1987, the State of Maine submitted to FERC a three-volume Comprehensive Rivers Management Plan. Volumes 1 and 2 of the plan were approved by FERC in October 1982. Volume 3 of the plan was included in the updated submittal in 1987 and contained hydro-related core laws, executive orders, and other plans. Subsequently, the State of Maine produced Volumes 4 and 5 of the Comprehensive Rivers Management Plan in 1992 and 1993, respectively (see separate discussion below). These volumes have also been approved by FERC.

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[1]. The Comprehensive Hydropower Plan consists of three parts: Maine Rivers Policy, The Projected Contribution of Hydroelectric Generation to Meeting Maine's Electricity Needs in 1990 and 2000, and the Statewide Fisheries Plan, Summary.

"Maine Rivers Policy," Executive Order No. 1, FY 82/83

On July 6, 1982, Governor Joseph E. Brennan issued the above-captioned Executive Order designating certain river stretches as meriting special protection. The Governor ordered 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 Rivers Act.

The section of the Union River on which the Project is located is not one of the listed river segments meriting special protection. Therefore, the order is not applicable to the Project.

[1] 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.

The Projected Contribution of Hydroelectric Generation to Meeting Maine's Electricity Needs in 1990 and 2000 (Maine Office of Energy Resources, October 1982)

Executive Order No. 1, FY82/83 directed MOER to prepare an estimate of the contribution that hydropower could make to meet the State's electricity needs in the years 1990 and 2000. The report was prepared in 1982; therefore, much 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."

The Project currently conforms with this portion of the Plan in that it contributes hydroelectric generation (an indigenous and renewable resource) in meeting Maine's electricity needs. The new license for the Project is projected to be issued in 2017 and the Project will continue to conform with this portion of the Plan.

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 hydro development sites. It also 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 – now under the auspices of the Division of Sea-run Fisheries and Habitat within the Maine DMR) regarding conservation, management, and enhancement of river fishery resources in Maine. The Plan also identifies and evaluates significant river fisheries based upon several criteria. The Plan states that at the Ellsworth Project, "No fish passage is required at this time". Subsequent to adoption of the plan, fish passage measures have been provided at the Project.

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 defines a list of unique and natural recreation rivers and classifies the rivers as A, B, C, or D. This study, prepared by the Maine Department of Conservation and National Park Service, identifies the main stem of the Union River from its outlet in Union Bay to Graham Lake, as Class C waters.

The reach of the Union River in the Project vicinity is identified as containing the following unique or significant resource values: Critical Ecologic, Undeveloped, and Anadromous Fishery.

Black Bear's proposals to continue operation of the Project essentially as it is operated now will help maintain or enhance the anadromous fishery in Graham Lake. The continued operation of the Project is consistent with the Plan.

State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 3

Volume 3 of the State of Maine Comprehensive Rivers Management Plan contains two parts. Part I is a compilation of laws which affect the construction, operation, maintenance, and licensing of hydro projects in Maine. Part II is a compilation of Executive Department Orders and other plans. (Note: A discussion of revised laws and Executive Department Orders implemented after the submittal of Volume 3 to the FERC in 1987 is contained in Volume 4 of the State of Maine Comprehensive Rivers Management Plan submitted to FERC in 1992, see discussion below.)

Volume 3, Part I – Core Laws

The applicability of these Core Laws to the Ellsworth Project are discussed below.

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).

Black Bear 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 Black Bear has worked with the various interests to develop a proposal that balances the applicable needs, the Project conforms with these Core Laws.

Maine Waterway Development and Conservation Act (MWDCA) 38 M.R.S.A.§630 et. seq.

The MWDCA replaced several earlier laws and requires the developer to obtain one permit from the Maine Department of Environmental Protection (MDEP) or the Land Use Planning Commission (LUPC). The legislature emphasized the importance of hydropower to the State of Maine when it enacted the MWDCA.

> The legislature finds and declares that the surface waters of the State constitute 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.

Black Bear is proposing to continue to operate the Project to provide a source of renewable energy available to the people of Maine. Therefore, the continued operation of the Project is consistent with the policies expressed by the Maine legislature. By continuing to operate the Project as proposed, the energy-related benefits noted above will continue, as will the benefits to fish and wildlife habitat, water quality and recreation opportunities.

Black Bear is not proposing any construction or redevelopment of the Project that would require an MWDCA permit. If any construction is proposed in the future, the appropriate permits will be obtained.

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. The decision to require a fishway at a dam must, under the Act, be based on the restoration of one or more fish species of anadromous or migratory fish to the area upstream of the obstruction. In addition, 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. Fish passage facilities are in place in the tailwater area below the Ellsworth Dam. The facilities include a fishway with an integral trapping facility that captures river herring and Atlantic salmon. The fish are transported to the appropriate stocking areas upstream. Downstream passage at Graham Lake Dam consists of a surface weir. The Ellsworth Dam has a surface weir/collection box with a flume. Black Bear proposes to continue the operation of fish passage facilities and fish trucking activities. Therefore, the Project conforms to this Act.

An Act Concerning Fishways in Dams and Other Artificial Obstructions in Coastal Waters – 12 M.R.S.A.§6121

This act states that the Commissioner of Inland Fisheries and Wildlife shall annually examine all dams and other artificial obstructions to fish passage within the coastal waters in order to determine whether fishways are necessary, sufficient or suitable for the passage of anadromous fish.

The Project area contains both riverine and impoundment fisheries habitats. Fish passage facilities are in place in the tailwater area below the Ellsworth Dam. The facilities include a fishway with an integral trapping facility that captures river herring and Atlantic salmon. They are transported to the appropriate stocking areas upstream. Downstream passage at Graham Lake Dam consists of a surface weir. The Ellsworth Dam has a surface weir/collection box with a flume. Black Bear proposes to continue the operation of fish passage facilities and fish trucking activities. Therefore, the Project conforms to this Act.

The facility provides for upstream fish passage and is also used for the commercial harvest of river herring by the City of Ellsworth under a cooperative management agreement with the Maine Department of Marine Resources.

<u>The Maine Dam Inspection, Registration, and Abandonment Act – 38 M.R.S.A.§815 et. seq.</u>[2]

This law allows MDEP to establish water level regimes and minimum flow requirements for impoundments not within the jurisdiction of FERC.

This statute is not applicable to the Project since it is a FERC-licensed Project and is not subject to Maine DEP jurisdiction regarding establishment of water levels.

<u>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.</u>

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 Ellsworth Project consist of Class B, and Class GPA waters. The operation of the Project and its consistency with these standards is discussed in Exhibit E, Section 4.4.2.

<u>Alteration of Rivers, Streams and Brooks – 38 M.R.S.A.§425 et. seq.</u>

This article prohibited the alteration of a river, stream, or brook or areas adjacent to rivers, streams, or brooks due to dredging, filling, or construction such that any dredged spoil, fill or structure may fall or be washed into these waters without first obtaining a permit from the Commissioner. This act was replaced with the Natural Resources Protection Act (NRPA), 38 M.R.S.A.§480-A et. seq. which regulates similar activities along the State's waters. However, projects that are reviewed under the MWDCA are not subject to review under the Natural Resources Protection Act (NRPA).

<u>Mandatory Shoreland Zoning and Subdivision Control – 38 M.R.S.A.§435 et. seq.</u>

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 City of Ellsworth, Town of Mariaville, Town of Waltham, and the Maine Land Use Planning Commission (which covers Fletchers Landing Township) currently have zoning requirements for those lands located within 250 feet of the normal high water mark of the Project impoundments.

[2] Legislative actions in recent years have changed the scope of this act.

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. The Project conforms with this article.

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 City of Ellsworth, Town of Mariaville, and Town of Waltham are located in an organized portion of the state that is subject to the jurisdiction of the Maine Department of Environmental Protection and local municipalities. Fletchers Landing Township (T8SD) is subject to LUPC regulations for the lands abutting the Project boundary include the Great Pond Protection Subdistrict. The purpose of this subdistrict is to regulate residential and recreational development on Great Ponds to protect water quality, recreation potential, fishery habitat, and scenic character. This subdistrict applies to areas within 250 feet of the normal high water mark of those bodies of standing water 10 acres or greater in size. Allowed uses without a permit include temporary docks, forest management activities, except for timber harvesting, primitive recreational uses and wildlife and fishery management practices (LURC, 2011). The Project conforms to this article for Fletchers Landing Township.

Special River Protection Zoning Map. Legend List (Maine Land Use Regulation Commission, 1987)

This map identifies river segments that have been designated by the Land Use Regulatory Commission[3] for "Special River Protection Zoning."

The Project is mainly located in an organized portion of the state that is subject to the jurisdiction of the Maine Department of Environmental Protection and local municipalities. A small portion of the Project is located in Fletchers Landing Township, which is subject to LUPC regulations, this section of the Union River is not identified in the Special River Protection Zoning map.

[3] The Land Use Regulatory Commission (LURC) is now the Land Use Planning Commission (LUPC).

Maine Rivers Access and Easement Plan (Joseph Handy, 1985)

Black Bear has consulted with stakeholders on access and other recreation issues in the Project area, and proposed recreation enhancements as detailed in Exhibit E, Section 4.4.7. The Project is in conformance with the strategies outlined in this Plan.

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. Maine DEP has jurisdiction for water quality certification for the licensing of the Ellsworth Project.

Black Bear will apply for water quality certification from Maine DEP. Project water quality and its consistency with these standards is discussed in Exhibit E, Section 4.4.2.

State of Maine Comprehensive River Management Plan – December 1992 – Volume 4

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. Part II is a compilation of Executive Orders and other plans including Maine resource agency policy regarding hydropower. Part III contains reports and studies regarding hydropower and relicensing.

Volume 4, Part I – Revised Core Hydro Laws

The revisions to the Core Hydro Laws contained in Volume 4 of the Plan are not all pertinent to the Ellsworth Project. The revised Core Hydro Laws that are pertinent to the Project are discussed below.

<u>Special Protection for Outstanding Rivers</u>

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 law.

<u>Hydropower Relicensing Standards</u>

These standards require that existing hydropower impoundments be managed to protect habitat and aquatic life criteria commensurate with the appropriate water quality classifications. The Ellsworth area is subject to Class GPA water quality standards. Maine statute 38 M.R.S.A.

subsection 464(9) clarifies that hydropower projects with impoundments must satisfy the aquatic life criteria contained in 38 M.R.S.A. subsection 464(4)(a) (i.e., Class 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 operation of the Project and its consistency with these standards is discussed in Exhibit E, Section 4.4.2.

Volume 4, Part II – Compilation of Executive Orders and Other Plans

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:

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.

Addendum to the State of Maine Statewide Fisheries Management Plan, June 1982

This addendum includes a number of particular projects in the plan's target for anadromous fish restoration. The addendum includes the Union River, which it lists as having the potential for two million alewives.

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. The plan also considers the potential for storage facilities to be developed as generating hydro facilities. Operation of the Ellsworth Project is consistent with this plan as it will continue to produce reliable, efficient indigenous energy from hydropower to meet the State of Maine energy needs.

Maine State Agency Hydropower Policy Statements

These policy statements provide the basis for agency comments on hydro-project license applications. These statements are not directly applicable to the Ellsworth Project as they set out the policy for State agencies to follow in commenting on hydro projects in general. Agency comments on the Project are addressed in the appropriate sections of Exhibit E.

Executive Order Designating the State Agencies Responsible for Water Quality Certification

This order identifies Maine DEP as the agency responsible for reviewing and providing water quality certification. Black Bear will apply for water quality certification from Maine DEP.

Project water quality and its consistency with these standards is discussed in Exhibit E, Section 4.4.2.

Feasibility Study of Maine's Small Hydropower Potential

This study was performed for the Maine Office of Energy Resources and examined the potential for development/expansion of hydropower development of Maine's low head dams.

This plan is not applicable to the Ellsworth Project.

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.

Volume 4, Part III – Hydropower and Relicensing Reports and Studies

This section of Volume 4 of the State of Maine Comprehensive River Management Plan describes the current regulations for hydropower relicensing and reports 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 Ellsworth Project.

State of Maine Statewide River Fisheries Management Plan – June 1982 Maine Department of Inland Fisheries and Wildlife, Maine Department of Marine Resources, and Atlantic Sea-Run Salmon Commission

This plan is discussed previously under State of Maine Comprehensive Rivers Management Plan, May 1987 – Volume 1.

Management of Atlantic Salmon in the State of Maine: A Strategic Plan – July 1984, Maine Atlantic Sea-Run Salmon Commission

This plan lists as its objectives the maintenance of Atlantic salmon populations in rivers where they currently exist, and the restoration of Atlantic salmon populations in historical salmon rivers. The plan also identifies specific strategies to achieve the stated objectives, including fishway installation or improvement, increased hatchery capacity, and diversion of hatchery stocks once natural reproduction increases in stocked rivers.

The Ellsworth Project is not targeted by these restoration plans.

Maine State Comprehensive Outdoor Recreation Plan (SCORP) 2003-2008, Maine Department of Conservation, Bureau of Parks and Lands

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. The SCORP satisfies the requirements of the Land and Water Conservation Fund (LWCF) Act (P.I. 88-578) which dictates that each state have an approved SCORP available on file with the National Park Service in order 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 State Wetlands Conservation Plan published in 2001.

According to the SCORP there are 35 private campgrounds located in the Downeast & Acadia region. It also shows that Hancock County has 140 miles of snowmobile trails and 241 miles of ATV trails, and 45 boat launches (7 of which are hand-carry). The SCORP does not contain any recommendations or assessments that are specific to the Ellsworth Project area. Black Bear has consulted with stakeholders on access and other recreation issues in the Project area throughout the relicensing process. Black Bear is in compliance with the strategies outlined in this plan.

2.8.2 FERC-Approved Federal Comprehensive Plans

Atlantic Salmon Restoration in New England, Final Environmental Impact Statement 1989-2021. U.S. Fish and Wildlife Service, 1989

This document discusses the stated aim of the USFWS relative to Atlantic salmon (i.e., the restoration of self-sustaining populations of Atlantic salmon by the year 2021 to 11 rivers in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island. The Union River is not included.).

The Union River Fisheries Coordinating Committee (URFCC), consisting of state and federal natural resource agencies and non-governmental conservation organizations; as well as the City of Ellsworth; Black Bear Hydro Partners, LLC; and interested members of the public, developed a Comprehensive Fishery Management Plan (CFMP) for the Union River. The management plan consists of multi-year assessment cycles, beginning with 2000-2005. The most recent CFMP covers the period 2015-2017. With respect to Atlantic salmon, only three suspected aquaculture strays (2012) and two wild salmon (one in 2013 and one in 2014), and 1 hatchery (2014) have returned to the Ellsworth Project in the past nine years.

The state and federal natural resource agencies are signatories to the Comprehensive Fishery Management Plan, which is consistent with the objectives described in this document.

Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service

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 Policy, in short, 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 the 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.

Black Bear has consulted with USFWS and other applicable resource agencies and organizations on the topics of protection of fish resources and provisions of recreational fishing opportunities within the Project study area. The Project is in conformance with this policy.

Nationwide Rivers Inventory. National Park Service, January 1982, updated 1995

The Nationwide Rivers Inventory (NRI), completed in 1981 for the New England Region, 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."[4]

This directive gives guidance to federal agencies on protecting the resources that cause the river to qualify for listing on the NRI.

According to the NRI, the West Branch of the Union River from the Route 181 bridge to Great Pond is listed for Fish. This segment of the river is a historic Atlantic Salmon Fishery (NPS, 2012). The Project boundary includes a small portion of this river segment. Black Bear has maintained the National Park Service on all distributions throughout the relicensing process and is not proposing any changes to the operation of the Project. The Project is in conformance with this directive.

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 will protect and enhance 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 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 Black Bear's operation of the Ellsworth Project. The most pertinent initiative of this Plan involves 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

[4] Presidential Directive, August 2, 1979.

Project waters thus attract a variety of transient and migrating waterfowl species such as Canada goose, black duck, common merganser, and mallard duck. Continued operation of the Ellsworth Project, as proposed, will have no new effects to Project wildlife or their habitats, but will continue to provide waterfowl habitat for both nesting and migratory species. The Project is in conformance with the plan.

Final Amendment #11 to the Northeast Multi-species Fishery Management Plan; Amendment #1 to the Atlantic Salmon FMP; and Components of the Proposed Atlantic Herring FMP for Essential Fish Habitat. Volume 1. (USFWS, 1998)

In 1996 the U.S. Congress recognized the increasing pressure on marine resources in the country and addressed these problems in its reauthorization of the Magnuson Fishery Conservation and Management Act, now known as the Magnuson-Stevens Act. This Act required the eight Regional Fishery Management Councils, in collaboration with National Oceanic and Atmospheric Administration (NOAA) Fisheries, 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.

The EFH designation for Atlantic represents all waters currently or historically accessible to Atlantic salmon within the streams, rivers, lakes, ponds, wetlands, and other water bodies in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut. Other species of fish incorporated under the NMFS amendments are not applicable to the Project.

Before a Federal agency proceeds with an activity that may adversely affect a designated EFH (e.g., relicensing of a hydro project), the agency must: 1) consult with NOAA Fisheries and, if requested, the appropriate Council for the recommended measures to conserve EFH and 2) reply within thirty days of receiving EFH recommendations. The agency response must include proposed measures to avoid or minimize adverse impacts on the habitat, or alternatively an explanation if the agency cannot adhere to the recommendation from NOAA Fisheries.

FERC will initiate consultation with NMFS regarding EFH for Atlantic salmon in the Project area following receipt of this application.

As mentioned previously, the CFMP addresses the need for fish passage facilities at the Project in a comprehensive fashion. The state and federal natural resource agencies are signatories to the CFMP, which is consistent with the objectives described in this document.

Final Recovery Plan for the Shortnose Sturgeon – 1998 National Marine Fisheries Service.

Congress passed the Endangered Species Act of 1973 (16 USC 1531 et seq., amended 1978, 1982, 1986, 1988) (ESA) to protect species of plants and animals endangered or threatened with extinction. NMFS and USFWS share responsibility for the administration of the Endangered Species Act. NMFS is responsible for most marine and anadromous species including the shortnose sturgeon. Section 4(f) of the ESA directs the responsible federal agency to develop and implement a recovery plan, unless such a plan would not promote the conservation of a species. NMFS determined that a recovery plan would promote conservation and recovery of shortnose sturgeon.

The NMFS recovery plan for shortnose sturgeon primarily addresses recovery of extant (i.e., existing) shortnose population segments. The plan does not specify the Union River in the NMFS implementation schedule for recovery. Therefore, the plan is not applicable to the Project.

Fishery Management Report No. 24 of the Atlantic States Marine Fisheries Commission: Interstate Fisheries Management for Atlantic striped bass – 1995 National Marine Fisheries Service.

The Atlantic States Marine Fisheries Commission prepared a Fishery Management Plan for the striped bass fishery in order to protect and restore this popular recreational and commercial species. The goal of this amendment is to: perpetuate, through cooperative interstate fishery management, migratory stocks of Atlantic striped bass so as to allow a commercial and recreational harvest consistent with the long-term maintenance of self-sustaining spawning stocks and to provide for the restoration and maintenance of their critical habitat. .

The document describes the goals and objectives for the species, its current status, the ecological challenges affecting the species, and management options and actions needed to reach and maintain management goals.

Striped bass use the Union River estuary for feeding during the spring, summer and fall and are attracted into the river by the presence of migrating river herring, American shad and eels. They are not known to spawn in the Union River, but originate from other coastal migratory populations at major spawning rivers outside of the Gulf of Maine, including the Hudson and Delaware Rivers, and the tributaries to Chesapeake Bay. Striped bass are a popular sportfish in the Union River and are currently protected through the use of regulated minimum sizes, creel limits and seasonal angling restrictions (URFCC, 2014).

As mentioned previously, the CFMP addresses the need for fish passage facilities at the Project in a comprehensive fashion. The state and federal natural resource agencies are signatories to the CFMP, which is consistent with the objectives described in this document.

Fishery Management Report No. 31 of the Atlantic States Marine Fisheries Commission. Amendment 1 to the Interstate Fishery Management Plan for Atlantic Sturgeon – 1998 National Marine Fisheries Service.

The Atlantic States Marine Fisheries Commission is a compact of fifteen Atlantic Coast states (including Maine) created to promote better utilization of the fisheries (marine, shell, and anadromous) along the Atlantic seaboard. The goal of the Amendment is to restore Atlantic sturgeon spawning stocks to population levels which will provide for sustainable fisheries and ensure viable spawning populations. The Amendment describes the life history of the species, including spawning locations where known, hatching requirements for eggs, and juvenile nursery area requirements and migrations. The document details a management plan intended to return the stocks to sustainable levels.

According to Amendment 1 of the NMFS Fisheries Management Plan for Atlantic sturgeon, only the estuarine complex of the Kennebec, Androscoggin, and Sheepscot Rivers in Maine currently support a spawning population of Atlantic sturgeon in New England. Amendment 1 requires each state to implement identification and protection of Atlantic sturgeon habitat within its jurisdiction in order to ensure the sustainability of that portion of the spawning stock. States must notify NMFS in writing of the locations of habitats used by Atlantic sturgeon. The State of Maine did not identify the Union River as having Atlantic sturgeon habitat. Therefore, the plan and its amendment are not applicable to the Project.

Fishery Management Report No. 35 of the Atlantic States Marine Fisheries Commission: Shad and River Herring – Amendment 1 to the Interstate Fishery Management Plan for Shad and River Herring – 1999 National Marine Fisheries Service; Technical Addendum 1 to Amendment 1 of the Interstate Fisheries Management Plan for Shad and River Herring – 2000 NMFS.

The Atlantic States Marine Fisheries Commission prepared a Fishery Management Plan for the shad and river herring fishery in order to protect and restore the species. The goal of this amendment is to: protect, enhance, and restore East Coast migratory spawning stocks of American shad, hickory shad, and river herrings in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass.

The document describes the goals and objectives for the species, its current status, the ecological challenges affecting the species, and management options and actions needed to reach and maintain management goals.

Historically, shad and alewife migrated upstream each spring to spawn in the fresh water ponds and lakes that drained into the Union River basin. A trap and truck operation is run by Black Bear for the purposes of stocking river herring and Atlantic salmon. This operation was implemented in 1974; since 2000, the number of adults stocked upstream has exceeded 100,000 fish and returns have ranged from 9,260 to 1,219,927 fish. Despite annual stocking of hatchery-reared smolts from 1971-1990, sporadic stocking of salmon fry and parr from 1971-2011, and a one-time release of surplus broodstock in 2012, only three suspected aquaculture strays (2012), two wild (one in 2013 and one in 2014), and 1 hatchery (2014) Atlantic salmon have returned to the Ellsworth Project in the past nine years. The CFMP is consistent with the objectives described in this document and conforms with this plan.

Fishery Management Report No. 36 of the Atlantic States Marine Fisheries Commission: Interstate Fisheries Management for American Eel (*Anguilla rostrata*) – 2000 National Marine Fisheries Service.

The Atlantic States Marine Fisheries Commission prepared a Fisheries Management Plan for the American eel fishery in order to protect and restore the species. The Atlantic States Marine Fisheries Commission American Eel Fisheries Management Plan is a working document that describes the goals and objectives for the species, its current status, the ecological challenges affecting the species, and management options and actions needed to reach and maintain management goals. The stated goals of the Fisheries Management Plan are to: (1) protect and enhance the abundance of American eel in inland and territorial waters of the Atlantic States and jurisdictions and contribute to the viability of the American eel spawning population, and (2) provide for sustainable commercial and recreational fisheries preventing the over harvest of any eel life stage.

Although the report does not identify the Union River as eel habitat, Project studies have found that American eel are present in the Union River and Project waters. Following consultation with the Maine DMR, an American Eel Upstream Passage Study was conducted. Black Bear is proposing to develop in consultation with the fisheries agencies upstream passage measures for eel at the Project. Downstream eel passage studies are scheduled at the project during the fall of 2015.

Interstate Fishery Management Plan for Atlantic Sturgeon: Amendment 1 - 1998 Atlantic States Marine Fisheries Commission.

Amendment 1 was designed to result in stock recovery, with consequent ecological and economic benefits to coastal ecosystems and fishermen. Amendment 1 describes the life history of Atlantic sturgeon, including spawning, hatching requirements, juvenile nursery area requirements and migration, as well as stock assessment.

Interstate Fishery Management Plan for Shad and River Herring Technical Addendum 1 - 2000 Atlantic States Marine Fisheries Commission.

Technical Addendum #1 (February 2000) was adopted to correct and clarify the monitoring requirements in Amendment 1, Tables 2 and 3.

Interstate Fishery Management Plan for Shad and River Herring Amendment 2 - 2009. Atlantic States Marine Fisheries Commission.

Amendment 2 was developed based on the concern that river herring are in decline coastwide. Amendment 2 prohibits interstate commercial and recreational fisheries beginning January 1, 2012, unless a sustainable management plan was submitted for approval by a state or jurisdiction by January 1, 2010. Amendment 2 also required fishery independent and dependent monitoring from member states to conserve, restore, and protect critical river herring habitat.

Interstate Fishery Management Plan for Shad and River Herring Amendment 3 - 2010. Atlantic States Marine Fisheries Commission.

Amendment 3 establishes a coast wide commercial and recreational moratorium, with exceptions for sustainable systems, for shad and river herring. To improve data collection of shad and river herring, Amendment 3 implemented additional fisheries independent and dependent monitoring for some states or jurisdictions, such as, monitoring stocks, hatchery production, and commercial, recreational, and bycatch fisheries. Finally, Amendment 3 requires states and jurisdictions to submit a habitat plan regardless of whether their commercial fishery would remain open.

2.9 Financial and Personnel Resources

Black Bear has considerable experience operating not only the Ellsworth Project but several other licensed hydroelectric and water storage projects as well. Black Bear has operated the Project and multiple other hydroelectric and water storage projects since 2009. Black Bear has available a complete staff of engineers, biologists, operators, mechanics, and electricians that are trained and experienced in the operation of hydroelectric projects. In addition, Black Bear 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

Black Bear does not propose to expand the Project to encompass additional lands of others. Therefore, this section is not applicable.

2.11 Applicant's Electricity Consumption Efficiency Improvement Program

Because Black Bear 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 Indian tribes affected by the Project.

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 Ellsworth Project is operated remotely from Brookfield Renewable Energy Group's North American System Control Center (NASCC) in Marlboro, MA[5]. An operator is available during weekdays and weekends as necessary to perform routine maintenance and operations at the Ellsworth Project. Daily logs of pond level, flow, and outages are maintained electronically for the Project.

The Project is subject to regular Part 12 Inspections by FERC. FERC's New York Regional Office conducts an environmental inspection every four to five years. Black Bear completes all necessary corrective actions to address comments and recommendations arising from FERC inspections in a timely manner.

The dam is inspected routinely by Black Bear's Engineering and Operations staff, as well as after local earthquakes of magnitude 3.0 or greater and floods in the Project vicinity. Black Bear 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, Black Bear 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 Black Bear's engineering staff is also conducted annually and routine repairs are performed as needed.

Black Bear has placed a copy of the Emergency Action Plan (EAP) at the Project and at its office in Hallowell, Maine. Local operations staff is on call 24 hours a day. Black Bear's staff reviews the EAP at least annually and there is an annual EAP training for Project personnel.

[5] Licensee Black Bear Hydro Partners, LLC is an indirect subsidiary of Brookfield Renewable Energy Group.

3.1.1 Existing and Planned Operation of the Project During Flood Conditions

The Ellsworth Project is operated as a peaking plant, with water being released from the Graham Lake reservoir and then used to generate electricity at the downstream Ellsworth powerhouse. During periods of high inflows, primarily in the spring and fall, the project may generate at full load up to 24 hours a day.

The ability to store large volumes of inflow in the spring is also valuable given the location of downtown Ellsworth just below the Ellsworth Dam. In a potential flood situation, Black Bear dam operators work in concert with emergency management personnel to manage water levels along the Union River in order to minimize risk and flood damage.

Black Bear is proposing to operate the Ellsworth Project essentially as it has been operated in the past with some resource enhancements. There would be no significant changes to the fundamental operation of the Project to support downstream flows or the flow regime in the Union River. As a result, the Project will continue to provide important benefits of regulated, relatively stable downstream flows.

3.1.2 Warning Devices Used to Ensure Downstream Public Safety

There are numerous safety signs at the Project and along the Union River advising the public of the Project and safety considerations. These signs are in addition to the signs attached to the upstream safety barriers (installed during the summer boating season upstream of the spillway gates and intake to protect boaters using the impoundments) and the recreational and information signs posted in the vicinity of the Project. Black Bear's Public Safety Plan for the Project is included in Appendix H-2. [The Public Safety Plan is being updated and will be included in the Final Application.]

3.1.3 Proposed Changes Affecting the Existing Emergency Action Plan

There are no proposed changes that would affect the existing EAP. As noted above, Black Bear 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, Black Bear 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

See Exhibit F – Supporting Design Report of this application for a complete description of existing monitoring devices at the Project.

3.1.5 Project's Employee and Public Safety Record

Black Bear has an excellent record of operating in a work-safe environment. During the past 5 years[6], 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 5 years.

Black Bear is committed to maintaining and operating its facilities in a manner that allows the public to safely enjoy recreational activities. Upstream safety barriers are installed during the summer boating season upstream of the spillway gates and intake to protect boaters using the impoundments, and warning signs are posted at numerous locations around the Project and on the Union River (see Appendix H-2).

3.2 Current Operation of the Project

A full 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 H -1 lists the record of unscheduled outages and related lost generation during the last five years. [to be provided in the Final License Application]

Table H-1: Ellsworth Project Unscheduled Outages and Lost Generation, 2010-2014

Unit	Date/Time Unavailable	Date/Time Available	Reason for Unit Unavailability	Estimated MW Hours Lost[1]

[6] Black Bear Hydro Partners, LLC became the Licensee for the Project by FERC Order Approving Transfer of License dated September 17, 2009 (128 FERC ¶ 62,212).

3.5 Licensee's Record of Compliance

The Licensee has a good record of compliance with the terms and conditions of the existing license. The Licensee has received a single letter of violation regarding the Project. On January 27, 2015 the Commission notified Black Bear that, in relation to an October/November 2014 fisheries incident at the Project, it had failed to show due diligence in the operation of the downstream fish passage facilities as required by Article 406 of the license, which consequently resulted in a violation of Article 406. Licensee met with the Commission and responded to the various requests from the Commission regarding the incident, supplying information regarding the incident and measures undertaken to ensure safe and effective fish passage at the facility. By letter dated May 26, 2015, the Commission summarized its understanding of the incident and expressed its appreciation for Licensee's responses and for the measures that were being undertaken to improve fish passage. All of the measures proposed have been, or are currently being, implemented by Licensee.

3.6 Actions Affecting the Public

Operation of the Ellsworth Project provides regulated, relatively stable flow and water levels to the Union River from the Graham Lake Dam downstream through downtown Ellsworth.

Black Bear has always allowed public access to the Project impoundments and the surrounding Project lands. Recreation within the Project boundary is typically recreational fishing and boating. Other portions of the Union River offer opportunities for boating, picnicking, swimming, kayaking, and fishing. There are several additional recreation opportunities in the vicinity of the Project. These opportunities include: Acadia National Park and Lamoine State Park, and numerous boat launches (MOT, 2012). Black Bear provides public recreation access at several formal recreation sites that provide opportunities for bank fishing and motorized and non-motorized boating. A full description of these opportunities, associated recreational facilities provided by the Black Bear, and the recreational enhancement proposed are contained in Exhibit E of this application.

Black Bear'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 is attached as Appendix H-2. [to be provided in the Final Application]

3.7 Ownership and Operating Expenses That Would Be Reduced if the License Were Transferred

Black Bear is applying for a long-term license to continue to maintain and operate the Project. Additionally, there is no competing application to take over the Project. Because there is no proposal to transfer the Project license, this section is not applicable to the Project.

3.8 Annual Fees for Use of Federal or Native American Lands

This section is not applicable to the Project since it uses no federal or Native American lands.

EXHIBIT 9

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APPENDIX H-1

PUBLIC SAFETY PLAN AND HIGHWATER GUIDELINES

[The Public Safety Plan is currently being updated and will be included in the Final License Application.]

EXHIBIT 9

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